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FOOD PRICE STABILIZATION: THE INDONESIAN EXPERIENCE WITH RICE

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FOOD PRICE STABILIZATION:
THE INDONESIAN EXPERIENCE WITH RICE

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A high-stakes debate is being waged over the meaning of food security and the policies needed to achieve it. At its highest level, the debate pits the free trade forces mobilized by the United States that are pushing for agricultural trade liberalization under the Uruguay Round of GATT negotiations, against Japan and the European Community, which favor high levels of agricultural protection and direct controls to prevent excessive dependence on food imports. But the debate has broader dimensions as well. Most countries in the developing world explicitly favor strategies of food self-sufficiency as the most appropriate approach to achieving food security. This autarkic tendency has deep historical roots and remarkable political tenacity in the face of economists' arguments about forgone gains from trade.

Indonesia provides a particularly vivid case study of this debate. The role of trade versus domestic production as the basis for food security has been analyzed and discussed in a surprisingly open and articulate manner since the beginning of the New Order government in 1967. The proximate definition of food security has always revolved around price stability, especially for the price of rice, the country's primary food staple. Partly because of the economic and political chaos of the mid-1960s, and partly because of operational considerations faced in implementing any approach to food security, Indonesia has emphasized price stabilization as the foundation of its strategic design for food security. But this emphasis has not been myopic, focusing only on the static and partial equilibrium consequences of changes in rice prices. Instead, an effort has been made, even well before computable general equilibrium models became a standard tool of policy analysis, to consider dynamic and economy-wide ramifications of price policy, the distributional consequences for farmers and consumers, and the role of other commodities in the rice stabilization program.

From the late 1960s until the early 1980s, imports of rice were used routinely by BULOG, the Indonesian Food Logistics Agency, as the balance wheel between supply and demand in its defense of a floor price and ceiling price for rice. But the long-sought goal of rice self-sufficiency was achieved in the mid-1980s, and the balancing role of trade was superseded by the problems of managing domestic buffer stocks as the sole mechanism for balancing seasonal and annual differences between production and consumption. Because of the high costs of storing rice in the tropics and the finite size of stocks, wider margins between the floor price and ceiling price became a *de facto* balance wheel as well, but also called in question the implicit assumption that food security and price stability were synonymous.

The goal of this paper is to clarify these issues that center on the debate over food security. The Indonesian example is used throughout for concreteness and also because the debate there is already at a level of sophistication that permits general analytical points to be drawn from the specific context. The Indonesian debate is on-going as well, and a further goal is to contribute to the policy dialogue as it grapples with the complementarities and trade-offs among rice self-sufficiency, price stability, and food security. It is not possible to quantify all the connections among these three concepts, nor to estimate the fiscal and economic costs and benefits associated with alternative mixes of each. But it is possible to provide a framework in which these costs and benefits are clearly identified and to read the historical record for a rough judgment on how well the Indonesian approach so far has served both the narrow interests of policy makers seeking food security and the broader interests of a society seeking rapid economic growth with an equitable distribution of the benefits, particularly with respect to food consumption. An especially fascinating part of the story is the apparent redefinition of food security over time by policy makers in a conscious attempt to avoid significant divergence between actual food policies and these broader social goals. Few countries have food policies that contribute actively to both growth and equity. A final reason to focus on the Indonesian example is its success as one of the few.

The paper is divided into four parts. The first reviews the debate over the definition of and elements in the concept of food security. Both the micro dimensions at the household level and the macro dimensions at the national level are discussed. The main focus, however, is on the national level because policy makers worry primarily about aggregate food security as a short-run concern. When food security as a household concern enters the policy arena, the appropriate starting point for analysis is the level and distribution of income relative to the level and stability of food prices. Any policy that provides food security at the national level in the form of reasonably stable food prices, while fostering an equitable process of economic growth, will be pointing in the right direction with respect to food security for individual households.

Although clearly not satisfactory as the *sole* focus of efforts to achieve food security, stabilizing key food prices is no doubt a major component of such efforts. The second section of the paper reviews the two major schools of thought on agricultural pricing--neoclassical as opposed to structural approaches--and concludes that neither is fully relevant in the Asian context, where a single food commodity, rice, dominates both production and consumption patterns. An approach based on the macroeconomic and dynamic consequences of price stabilization is outlined as the basis for evaluating the benefits of pricing interventions.

The third part addresses the costs of such interventions, both economic and organizational. Important operational issues involving complex institutions face policy makers who wish to stabilize the price of their basic foodstuff. These issues involve analytical as well as financial dimensions, and they are discussed as a means of identifying the full range of relevant costs that must be matched with the benefits from price stabilization. This section draws on earlier Indonesian efforts to define appropriate levels of buffer stocks as the country reached self-sufficiency and on recent work that attempts to generalize one of the models used in that effort.

The final section presents the Indonesian case study in historical perspective. It reviews (1) the efforts over 25 years by the government of President Suharto to stabilize

rice prices in Indonesia, (2) the main analytical issues that arose during that experience, and (3) the on-going debate over the potential of self-sufficiency in rice to serve as a workable approach to food security. Rice surpluses in 1985 and 1986 stimulated policy attention on diversification away from rice production, but deficits in 1987 and 1988 renewed concerns over Indonesia's capacity to maintain self-sufficiency in rice. These concerns were only partially alleviated by the excellent rice crop in 1989.

Price stabilization has remained an important policy objective during surpluses and deficits, but the financial costs, feasible levels of prices, and general policy thrust with respect to the agricultural sector are sharply different in the two settings. A policy approach that favors greater flexibility in the agricultural economy, and greater price fluctuations to encourage farmers and consumers to be more flexible, would seem to be an appropriate response to such widely divergent environments. But carried very far, such flexibility is not compatible with continued emphasis on price stabilization. Consequently, the policy debate at the start of the 1990s over food security and price stability continues to require a broad perspective, one that encompasses the contribution of agriculture to the development process and includes analysis of the price policies appropriate to stimulating that contribution.

Part I: Free Markets and Food Security

Self-sufficiency in rice and other foodstuffs such as sugar and soybeans has been a consistent objective of Indonesian agricultural policy throughout the New Order regime. Both historical and production cost data based on farm surveys confirm that self-sufficiency in rice is less costly on average than rice imports from the world market. Because of fluctuations due to weather, diseases, and pests, however, rice production in Indonesia is unstable and in any particular year can be above or below the normal level of rice consumption. In order to stabilize the rice economy from production instability as well as from sharp fluctuations in world prices for rice, BULOG operates a floor and

ceiling price policy using domestic buffer stocks as the balance wheel to smooth out year-to-year fluctuations in production and consumption. The goal is to keep rice consumption on a smooth trend despite unstable rice production. The primary vehicle for stabilizing rice consumption is the stabilization of rice prices, which is BULOG's most important task.

For the five years of REPELITA IV, 1983/84 to 1988/89, Indonesia was almost exactly self-sufficient in rice on average, and per capita availability (consumption) increased smoothly each year. In none of the individual years, however, was domestic production equal to consumption. In some years, for example 1984, production was larger than consumption, and BULOG stocks increased. In other years, for example 1985, production also exceeded consumption but, with BULOG warehouses full, exports were used to handle the surplus. In 1986 and 1987 consumption was slightly larger than production, and BULOG stocks were drawn down. In 1988 production was again less than the desired consumption level and, with low BULOG stocks, external supplies were called upon to provide stability to Indonesia's rice markets. Good rains for the 1989 crop plus the stimulus of sharply higher prices produced a surplus for the first year of REPELITA V, and a full recovery of BULOG stock levels, including replenishing the iron stock reserve of one million tons.

Despite all of this activity on BULOG's account, the overall picture is one of stable growth in per capita rice consumption, relative stability in Indonesia's rice market (despite a decline in rice prices in 1985 and an increase in 1988), and perhaps most importantly, the achievement for the first time of self-sufficiency in rice for an entire five-year plan period. It must be stressed, however, that increasing rice production was only part of the story of self-sufficiency and rising rice consumption. The role of prices and price stability was also important in allowing consumers to maintain a smooth trend in rice consumption even though production varied considerably from year to year.

This review of the achievement of rice self-sufficiency during REPELITA IV reveals three important elements in the role of the government in reaching that long-

sought objective. First, unless investments in the rice sector stimulate the trend of rice production to rise as fast as consumption (which increases steadily due to population growth and improvements in per capita incomes), self-sufficiency cannot be maintained. But even such an obvious fact can obscure an important lesson: the time period during which self-sufficiency is measured is crucial. For example, Indonesia has nearly always been more than self-sufficient in rice from March to October, and often in deficit the rest of the year. Similarly, some households and regions are always in surplus, while others, especially in urban areas, are constantly in deficit and must buy rice from the market. Consequently, the temporal and geographic boundaries used to define self-sufficiency are crucial to the outcome; arbitrarily using a calendar or fiscal year as the basis, or the total range of islands in such a far-flung nation as Indonesia, makes the task of achieving and maintaining self-sufficiency more difficult and considerably more expensive.

The second element of government involvement in reaching self-sufficiency is through the level of rice prices maintained in the domestic economy. Other things equal, a higher level of rice prices will increase rice production, decrease rice consumption and make self-sufficiency easier to achieve. It has often been said that Indonesia can always be self-sufficient in rice at some price; the issue is whether consumers can maintain satisfactory levels of rice consumption as well. But domestic rice prices do not exist in a vacuum. In particular, their level relative to the trend of prices in the world market and relative to the costs of inputs to farmers (especially fertilizer prices) strongly influences the efficiency with which consumers and producers allocate the scarce economic resources of the society.

There are no good economic reasons for maintaining rice prices (or fertilizer prices) significantly above or below their long-run opportunity cost, on average, in world markets.¹ For this reason, investment policy is the main vehicle for keeping rice production on an equal trend with rice consumption if self-sufficiency is to be

1. This assumes that the normal disequilibrium in fertilizer use that is caused by imperfect credit markets, risk markets, and farmer knowledge is gradually eliminated over time. Otherwise, a continued subsidy on fertilizer prices raises economic efficiency relative to pricing fertilizer at world market levels. This topic is discussed in more detail in Part 4.

maintained. If a persistent import gap opens up over a number of years, while rice and fertilizer prices remain roughly in line with long-run trends in world markets, then inadequate investments are being made in rice research, irrigation, and rural infrastructure. If these investments seem to have a low economic payoff relative to other investment opportunities (again, in the long run), a concern for economic efficiency suggests that imports should be used as a regular feature of food policy. Although this accurately describes the situation for wheat, it is probably not the most likely situation for rice, for which Indonesia does seem to have a long-run cost advantage relative to imports.²

The third element of government policy with respect to self-sufficiency is **price stabilization** and the level of BULOG stocks considered appropriate for that purpose. With infinite stocks, prices can be kept completely stable, but both economic theory and experience dictate that a finite stock level cannot defend price stability under all circumstances.³ Accordingly, an important trade-off exists. Larger buffer stocks permit a longer period of stable prices, but at costs that rise exponentially with the size of the buffer stock. Smaller stocks require that prices fluctuate more, but with substantial cost savings. The only escape from this apparent dilemma is to add a degree of freedom to the system by permitting supplies to move into or out of the country as an additional balance wheel, once stocks are drawn down or warehouses filled up.

Thus, three elements of government policy interact to create the environment for self-sufficiency in rice: (1) public investments in rice production to maintain it on the trend of rice consumption; (2) the establishment of a domestic level of rice (and fertilizer) prices that reflects their long-run opportunity costs in world markets; and (3) stabilization of domestic rice prices through market interventions using buffer stocks as a balance wheel. Each of these elements has powerful efficiency effects individually, as well as direct impact on the state budget, and these effects make each component a separate,

2. The most recent study to reach this conclusion is Pearson, et. al. (1990).

3. See Williams and Wright (forthcoming) for a sophisticated analysis of the limits to price stabilization with finite stocks.

important policy issue. But the interconnections among the three elements make it impossible to set policy for one without having a substantial impact on the others. Consistency among all three elements is essential in the long run if substantial resources are not to be wasted. Achieving this consistency is clearly the most difficult aspect of designing a policy to assure food security at the macro level.

From this perspective, the concept of self-sufficiency hinges on two critical factors: the length of time being considered (...a month? ...a year? ...a five-year plan?) and the degree of price stability desired. A third factor, the breadth of the commodity definition, can also be introduced to widen the scope for substitution in both production and consumption, and thus allow greater efficiency in the allocation of resources. For example, Indonesia could well be self-sufficient in low-quality rice but not in high quality rice, or self-sufficient in agricultural production but not in foodgrain production (because wheat cannot be produced locally).

Which definition is "right?" No single correct answer exists. In order to maximize economic efficiency, only internal budgetary balance and external foreign exchange balance should be imposed. With a balanced government budget and a stable equilibrium in the overall balance of payments, all trade balances for commodity distinctions smaller than those macro aggregates can then be permitted to reflect comparative advantage. Clearly, deciding to seek self-sufficiency anywhere along the spectrum of commodity definitions--from "low-quality rice" to "agriculture"--becomes an exercise in political judgment where economic principles can merely illuminate the likely opportunity costs, and even then in a fairly narrow sense.

The debate between the United States and Japan over food security is being conducted over precisely these points. The Japanese position, recently summarized in *Nihon Nogyo Shimbun* (*Japanese Agricultural Newspaper*), is worth quoting at length because it shows clearly the fundamental differences between approaches to food security in a high-cost food importer and a low-cost food exporter.

Since the issue of food security was recognized--at Japan's insistence--as a legitimate concern during the Uruguay Round of the GATT agricultural talks, U.S. negotiators have begun saying that this issue should be dealt with separately from that of food self-sufficiency. We in Japan cannot understand what sort of food security there could be without self-sufficiency, but apparently the United States is trying to develop a new theory on food security and is attempting to use Japan's argument to its advantage.

The U.S. side argues that food security can be achieved through food imports. As long as food imports are guaranteed, they say, Japan will be assured of food security and will not need to be self-sufficient. There are some serious flaws in this line of thinking. The first is the contradiction inherent in separating the issues of self-sufficiency and food security. It is obvious that self-sufficiency better meets the objective of food security than do imports, which are always clouded by some element of doubt. Separating these two issues is to deny the very issue of food security itself.

The truth of the matter is that the United States does not want to acknowledge the food security issue, despite its recognition by GATT. Even while it attempts to trivialize it, the United States cannot ignore the reality of this concern.

Let us now consider what this argument involves. If it is possible for a country to achieve food security by completely relying on imports and not by being self-sufficient at all, then an extension of the argument is that food-exporting countries become solely responsible for food security. According to U.S. thinking, it is quite acceptable for food security and the responsibility of the global food supply to be left in the hands of a few nations. This is a disturbing thought indeed.

The United States, which on several occasions has blundered by using food as a diplomatic weapon, will always insist that the embargoes on soybeans to Japan and on wheat to the Soviet Union were mistakes, and that they will never be repeated. It is part of the U.S. export strategy to assure countries in this way, but we cannot accept this as an absolute guarantee. We would like to believe that the embargoes will not be repeated, but this does not mean we should rely on imports as a means of achieving food security.

The United States' export strategy and Japan's food security are two completely different issues. Many nations believe it is only natural to be self-sufficient to ensure food security. Saying that imports can achieve food security is, at best, denying this common perception. At worst, it is an internationally unacceptable, distorted and parochial concept concerned only with maintaining the profits of exporting countries.

Many countries are trying to raise their self-sufficiency rates and to maintain their production bases to minimize the uncertainty that surrounds imports. One thing that is difficult to ignore is the unpredictability of food production. The grain situation in the United States is a case in point. For several years, the U.S. grain surplus was enormous, but after last year's drought, this changed completely. The Soviet Union and China are also faced with rapidly increasing demand for grain, resulting from climatic and environmental changes. This has led to upheaval in the world grain market.

These days, food production is becoming ever more unpredictable because of climatic, demographic and economic changes. Food security, founded on self-sufficiency, is therefore of paramount importance. (*Nihon Nogyo Shimbun*, November 6, 1989. English translation in *Japan Agrinfo Newsletter*, January, 1990.)

This statement of the Japanese position mirrors attitudes and policies throughout most of Asia. Indeed, as the severity of the drought in 1987 and 1988 became apparent in Indonesia, and BULOG's stocks dropped, President Suharto repeatedly denied the agency permission to import rice in order to stabilize prices. His argument, that self-sufficiency in rice was "too important" to give up because of temporary production set-backs, shows that food security as a political concept is only loosely linked to price stabilization as an operational policy. Because of this disparity, economic principles can only be carried so far in the analysis of food security. There is no evidence of economic factors being considered in the Japanese defense of their rice policies, much to the frustration of the United States. Of course, rich countries can ignore economic principles longer than poor countries, on behalf of strongly held political objectives. Part 2 asks whether economists have failed to understand the underlying economic rationale for these political objectives, especially in the context of food security. But the current position of the profession certainly maintains that food trade, and regular imports when appropriate, contributes to food security rather than imperils it.⁴

Whether food security is primarily a political or an economic objective, one economic principle is quite robust in addressing the role of self-sufficiency: the broader the definition of the commodity, the more stable the production of the aggregate is likely to be relative to the instability of each individual component. Thus rice production is less stable than the production of total food staples, which is less stable than the production of all foods, which in turn is less stable than total agricultural output. Indeed, a diversified portfolio of exports would be even more stable than output from any one sector and, from a strictly economic perspective, only the aggregate of foreign trade needs -----

4. For an historical perspective on the role of trade in achieving food security, and affirmation of basic economic principles in addressing it, see Lindert (1990).

to be in balance for long-run "self-sufficiency." In the short run, capital inflows permit significant imbalances even at this aggregate level.

In the Indonesian context, broadening the concept of self-sufficiency beyond rice to include all foodcrops or all of agriculture has two fundamental advantages (and one significant disadvantage). First, the broader the definition, the more stable will be the underlying production pattern, and the need for price stabilization through BULOG buffer stocks will be correspondingly less. Second, Indonesia routinely runs a substantial surplus on the total agricultural account, so occasional imports of rice are easily paid for from the agricultural export earnings. The disadvantage of a selective broadening of the definition to include only food staples is that all wheat is imported and there is no regular surplus of export earnings from food staples alone to bring the country up to "self-sufficiency" under this particular definition.⁵

The implementation of a broader concept of self-sufficiency, to include longer time periods or additional commodities, must use one of four mechanisms for coping with continued instability in domestic production of rice. The first mechanism, which has consistently been rejected throughout Asia, is simply to let consumers adjust to changing production levels through changes in rice prices and real incomes. Still, this approach is increasingly considered as Indonesian incomes increase and consumer sensitivity to prices decreases. At an influential Round Table on "Indonesian Agricultural Development" in preparation for REPELITA V, senior analysts from the Ministry of Agriculture, the Bogor Agricultural Institute, and the World Bank, argued as follows with respect to rice (and other strategic agricultural commodities):

Achieving and maintaining self-sufficiency nationally, and especially regionally, can be very expensive. The benefits of self-sufficiency must be weighed against higher costs, less efficient resource allocation, slower

5. An alternative way of broadening the definition also has considerable appeal. If the "rice-equivalent" of fertilizer exports counted toward domestic rice production, Indonesia would have an additional strategy for maintaining self-sufficiency. Especially if some of the fertilizer exports were linked to rice imports from the same country, for example Vietnam or Burma, such a strategy would actually diversify the risks of bad weather to a considerable extent. Arranging a barter deal whereby Vietnam borrowed 500,000 tons of urea and repaid after their rice harvest with 500,000 tons of milled rice would be a profitable transaction for both parties because the marginal rice-to-urea response rate is much higher in Vietnam, with its low current fertilizer use, than in Indonesia.

growth, greater domestic market price instability and lower employment in less protected sectors. The major source of growth in the agricultural sector in the future will most likely be from economic efficiency gains. The goal of economic efficiency conflicts with the goal of self-sufficiency, both nationally and regionally, in the production of strategic commodities. [Tabor, Nasoetion, Suryana and Mitchell. (November 1987), pp. 52-53.]

The efficiency gains from the free trade approach espoused above do not take account of significant efficiency losses that might occur because instability in world rice markets is transmitted into the domestic economy. The second mechanism for coping with such instability, which has been adopted widely by large Asian countries (not just Japan), is to isolate the domestic rice economy from the world rice market by using buffer stocks to smooth consumption from year to year in the face of unstable production. Large buffer stocks are extremely expensive, however, because of interest costs and physical losses in storage.⁶

To control the high fiscal and economic costs and deterioration of quality inherent with large buffer stocks, many countries also resort to a third mechanism for stabilizing consumption, international trade in rice in support of stable domestic rice prices. Most countries in Asia use a state enterprise to control rice trade because it is easier to manage in conjunction with the implementation of a price stabilization program. As the Japanese have discovered, however, such direct controls conflict directly with Article 11 of the GATT, and the introduction into the Uruguay Round of GATT negotiations of food security as a legitimate goal of government policy was designed to resolve this conflict. The refusal of the United States to equate food security with self-sufficiency has thwarted this approach so far.

The fourth mechanism for coping with instability has only received attention in the past few years. There is considerable potential to invest in agricultural technology and infrastructure in such a way as to increase the flexibility and diversity of cropping patterns. This increases the ease of substitution across crops as individual surpluses and -----

6. A parallel paper to this one develops a Lotus-based model of buffer stock costs for comparison with import costs. See Dawe and Timmer (1990).

deficits emerge, and thus reduces the difficulty and costs of stabilizing any single crop, such as rice.⁷

Consumption substitution across commodities is also an important element in determining the difficulty of stabilizing the price of a single commodity such as rice. After noting the substantial decline in the absolute value of the price elasticity of demand for rice since the early 1970s, Tabor and colleagues note the implications for price stabilization:

The decline in expenditure and own-price elasticities for rice is fully consistent with the revealed logic of economic development in a staple food economy. After a more than doubling of real per capita private consumption expenditures, the average consumer has a greater capacity to insulate rice consumption levels from the vagaries of the market. A failure to appreciate the stabilizing consequences of economic growth on consumption can explain in part the lingering desire to stabilize food prices, at low levels, in many developing economies.

. . . Maintaining rice prices within a narrow band in a more inelastic market has become much more difficult, since small quantity changes can induce greater changes in prices. Still, stabilizing inter-seasonal rice prices remains important as a means of reducing production risk and consumer uncertainty. However, the greater volatility in the more inelastic market means that government interventions will have to be tightly fine-tuned to market conditions. Poorly timed or poorly planned market interventions, in an inelastic market, run the risk of aggravating rather than dampening supply-induced fluctuations. [Tabor, Altemeier, and Adinugroho, (1989), pp. 43-44.]

No sizable country in Asia has been willing to opt for the free trade approach to stabilizing its rice economy, probably because the world rice market is even less stable than most domestic rice economies. The tendency to protect the domestic rice economy from all external forces seems to rise, not fall, with the level of incomes. Whether this reflects the logic of collective action in a world where political mobilization dictates policy, or the capacity to indulge social preferences for a luxury "good" such as price stability as incomes rise, is a topic of considerable research.⁸ But full isolation from the world rice market requires self-sufficiency on trend if consumption requirements are to be met on average, plus large buffer stocks if annual consumption levels are not to

7. The impact of price stabilization on crop diversification, and vice versa, are discussed in Part 2.

8. See Lindert (1990) for a review of this research in a historical perspective.

fluctuate as much as domestic production. The only economically efficient way out of this dilemma is to implement the goal of self-sufficiency in a flexible fashion that permits imports and exports as a vehicle for maintaining buffer stocks at a level required by distribution lags and the need to keep minimum reserves for local emergencies. Large countries need to hold larger buffer stocks than small countries in order to protect themselves against adverse price movements when they enter the thin world rice market, but there are still significant cost reductions available through international trade even for countries as large as China, India, and Indonesia.⁹

For Indonesia to implement this broader concept of self-sufficiency in rice, the state budget must allocate sufficient investment resources to keep the trend of production equal to the rising trend of consumption. The time period of the trend is a matter for analysis, but the five-year horizon of REPELITA is a convenient starting point, especially because the goal was reached almost exactly in REPELITA IV.¹⁰ To monitor progress in rice production relative to consumption, much more accurate rice production statistics will be needed than are presently reported, but the Central Statistical Bureau has made substantial progress in determining the major sources of bias in the existing reporting system used by the Department of Agriculture. In addition, the Integrated Planning Unit (IPU) at BULOG has made significant progress in developing a short-run projection model for rice production and BULOG procurement that is based on rapidly-available rainfall data from the major rice-producing provinces.

By combining the IPU model with very close monitoring of the level of BULOG stocks and changes from year to year, the balance between rice production and consumption can be tracked over time. If stocks get dangerously low, as they did in late 1988, external supplies should be used to bring them up to levels adequate to keep rice

9. See the paper by Dawe and Timmer (1990) for a rough attempt to quantify the cost savings from international trade when the country faces a rising supply price in world markets.

10. Schwartz (1987) has investigated whether particular time horizons give more robust estimates of underlying trends and has concluded that no optimum exists for choosing the appropriate length of time to measure the trend around which stabilization will take place.

prices stable in real terms. If stocks get so large that storage costs escalate, then arranging rice loans or commercial exports will be desirable. The difficult problem will be to sort out short-run deviations between production and consumption, as reflected in BULOG stock changes, from longer run departures of domestic production from the trend in consumption. Both improved operational guidelines for implementing policies with respect to procurement and market operations, and fuller specification of the IPU model to reflect longer-run weather patterns, will be needed to solve this problem.

The second element in implementing a flexible self-sufficiency concept is to keep domestic rice and fertilizer prices roughly on the trend of world prices. Because of Indonesia's large size, a price premium for rice of perhaps 10 percent will add to domestic food security, as will a modest subsidy on urea, so long as Indonesia has a greater tendency to import than to export.¹¹ Added rice production could be achieved if domestic rice prices were to be raised to levels well above the long-run world level, as in Japan, Korea, and Taiwan, but Indonesian consumers are still too poor on average to be able to afford such a strategy without substantial malnutrition resulting. The impact on costs of labor-intensive manufactured goods would also place Indonesian exports at a disadvantage with respect to major Asian competitors with lower food costs.

The last important issue in implementing a broader self-sufficiency policy is whether cereal imports--rice, wheat, corn and soybeans--can be consistently positive year after year so long as a broader food or agricultural trade account remains in surplus. As noted above, the advantages to such a broader definition of the category used to measure self-sufficiency are significant, especially the greater stability of the aggregate category relative to its individual components, and the potential to substitute in both production and consumption within the category through offsetting trade flows. Perhaps most

11. Both proposals are controversial with donor economists. Starting as early as 1981, the World Bank in particular has urged that all fertilizer subsidies be eliminated and that rice prices follow world prices much more closely. Usually the two proposals were kept separate because losses in rice production due to higher fertilizer prices were often to be compensated through higher farm prices for rice. None of the donors has suggested publicly that all world price fluctuations should be passed into the Indonesian economy, but pressures to deregulate agricultural trade clearly have the stabilization program in mind as well.

importantly, Indonesia is likely to remain an efficient and low cost producer of an agricultural trade surplus for many years to come, in contrast to other rapidly growing Asian economies which became net agricultural importers fairly early in their growth process.

Throughout this discussion of the relationship between food security and self-sufficiency runs a central theme. Food security as a political concept requires an operational definition. In most Asian countries this has taken the form of domestic price stability relative to world prices, thus requiring state control over trade flows in rice. In order to minimize the need to resort to trade at all, and to avoid the uncertainties in the international price of rice, self-sufficiency has also become a popular objective, the more so as countries become rich enough to afford the protection implied by measures needed to implement policies that achieve greater degrees of self-sufficiency. Although the political rationale for agricultural protection, even for the basic foodgrain, exceeds the economic logic, the sharp instability in world rice markets has supplied policy makers with ample excuses to invest in rice production at levels that exceed narrow economic measures of comparative advantage. Such measures, however, do not capture the full benefits of higher farm incomes nor the greater ease in stabilizing a domestic rice economy that comes from reduced exposure to the world market, especially for a large country. The next section investigates the failure of existing economic models to reflect the full complexity of these issues and proposes an alternative array of benefits to price stabilization that expands the pricing debate beyond issues of food security, into macro economics and the dynamics of economic growth as well.

Part 2: The Analytical Case for Price Stabilization

A three-way debate is under way on the appropriate role of price policy in agricultural development strategies.¹² The free-market school argues that all agricultural prices should reflect their opportunity costs at the border, no matter what the international market processes are that determine the prices, and no matter what the price levels happen to be. The result of such a pricing strategy is supposed to be optimal efficiency of resource allocation, as well as minimal rent-seeking activity with its associated losses in X-efficiency.¹³

The structuralist school argues that the entire border price paradigm for domestic price determination is misdirected, at least for a select list of commodities, such as basic foodstuffs, that have important roles in the macro economy and welfare of consumers. Supply and demand elasticities are quite small for these commodities, so the triangles of allocative losses from not equating domestic prices with border prices are trivial. The border prices themselves are mostly the result of gross distortions in agricultural policies in the developed world, are highly unstable, and thus carry minimal information on how resources should be allocated in the long run. Accordingly, prices should be set to favor income distribution objectives in conjunction with macroeconomic stability.¹⁴

The agricultural pricing debate is just one of several that have been conducted between these two schools of thought in development economics since the 1950s.¹⁵ The free-market approach has clearly won the ear of most large donor agencies in the 1980s, although the structuralist paradigm remains influential in Latin America and South Asia.

12. This section draws extensively on Timmer (1989).

13. This school of price policy is usually associated most closely with T. W. Schultz and his colleagues and students from the University of Chicago. See Schultz (1978) for a review of this philosophy and Chapter 2 of Timmer (1986b) for an introduction to the border price paradigm that serves as its intellectual foundation.

14. See the work of Taylor (1980), Streeten (1987), de Janvry (1978), Lipton (1977), and Rao (1989).

15. An excellent review of this debate from a neoclassical perspective is in Little (1982); the structuralist perspective is best presented in Taylor and Arida (1988).

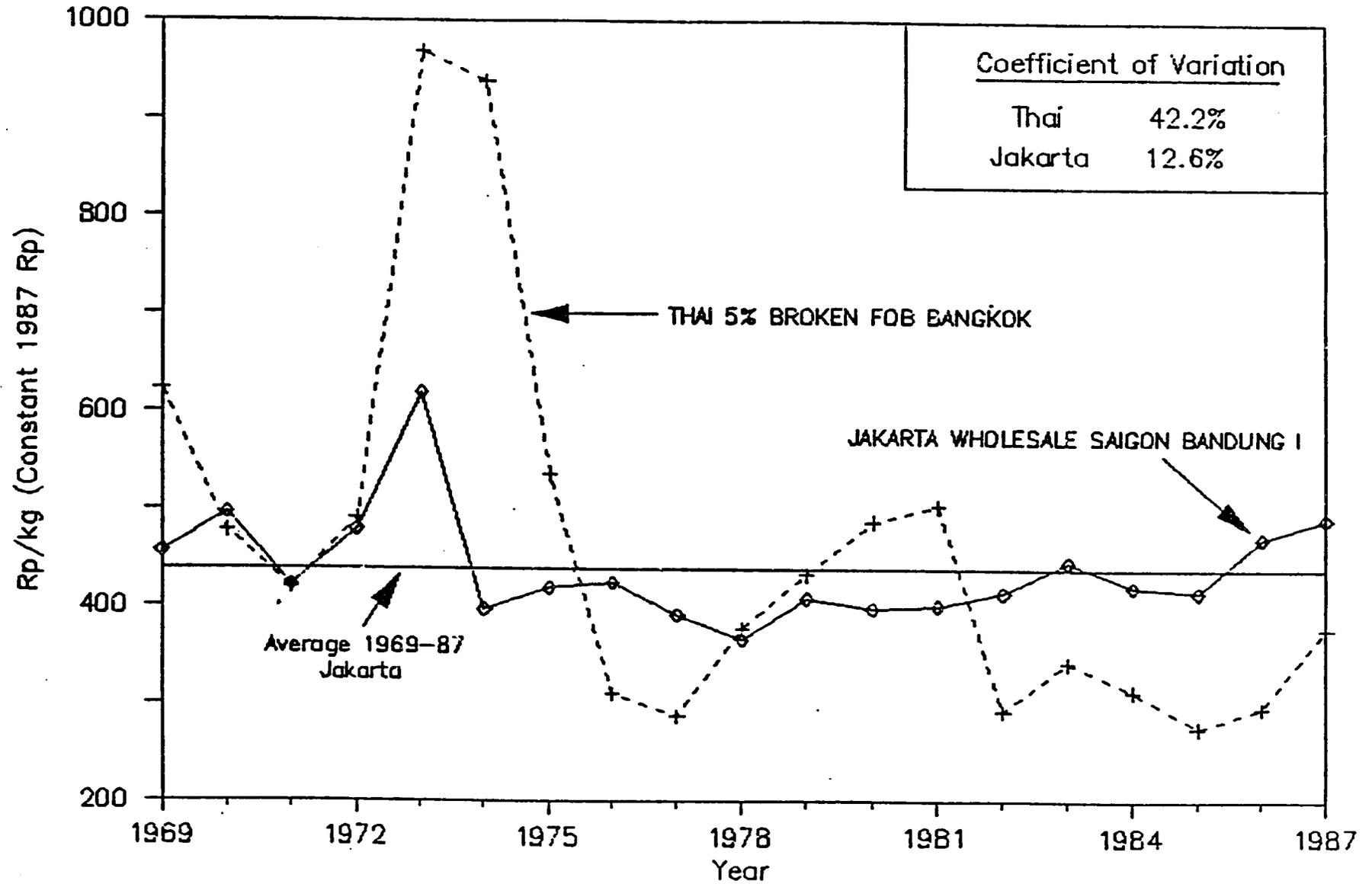
Other developing countries, even the most successful ones in East and Southeast Asia, have openly rejected the free market approach for primary foodstuffs, especially rice and wheat, in favor of interventions to stabilize and support agricultural prices. At the same time, the structuralist approach has also been rejected because the allocative and budgetary costs of wide deviations from border prices (including those deviations due to overvalued domestic currencies) have turned out to be substantial. The result has been a melange of ad hoc pricing interventions intended to satisfy the needs of farmers for price incentives, the needs of consumers for low-cost foods, the constraints imposed by budget-minded finance ministers, and the powerful socio-political desire for price stability as the proximate indicator of a society's degree of food security. Figure 1 shows one example of the outcome of such a pricing strategy. Indonesia has sharply reduced the instability of domestic rice prices relative to that in the world market but, as a stated intent of policy, has not deviated from the long-run trend in world prices.

The analytical underpinnings for this pragmatic approach to agricultural pricing so dominant in Asia are just beginning to coalesce into a third school of thought, tentatively labeled here the "stabilization" school. The main contention of this school is that an economy actually *incurs* significant efficiency losses by *following* short-run price movements in international markets. However, equally significant efficiency losses are imposed on an economy by *not* following longer-run trends in international opportunity costs (whatever the market processes that determine them). Optimal *efficiency* thus calls for some degree of market intervention to stabilize short-run prices, but there must be sufficient flexibility to allow domestic prices to reflect international price trends. Rent-seeking behavior is constrained, if not eliminated, by using competitive market agents to carry out most marketing activities, but within government-established price bands.

While rejecting the call of free market advocates for no pricing interventions, the stabilization school also rejects the structuralist desires to use agricultural prices primarily as an instrument for redistributing incomes. Further, by encouraging the development of a competitive private marketing sector over time, the role of government price

Figure 1

Indonesia: Comparison of Domestic and International Rice Prices 1969-87
1987 Constant Prices



interventions can decline as the role of price stability for the basic foodstuff becomes progressively less important to the economy during the course of economic development. Structuralist- or socialist-inspired stabilization policies that actively seek to displace the private marketing sector have great difficulties when the opportunity (or budgetary need) comes for such a transition.

Neither the underlying analytical foundations nor workable operational procedures have been satisfactorily developed for domestic price-stabilization schemes to be implemented and evaluated with any degree of coherence.¹⁶ The fact that nearly all countries in Asia and the Near East attempt to implement such schemes suggests that the rewards to progress on both fronts--analytical and operational--will be very substantial. This paper is primarily concerned with operational issues of analyzing, designing, and implementing price-stabilization schemes; the underlying theoretical rationale is being dealt with by a variety of authors.¹⁷ It is important, however, to lay out the basic logic of the analytical approaches in order to focus the discussion of operational issues on pricing strategies that are consistent with the theoretical rationale for their design and implementation.

With the early contributions of Smith, Marshall, and Pigou to the economics literature, economists have understood for nearly a century the basic analytical rationale for government interventions into market price formation. Economies of scale and monopolies, externalities in production and consumption, public goods, and imperfect information in the absence of complete contingency markets have long offered theoretical justification for interventions designed to correct such market failures. The resurgence of the free-market paradigm builds on a crucial lesson from postwar development experience: policies that attempted to strengthen the competitiveness of markets as a way to improve their efficiency outperformed policies that attempted to correct for market failures by

16. As a simple example of the problems faced, there is no reliable technique for estimating trends in prices. See Schwartz (1987).

17. See especially work by Newbery and Stiglitz (1981), Runge and Myers (1985), Stiglitz (1987), Just (1988), Pradhan (1988), Myers (1988), Dercon (1989), Newbery (1989) and Dawe (1990).

suppressing market activities. This success for market-oriented policies came about primarily because government failures in market interventions were often far more serious in terms of wasted economic resources and forgone growth than were the market failures they were designed to correct.

An additional factor grew out of the theory of the second best. Many imperfections in markets, especially in rural factor and product markets, could be explained as second-best adaptations to inherent constraints on first-best arrangements because of imperfect and asymmetric information, moral hazards and high transactions costs, and a significant degree of risk aversion by the very poor in the context of incomplete credit and contingency markets. In such circumstances, government interventions into one market run a substantial risk of lowering the welfare of the poor because of the connections of that market with other markets that provide some degree of welfare insurance. Under the twin banners of "government failures" and models of interlinked markets in a second-best world, neo-neoclassical and social-choice theorists provided a new intellectual foundation to the free-market paradigm.¹⁸

Potential versus Actual Benefits of Government Intervention

The basis of this foundation is not theoretical, however, but inherently empirical. Given the reality of widespread market failures in developing countries, modern welfare economics is very clear on the *potential* scope for government interventions to achieve a Pareto-superior position for the economy. Whether a government can improve welfare through an actual intervention in a specific case depends on two factors: whether the market failure itself is "real" within the context of the theory of the second best, and whether the government can actually improve social welfare by intervening. The latter question must be addressed in a dynamic context that explicitly includes the potential for vested interests to capture both the economic gains from the policy intervention and the policy-making process itself, thus leading to further interventions that carry the economy

18. See especially Stiglitz (1987), Srinivasan (1985), Braverman and Guasch (1986), and Bates (1981).

away from the Pareto optimum achieved by the initial, but limited, government intervention.

The stabilization school attempts to build on these analytical foundations to develop the empirical case for price-stabilization policies. In doing so, however, it rejects the emerging consensus that the welfare gains from price stabilization, although usually positive on theoretical grounds, are empirically not very important relative to the costs governments must incur in order to stabilize prices.¹⁹ Two key innovations in the analysis, one microeconomic and one macroeconomic, lead to such different empirical conclusions. The first is to consider the farmer as an investor rather than the manager of a static stock of assets and a flow of variable inputs. The model of farmer as manager is the basis of nearly all theoretical and empirical assessments of risks from price and yield instability, but it clearly excludes important elements in farmer decision making that are strongly influenced by these risks, especially expectations and patterns of investment in physical and human capital. Transforming the problem into one of dynamic portfolio investment decision making enormously complicates the analysis of risk, even when restricted to farm-level issues.

Tracing the macroeconomic ramifications of price instability is even more complicated because general-equilibrium analysis is needed with dynamic investment functions that are conditioned by stability-sensitive expectations.²⁰ But incorporating

19. This is the key conclusion in Newbery and Stiglitz (1981), in Stiglitz (1987), and in Bigman, Newbery, and Zilberman (1988). The latter authors, for example, in their discussion of Just's arguments for price-stabilization policies, make the following comment: "Attempts to quantify the net (efficiency) benefits of institutional attempts to reduce risk, like commodity price stabilisation or quota policies, suggest that they are usually small and often negative" (p. 461). Working from a different analytical framework, Ravallion (1987) comes to a related conclusion: "... although the results of this study [of the Bangladesh famine in 1974] suggest a case in favor of foodgrain price stabilization, the most appropriate form of policy intervention remains unclear. The case for public storage [the most common mechanism used to stabilize prices in developing countries] rests on the nature of the distortions to markets; buffer stocks will not be able to stabilize a competitive market with rational expectations" (p. 172). Both approaches conclude there is little empirical rationale for governments to attempt to stabilize foodgrain prices, a result very sharply at variance with actual experience. Accordingly, different approaches should be investigated.

20. The macroeconomic dimensions of price stability are stressed in Ravi Kanbur's review of the Newbery-Stiglitz book. See Kanbur (1984). The extreme difficulty of building dynamic investment factors into general equilibrium models of agricultural pricing can be seen in de Janvry and Sadoulet (1987). See Dercon (1989) and Dawe (1990) for further discussion of the macro dimensions of food price stability.

these dynamic factors into both the micro and macro analyses offers the opportunity to examine the impact of price-stabilization policies on agricultural development and economic growth. The static, micro-based models simply do not address these issues; they are incapable of assessing the consequences for the economy of the price-stabilization policies that are widely implemented--consequences that policy makers actually worry about.

Pradhan (1988), in his analysis of fertilizer-pricing strategies in India, reaches similar conclusions after a careful review of the analytical literature on price stabilization:

The efficiency and policy implications of the perfectly competitive market with a complete set of markets need to be qualified (and qualified strongly in some cases) because their assumptions are not realistic. Perhaps most significant in this context are the assumptions about perfect insurance and capital markets, particularly in the context of economic environments characterized by uncertainty and price fluctuations. Unfortunately, the theoretical and empirical literature reviewed here shows that either the models are too simplified (e.g. the debate following the Oi-Waugh contributions), or they fail to capture some of the essential problems of price instability in uncertain environments. . . . In an attempt to incorporate these, five such adverse welfare consequences (the contingency fund effect, the adjustment cost effect, the forecasting error effect, the psychic cost effect, and the "fear of bankruptcy" syndrome) stemming from continued adjustment and disequilibria in the face of uncertain price fluctuations are hypothesized and introduced. . . some of the important effects can be embodied in a general notion of transactions costs as an increasing function of price instability and uncertainty. Indeed, once these microeconomic and macroeconomic factors are realistically (and even quantitatively) considered, it becomes clear that imperfections in risk and capital markets combined with substantial price fluctuations for a commodity like fertilizers in a country like India have significant adverse externalities and non-Pareto-maintaining welfare consequences (pp. 31-32).

The absence of stock markets and insurance markets for Indian investors in fertilizer factories means that instability in fertilizer prices and uncertainty lead to sub-optimal levels of investment in domestic factories, thus causing a larger-than-optimal exposure to the world market in which India has a "large-country" effect on prices. The macroeconomic consequences of the adjustments required to cope with this added exposure are quantitatively significant, primarily for two reasons: the foreign exchange

requirements are a large fraction of normal imports, and fluctuating prices of fertilizer lead to fluctuating supplies of food, which further destabilize the macro economy.

The logic of extending Pradhan's analysis of fertilizer pricing to food pricing is straightforward.²¹ No farmers anywhere in the world have stock markets in which they can choose a portfolio of farm assets that can match their personal risk preferences. They are mostly stuck with the farms they have. Nor can yield or price risks be hedged in existing markets at reasonable costs. Asymmetric information makes crop insurance a very expensive option, one that is frequently nonexistent. Futures markets have very short time horizons; they are adequate in the United States perhaps for the short-run allocation of inputs but not for longer-run investment decisions where price uncertainty is a major impediment.²² Even in developed countries, few farmers use futures markets to offset their price risks. Stiglitz (1987) speculates that transactions costs may be too high, farmers may feel an informational disadvantage relative to large traders, and they may fear manipulation. Lack of liquidity can also create risks when new market information causes prices to change more than trading limits permit.²³ Such lack of liquidity is a significant impediment to those farmers who do want to use futures markets; most do not or cannot.

21. In fact, the logic begins with the analytical case for food-price stability, which Pradhan has extended in an innovative fashion to fertilizer pricing. The issues for industrial investment in the large-scale fertilizer industry have few direct counterparts at the level of farm investments, but investments in the marketing sector have similar economies of scale and inability for investors to diversify their risks through stockmarket portfolio choices.

22. See Crawford (1988) for a model that demonstrates the downward bias to investment in such circumstances.

23. The New York Times reported on June 16, 1988, that many farmers who had sold corn and soybean futures when yield prospects were favorable attempted to buy back their contracts as the summer drought deepened. Large pools of unmet buy orders accumulated for corn and soybeans--85 million bushels for corn and 12 million bushels for soybeans--as prices rose the daily limit each day of trading.

The Quantitative Significance of Price Stabilization

The important analytical question for the stabilization school is not to demonstrate that the pervasive market failures in developing countries lead to non-Pareto-optimal outcomes, but that they are quantitatively significant relative to the costs governments would incur in order to alleviate them. It is already clear that large costs from price instability will not be found in the static, micro-based models that follow the Newbery-Stiglitz tradition. As noted above, impact on investment behavior and on the macro economy are the obvious places to look for more significant benefits from price stabilization, as well as at consumer preferences for price stability in the presence of adjustment costs. No formal model is offered here, but the likely ingredients of a model that would capture these effects include the following: displaced investments in physical capital at the farm level, the marketing sector, and the industrial sector; substitution of consumption and leisure for savings and work; biases in investments in human capital for the farm agent and intergenerationally in children; the transactions costs consumers face in reallocating budgets when prices change; the welfare gains from a psychic sense of food security (and voters in rich countries and poor alike place a substantial economic price on this factor); and the feedback from this sense of security to a stable political economy, which reinforces investors' willingness to undertake long-term (and hence, risky) commitments.

Investment.-- It has long been recognized that the absence of long-term contracts, future-contingency contracts, and perfect credit markets induces a downward bias in investment in both physical and human capital.²⁴ Unforeseen instability in food prices is likely to cause reduced investment in both kinds of capital at three levels of the economy. At the farm level, price instability leads to lower investments than are optimal in production for the market relative to production of subsistence crops, in productivity-enhancing soil amendments, irrigation and drainage facilities, land leveling, and new

24. See Crawford (1988) and Becker (1962).

technology, as well as in commodity-specific knowledge and skills. Farmers also invest in processing and marketing equipment--small mills, motorcycles, and trucks--that allow them to increase the value added of their sales through better quality or timeliness of delivery. Sharp instability in prices make such investments riskier than is optimal for the society as a whole. The displaced investments are likely to be reflected in lower savings rates from farm incomes because rural credit markets usually do not offer efficient financial intermediation. There is also likely to be some displacement of work, and hence earned income, in favor of greater leisure. Both the added consumption from displaced savings and increased leisure contribute to welfare of the farm family, of course, but the shift in allocation of time and resources because of price instability is not optimal for economic growth.

Investments by the private sector in marketing infrastructure are also dampened in the face of price instability (except, perhaps, for short-run speculative investments), and this lack of investment has a particularly negative impact on growth because of the increasing returns and public-goods aspects of development of an efficient marketing system. Such a system must connect farmers with local buying agents, thus transmitting market information and permitting exchange to take place, which generates gains in efficiency from trade. It must transform agricultural commodities at the farm gate into foods at the time, place, and form desired by consumers. An efficient marketing system has to solve the problem of price discovery, at least at the local level and seasonally, even if government price policy sets a band in which such price discovery must take place.²⁵ Many marketing investments are commodity-specific--rice mills and driers, for example--but decisions about trucks, warehouses, telephones, and so on may also be based primarily on the production and trading prospects for a single important commodity such as rice or wheat, and these prospects depend to a significant extent on the degree of price stability.

25. See Chapter 4 of Timmer, Falcon, and Pearson (1983) for further analysis of the importance of an efficient marketing system and the role of price policy in developing one.

The Industrial Sector.-- The industrial sector has a stake in food price stability because of the importance of wages in expected costs. Stability of money wages through stable food prices is likely to induce investments in labor-using machinery, thus improving the efficiency of technology choice in labor surplus economies. If stable food prices also contribute significantly to a stable political environment in which investors can form secure long-run expectations, the overall level of investment in productive resources is also likely to be stimulated. The impact on political stability may be especially significant for foreign investors who have less knowledge of and access to local political leaders than domestic investors.

The Macro Economy.-- Structuralist models that show the importance of stable food prices to the level of macroeconomic activity are also relevant in this setting.²⁶ Using a recent model based on Tanzanian experience, Dercon concluded as follows:

In the basic version of the model [based on Taylor] the well-known result that price stabilization would have limited effects was obtained. If urban groups are strong, however, price stabilization might well be justified on macroeconomic and distributional grounds. . .

Another way of looking at these results is to focus on what might be the effects of market liberalisation, starting from a system of price stabilization. The simple view that everybody will gain from market liberalisation is not correct, at least from a static point of view. Our analysis suggests that the presence of strong urban groups would cause everybody to lose from liberalisation in the food market. [Dercon (1989), p. 26.]

As with nearly all other work on price stabilization, Dercon's model does not incorporate any effects on investment. Although the short-run structural macro models are important for demonstrating the impact of food price stability on the stability of employment and short-run economic activity, the dynamic effects may well be far more significant. Contingency funds set aside to cope with unexpected price rises can instead be devoted to productive investments, and the efficiency of investments would rise.

26. See Taylor (1980) for a model of these short-run effects.

Not all macroeconomic consequences of stabilizing food prices are positive. The resource requirements of the price-stabilization program itself can destabilize foreign-exchange requirements, the credit system and money supply, and budget allocations, a topic discussed in more detail below. An important operational issue is to balance the positive macroeconomic effects against these negative ones, as well as against the operational costs of the stabilization program itself.²⁷ As the work by Dawe (1990) shows, however, interconnections among credit flows by consumers, producers, and a public stabilization agency complicate efforts to understand this balance.

Consumers-- The last factor to be incorporated into the analytical model that underlies the stabilization approach to agricultural pricing is the impact on consumers. The models used in the stabilization debate so far have looked rather narrowly at gains and losses in consumer surplus or, more elegantly, in compensating variations or equivalent variations.²⁸ The stabilization approach argues that important sources of welfare loss to consumers due to price instability are omitted by such neoclassical approaches. Two sources seem especially large and may be measurable. The first is the value consumers place on avoiding the transaction costs incurred because of the need to reallocate their budget resources each time relative prices change. Compared with rich consumers, poor consumers are likely to value this aspect more. To fulfill minimal nutritional requirements, the poor feel the pressure to substitute among food commodities much more acutely than do the rich.²⁹ Accordingly, there are important implications for income distribution of food price stability.³⁰

Second, fear of food shortages in urban areas evokes a universal and visceral reaction. Governments are held accountable for provisioning cities at reasonable costs, and citizens have repeatedly demonstrated their capacity to bring down governments that

27. These issues have received considerable analytical attention in the case of Kenya's grain price stabilization program. See Pinckney (1989).

28. See Hallam (1988) and Helms (1985).

29. See Timmer (1981).

30. Similar arguments are made by Newbery (1989).

fail in this obligation.³¹ It is acute food shortages--not the average level of food prices-- that induce anti-government panics, however. Food shortages are simply the mirror image of sharp price rises. Price policies that successfully avoid such episodes clearly contribute substantially to levels of overall social welfare. This level of social welfare is reflected in a more stable political economy, with its attendant positive impact on investors' expectations.

The benefits from stabilizing the prices of basic foodstuffs, or other agricultural commodities with significant macroeconomic linkages, are considerably larger than those reflected in the models that have been used so far to analyze relative costs and benefits of price-stabilization programs. While little is known empirically about the size of the dynamic and macroeconomic benefits of stability, they should not be ignored in the evaluation of such programs. The fallacy of doing so has been noted by the popular writer, Adam Smith:

The Fallacy:

- The first step is to measure whatever can be easily measured: This is ok as far as it goes.
- The second step is to disregard that which cannot be measured or give it an arbitrary quantitative value: This is artificial and misleading.
- The third step is to presume that what cannot be measured easily is not very important: This is blindness.
- The fourth step is to say that what cannot be easily measured really does not exist: This is suicide.

[A. Smith, *Super Money*]

The pervasive, indeed universal, tendency of Asian governments to stabilize their domestic rice prices relative to unstable world market prices for rice suggests that the benefits may be very large, well worth considerable analytical and empirical efforts to understand and measure. The relatively rapid economic growth in many of these Asian countries argues that the impact of efficiency losses and budgetary costs on growth cannot be too large, at least if the price-stabilization program is well designed and

31. See Kaplan (1984) for a fascinating historical account of the relationship between urban masses and their rulers with respect to provisioning of basic foodstuffs.

implemented. A focus on these operational issues of design and implementation, which are somewhat better understood than the resulting dynamic and macroeconomic benefits, offers some practical guidelines in judging the efficacy of price-stabilization policies. The guidelines are drawn from countries that have been more successful than others in managing the complex tasks of intervening in agricultural price formation without incurring unacceptably large budgetary costs or sacrificing long-run efficient resource allocation.

Part 3: Operational Issues in Analyzing Price-Stabilization Policies

All countries in Asia intervene in their rice markets. The primary analytical methodology used by economists to understand the impact of intervention, the border price paradigm, says they should not. This must be one of the widest gaps between theory and reality in all of economics. As Sicular notes in her conclusions to a major volume on food pricing in Asia, much of the intervention is intended to stabilize prices:

One important concern revealed by observed food price policy in these six countries [Indonesia, Thailand, Korea, Philippines, Nepal, and China] has been a concern for stability. Stability has both political and economic facets. Political stability can require paying sufficient attention to the welfare of key political groups when setting food policy, sometimes at the expense of efficiency and equity. Economic stability has many aspects, one of which is simply price stability. Indeed, price variability is frequently of greater concern to policy actors than price levels. . .

Price stability is, of course, intimately tied to food security, that is, providing stable and adequate supplies of staple foodstuffs. In pursuit of food security, countries make choices about how heavily to rely on food imports and to what degree domestic prices should be linked to international prices. In the presence of international price variability, policy makers need to think carefully about how to interact with international markets. On the one hand, narrow-minded pursuit of food self-sufficiency can incur substantial costs in terms of gains from trade. On the other hand, opening the economy can destabilize prices internally, at times with negative economic and political consequences. Some countries try to resolve these problems by importing food while concurrently protecting domestic prices from the influence of international prices. Without careful planning, such an approach can create instability in the budgets of those agencies that maintain the buffer between domestic and international prices. Fearing the vagaries of international markets, countries such as Indonesia and Korea have shown reluctance to rely too

heavily on imports of staple grains and have taken measures to delink domestic from international prices. [Sicular (1989), pp. 291-292.]

The gap between theory and practice exists because of failures at both ends. The analytical methodology that sees efficiency losses in every deviation from border prices has serious problems in purely theoretical terms. Relaxing the assumptions that make the framework simple and elegant, and therefore useful as a conceptual device, comes at a high cost in practical applicability. If analysts insist on realistic assumptions to reflect the pervasive market failures, nonequilibrium outcomes, and lack of information in the economies of developing countries, their methodologies are made progressively more complex, situation-specific, and dependent on the very knowledge that is lacking.

On the other hand, most governments do intervene too much, at significant cost to the budget and the efficiency of the economy. One goal of this paper is to use a specific historical example to identify an analytical process that copes with both of these realities. The Indonesian experience with rice price stabilization is sufficiently well-documented that careful analysis should provide both better methodologies and insights on appropriate price policies for the future.

To be successful, this analysis must recognize both the objectives for and problems with market interventions.³² In rice-based Asian economies, rice price policy can affect economic growth, income distribution, and political stability--three important factors in any policy maker's objective function. Economic growth is affected by the level and stability of price incentives to farmers, which stimulate growth in output and rural incomes. Low and stable consumer prices keep real wages low, thus stimulating investment, industrial output, and exports. With purchases of rice still a large share of

32. For more extensive discussion of the operational issues in food-price stabilization and market intervention, see Chapter 3, "Implementing Price Policy: The Impact on Markets and Marketing" in C. Peter Timmer, Getting Prices Right: The Scope and Limits of Agricultural Price Policy (Ithaca: Cornell University Press, 1986); the "principles" section of C. Peter Timmer, "Analyzing Rice Market Interventions in Asia: Principles, Issues, Themes, and Lessons," in Asian Development Bank, Evaluating Rice Market Intervention Policies: Some Asian Examples. (Manila, 1988); and the Indonesian experience summarized in C. Peter Timmer, "The Role of Price Policy in Increasing Rice Production in Indonesia, 1968-1982," in Ray A. Goldberg, ed., Research in Domestic and International Agribusiness Management, vol. 6, (Greenwich, CN: JAI Press, 1986), and C. Peter Timmer, "Food Price Policy in Indonesia," in Terry Sicular, ed., Food Price Policy in Asia (Ithaca: Cornell University Press, 1989).

household budgets in many Asian countries and rice production the single most important farm activity, the impact of rice prices on real incomes by sector and income class is enormous. Most countries have no other policy instrument with a fraction of the potential of rice prices to alter the society's income distribution. Because of the economic significance of rice, maintaining reasonable stability in rice prices contributes directly to political stability. Nothing is more unsettling politically than rapid shifts in real income and wealth among large sectors of the population. Governments can eliminate at least one important cause of such instability by stabilizing rice prices.

Unfortunately, there are serious problems with the price policies used to reach these three objectives. The most visible, and therefore the most important to government policy makers, is the cost to the budget of defending stable prices and of maintaining domestic price levels above or below prices in world markets, even temporarily. But there are important hidden costs as well. The budgetary costs are not painful just because taxes must be collected to pay for them if fiscal policy is to remain in balance. Expenditures for subsidies to producers or consumers have alternative opportunities in investments or other programs that might offer higher payoffs. Static efficiency losses due to misallocation of resources are seldom large when compared with income transfers or GDP, but if distortions are sufficiently large and persist long enough to be built into investment patterns, the losses become truly significant.

This is especially true when prices for rice are the object of intervention and all other commodities are produced and consumed according to market signals. This is the approach suggested by the analytical arguments developed here, and which is implemented in Indonesia and elsewhere in Asia.³³ The spillover effects of price policy to other markets can be immediately troublesome when close substitutes in production and consumption exist, but the longer-run impact on the structure of the economy is also worrisome. Keeping resources in rice production specifically or in agriculture generally that should be encouraged to move to the industrial or service sector requires policies that

33. The limited efforts at stabilizing other staple foods in Indonesia are discussed in Timmer (1989b).

can make the entire agricultural sector uncompetitive and therefore a high-cost burden to the rest of the economy. Diversification out of rice into commodities and livestock products with greater value added is a natural evolutionary process, which can be slowed or stopped altogether with price support and stabilization policies.³⁴ Structural change is impeded, rice farmers develop powerful political lobbying groups, and the potential for policy reform then rests with highly polarized sectoral interests. It is not clear whether the larger costs are to the economy or the political process.

Encouraging diversification away from rice, especially away from production for direct home consumption, requires the ready and stable availability of rice in local markets, however. Again, "too much" stabilization, especially at price levels well above long-term levels in world markets, impedes this crucial process of diversifying the rural economy, including the formation of small scale rural industries and service activities. But not enough stabilization makes it too risky for rural households to trust local markets for access to their staple foods, with far too little investment in more productive activities. Balance is again the key issue.

Lastly, continuous market interventions and price controls have an impact on the development of a private marketing sector. Investments in physical and human capacity in this sector are not forthcoming if margins are squeezed, policy implementation is erratic, or the middleman is held responsible for policy failures. The loss is the absence of competitive traders in search of marketing opportunities for new commodities or greater volumes. Farmers everywhere need this dynamic search process; it provides them with information about what to produce and how profitable it will be. Government traders seldom reach farmers at all, much less with this type of information. Growth and diversification in agriculture is stimulated by transmitting information about changing demand patterns to farmers willing to experiment. Only a competitive, dynamic private trading sector has demonstrated much capacity to establish this link. No price

34. See Timmer (1988) for a more complete discussion of the relationship between agricultural diversification and price policy.

stabilization program that significantly retards the development of such a private trading sector can be successful in the long run. This is a particularly difficult lesson to learn for a parastatal marketing agency such as BULOG which has heavily invested in building its management capacity to handle many of these operational tasks itself. Just as it learns how to be more efficient and thus able to handle larger volumes successfully, the private sector should be playing a progressively larger role in day-to-day marketing activities.

Striking an appropriate balance between the public good and private interests is at the core of much of economic analysis and political debate. It is an ancient problem; the philosophical debate goes back to Aristotle and Plato and the analytical roots extend to Adam Smith, Pigou, and Lerner. The food price dilemma as a policy issue in developing countries is conceptualized in Timmer (1986c) in terms of the tension between private decisions by producers, traders, and consumers and the policy environment that affects those decisions. The issue here, however, is much more operational. How can government interventions into the level and stability of prices in domestic rice markets be designed to stimulate the development of a competitive private marketing sector rather than retard it?

The issue is particularly difficult for policy analysts because the factors that stimulate the private sector are often subtle and hard to measure, even in a developed economy such as the United States. Generating positive expectations about potential role and rate of return on investment is obviously essential, but there is little academic knowledge about the ingredients in such expectations, and few policy analysts have personal knowledge of what makes private traders tick. Recent research on whether behavior of prices can be used as an indication of expectations in investors' minds reveals the complexity of the issue:

Most investors know that excess returns on stocks, bonds, and exchange rates are largely unpredictable. Rationally, they realize that if an asset were widely perceived to be cheap, it would not remain cheap for very long. Speculation ensures both that there will be no easy money and that any predictable component of price changes will be dwarfed by the magnitude of the price changes themselves.

With sophisticated statistical methods at their disposal, economists have been busy identifying these predictable components. Although this portion of

returns comprises only a tiny fraction of short-horizon price movements, it has become the subject of heated debate. Some economists argue that any portion of returns found to have been predictable must already have been in investors' minds. In other words, they argue that we can learn about investors' expectations by looking at what actually happened to prices. So, for example, if the stock market rises rapidly for several years, they might conclude that the expected return on stocks was very high (but that stocks also must have been very risky).

However, others disagree with this approach. They contend that investors do not think of this portion of returns as predictable but rather that the predictable components are either statistical artifacts or evidence that some investment strategies indeed pay high risk-adjusted returns. Therefore, the alternative view holds that a rapid rise in stock prices tells us little about investor expectations. . .

. . . [S]everal striking facts emerge from these [survey data on asset-price expectations elicited from asset-market participants in the United States]. . . Only recently have we begun to explore the following alternative explanations:

. . . 4) *Ask whether investors learn as they go.* Economists often assume investors are born understanding the economy. But if the economy is as much of a moving target as is economics, then the predictions of rational but initially uninformed investors may not converge quickly or at all to the economy's actual behavior. Put differently, rationality can be defined only relative to specific information. [Froot (1989), pp. 6-8.]

Given the highly imperfect information and nearly non-existent risk markets in developing countries, especially in rural areas, mechanisms that stabilize expectations and speed learning by doing on the part of investors are likely to pay high returns. We do know that, in these environments, positive expectations on the part of a private trading sector are fragile; they take a long time to build and can be destroyed overnight with one foolish intervention. Trading is risky enough without having to figure out what the government will do. Perhaps the best that price policy analysts can do to encourage an efficient private sector is to create a stable policy environment, set price margins wide enough for significant participation by the private sector, and eliminate legal and bureaucratic barriers to entry by private traders. Simple as these tasks seem, they often conflict directly with the short-run or long-run interests of policy makers in food price stabilization and of food logistics agencies in implementing it. This conflict has turned out to be especially difficult in Indonesia in the late 1980s. It is discussed at length in Part 4.

Incentives to Farmers and Diversification

Price policy for rice or wheat has an obvious impact on the short-run profitability of growing rice or wheat. The less obvious influences of price policy on the structure of incentives occur when these prices are stabilized relative to the prices of other farm commodities, thus influencing the choice of crops in ways not immediately apparent from comparisons of static profitability. In this sense, price policy is the key link between short-run and long-run diversification efforts in Asia. Three different dimensions to agricultural price policy must be emphasized: the impact of rice price policy on the profitability of diversifying into non-rice crops; the impact of stable food supplies on willingness to invest in non-food crop production for the market, including investments in non-agricultural rural activities, and the potential to use price policy for the non-rice crops themselves (including rural industrial goods) in an effort to enhance their profitability and adoption.

Price-stabilization schemes for basic food staples, for rice in Southeast Asia, have a directly negative impact on diversification programs through the following mechanisms: the enhanced profitability of rice production made possible by the stabilization (and support) of rice prices, and therefore the relative discouragement of non-rice crops in terms of the riskiness of their prices for producers; the trade-offs between the budgetary costs of price-stabilization programs for rice and the costs of adjustment for farmers and consumers if rice prices are allowed to fall (or rise); and the enhanced efficiency of the rice marketing system made possible by government investments on behalf of stable procurement and distribution capacity. Successful price-stabilization programs for rice greatly enhance the profitability of growing rice, an outcome once desired by most governments until the onset of gluts in the mid-1980s.

Redressing this increased profitability of growing rice due to price-stabilization programs is a difficult task. The government cannot simply give up the price-stabilization program for rice and allow the entire agricultural economy to reflect border prices at the prevailing exchange rate. This alternative is not desirable for reasons of

both income distribution and long-run efficiency, not to mention short-run political realities. The *price* defended by the stabilization program is a topic of policy concern, but continued efforts to stabilize domestic rice prices are likely in all countries that have been traditional importers of rice. It is possible to emphasize the positive aspects of reliable rice supplies in rural markets as an inducement to diversify away from purely subsistence production, but this affects a relatively small proportion of farmers in the more dynamic economies of Southeast Asia, including Indonesia. It may remain a significant factor in parts of rural China and Bangladesh, for example.

Nor is it feasible to redress the imbalance in the profitability of growing rice by setting up price-stabilization schemes for the non-rice crops as well. Rice in Asia has unique aspects that justify spending substantial financial and policy resources on stabilizing its price. For the same reasons that significant macroeconomic and general-equilibrium effects of price changes for rice must be factored into evaluation of stabilization schemes, the relatively minor nature of these effects for nontraditional crops argues against a "spillover" justification for stabilizing their prices. More important, many of these crops must seek export markets as well as urban domestic markets, and they must be price competitive on a day-to-day basis to establish a reputation for reliable supply. Finally, many of the nontraditional crops have very short shelf life--fresh fruits and vegetables, live fish, and livestock products, for example--or require relatively sophisticated and timely processing.

Price-stabilization schemes can work reasonably efficiently only when the commodity is storable at low cost and does not have wide variations in quality that are difficult to define in terms of standard price discounts and premiums. Few nontraditional crops meet these criteria, though corn and soybeans come closest. For countries that operate an import-substituting scheme for these crops, a temporary price-stabilization scheme organized around rural buying stations to prevent a collapse in local market prices as increased production comes on stream might make sense. But if the nontraditional crops must be exported, the most effective way to stabilize prices is to

ensure that the f.o.b. price at the port is transmitted efficiently back to farmers, after conversion at a competitive exchange rate. This approach has worked quite well for dried cassava exports in Indonesia, but only during periods of reliable export supplies. When domestic demand is large enough to consume local surpluses on Java, f.o.b. export prices are not transmitted efficiently back through the marketing chain.³⁵

The importance of price policy to diversification efforts is thus somewhat contradictory. In most cases, rice price policy actually tends to be part of the problem rather than part of the solution, but there are likely to be tangible benefits that justify imposing these added barriers to diversification. Price policies for non-rice crops might also be part of the problem, however, if they have the effect of causing farmers to produce crops for sale to government procurement agents at a guaranteed floor price and the government is then unable to turn around and sell them at a profit. The different technical and market characteristics of each crop must be examined before a uniform judgment can be made in this regard, but many nontraditional crops proposed as suitable candidates for rice diversification programs have either too complicated a set of marketing and processing requirements for government agencies to handle them efficiently or, at market prices, too low a production value to be adopted by farmers. Pilot projects to demonstrate technical feasibility of particular crops in a particular region are obvious exceptions to this general rule, but they illustrate the nature of the problem. Diversification crops must create more value added for the economy than that created by the rice they displace, and enough of the increment must be garnered by the farmer to make it profitable to adopt the crop in the first place (i.e., not all of the value added can be in processing and distribution). Rice production with modern technology under irrigated conditions at stable prices is very profitable. It will be difficult to find substitutes that have wide applicability.

35. See Unnevehr (1984) for the empirical evidence that demonstrates the sensitivity of market connections to local supply-demand conditions.

Budgetary Costs

Governments enact programs to stabilize commodity prices because free-market prices do not, by some public criteria, provide a satisfactory degree of price stability. These programs are subject to two basic principles: they are activities of the public sector that require the expenditure of public resources; and price stabilization is inherently destabilizing to some other part of the economy, usually the budget or credit system.

Stabilizing grain prices has two distinct but related components: seasonal price stabilization between postharvest lows and preharvest highs; and year-to-year stability relative to world prices. The high costs of seasonal price stabilization often catch policy makers by surprise. Squeezing the price margin to less than the lows and highs that would be dictated by the full costs of storage incurred by the private sector, including the profit and risk premium, is an expensive undertaking. The benefits, however, in terms of increased confidence on the part of farmers to invest more heavily in productive inputs, and on the part of consumers who do not need to engage in destabilizing hoarding behavior, often justify the costs of implementing floor and ceiling price policies. Poor consumers also gain directly by not being faced regularly with extremely high prices against which they have few resources to buffer their food intake.

As discussed in Part 2, stabilizing domestic prices in relation to world prices is most easily accomplished through a national buffer stock operated in conjunction with trade policy. Coordination is achieved by placing monopoly control over imports and exports in the hands of the same agency that manages the logistical operations involved in running the buffer stock. In principle, this role for the agency permits international trade to be the balance wheel that maintains a stable equilibrium between domestic demand and supplies available to the market from domestic production and net trade (and stock changes). As already noted, such direct quantitative controls conflict with GATT rules and desires of trading partners such as the United States and Australia, but they are standard in rice trade in Asia. Of the major countries in Asia, only Thailand does not

restrict international trade in rice to a state-controlled monopoly, and even Thailand has often used extensive intervention into its export trade to stabilize (and lower) domestic rice prices.

Unlike seasonal price stabilization, which always costs the government money, monopoly of international trade can sometimes yield revenue for the budget or the state trading company. The key is the level of the domestic price relative to the international price and the direction of trade. Economic forces limit the options, however, and push the results toward subsidies rather than revenues. Countries that keep their prices below border prices tend to discourage production at efficient levels and hence end up importing the needed supplies, at a cost to the budget, to keep domestic prices low (again, the exception is Thailand). In reverse fashion, countries that maintain prices to farmers well above border prices frequently produce surpluses that must be stored or exported at a loss. Because weather patterns in Asia frequently induce good or bad rice crops in many countries at the same time, surpluses in a given country tend to occur when world rice prices are low, and vice versa. Exports as a balancing device must then be subsidized; as must imports when the weather turns bad. Consequently, schemes for both seasonal and annual price stabilization require public resources to be effective.

Two distinct forms of financial resources must be committed on behalf of the public food logistics agency. Assuming the agency is implementing a floor and ceiling price policy through a combination of domestic procurement, market injections from short-run buffer stocks, and international trade, it needs a line of credit to purchase domestic grain during the harvest and to store it until needed for market injection, as well as a continuing budget allocation to cover operational losses incurred because of the squeeze on the price margin. A third form of financing, the subsidy required to cover losses on international trading (or profits), depends on prices in world markets relative to domestic prices and on the direction of trade. This relationship can change dramatically from year to year. South Korea nearly always profits when it imports rice from world markets; Indonesia did in 1983, but its imports required subsidies in 1980 and 1981. In 1985 and

1986 Indonesia had to subsidize rice exports. In 1989, Indonesia could have exported small quantities of rice at a profit, but chose to build up domestic buffer stocks under the banner of self-sufficiency.

With proper financial controls and accounting procedures, central banks and ministers of finance should expect their food logistics agencies to repay, with full interest, the credit used for domestic procurement and seasonal stockholding when the stocks are sold in the market. Continuing losses incurred on behalf of policy-dictated objectives for price stabilization should be visible as direct subsidies in the routine budget. Such an open financing mechanism for food-price stabilization has the twin advantage of clearly identifying the regular subsidies incurred by society to stabilize its staple food prices and highlighting the fact that some of the instability is transferred to the outstanding debts owed by the food logistics agency. When crops are good and purchases are high, credit needs rise sharply. This credit is not repaid until the stocks are needed to contain domestic price rises. Repayment can take quite a while if the private sector (including farmers) also holds stocks from the good harvest and provides supplies to domestic markets for longer than normal. The added interest costs on the "excessive" public stocks must then be added to the agency's routine subsidy, or the stocks must be exported (probably at a loss). The main point, however, is that demand for credit by the food agency becomes unstable as grain prices become stable. Since the outstanding credit held by a food logistics agency is often a substantial share of total credits in the formal banking system--20 to 30 percent is common--the macroeconomic consequences of this financial instability can be quite dramatic (especially if the country is operating under strict credit ceilings imposed by an IMF standby agreement, as in Indonesia in the late 1960s and Bangladesh in the early 1980s).

The transmittal of instability in credit and budget requirements to the rest of the economy can impose significant adjustment costs, no matter whether the food logistics agency is increasing or decreasing its use of credit and budgetary resources. When needs rise, interest rates rise or government loans are rationed, budgets of other agencies are

cut, investment projects are delayed, or the deficit is financed by increasing the money supply, with attendant potential for inflation (although the large grain crop that generated the requirements for additional credit has a negative impact on inflation). When loans are unexpectedly repaid as stocks are drawn down, money and purchasing power are withdrawn from the economy, with potential recessionary impact.

Offsetting the instability in formal credit markets induced by fluctuating procurement, distributions, and stock holdings by the logistics agency is a significant balancing force operating through informal credit markets accessible to consumers. As Dawe (1990) has shown, if consumers, including farm households in their consuming capacity, make consumption decisions according to some sense of their permanent income, then high rice prices cause them to borrow, mostly in informal credit markets or from household savings. Low rice prices cause consumers to save. Of course, high rice prices (and the need for consumers to borrow) correspond to periods of low procurement by the logistics agency, and little need to borrow in formal credit markets. Indeed, the logistics agency may be generating a positive cash flow and repayment of debt by selling stocks in defense of the ceiling price.

In reverse, periods of good harvests and low prices (either seasonally or from year to year), require the logistics agency to borrow heavily in order to procure rice in defense of the floor price. This is just when consumers are saving financial resources due to the low rice price in anticipation of higher rice prices later. The conditions for these two forces to exactly offset each other are quite exacting, including perfect foresight and credit markets, but clearly the *nature* of the offsetting effects reduces the destabilizing impact of credit demands by the logistics agency responsible for price stabilization. Further, the better integrated are financial markets, and the better consumers are able to predict price movements, the less credit instability will be transmitted to the real economy.

Changes in the real scarcity of food require that adjustments be made somewhere in the economy. The important questions for the analysis of stabilization schemes for food prices are which adjustments do the least damage to the growth prospects for the

economy, and to the desired distribution of income.³⁶ These questions require a general-equilibrium analysis with dynamic investment functions linked to the impact on expectations of instability in food prices, in credit markets, and in budgetary behavior of the government.

The operational significance of the two basic principles--grain price stabilization both costs public resources and destabilizes either the government budget or the credit market--is quite profound. Failure to face them directly is the most common reason for failure of stabilization programs. Planning of stabilization activities can be based on expected values under normal circumstances, and budgets can be drawn up under these assumptions. But actual operations must be conducted as reality unfolds, and reality is likely to hold surprises with respect to the size of the harvest, level of consumer demand, expectations of the private sector and its participation in storage and transportation, functioning of domestic credit markets, world market prices (in dollars), and the country's exchange rate.³⁷ For the logistics agency to cope with these surprises, it must be able to arrange for substantial credit lines on very short notice, often no more than a week or two. Many government agencies have difficulty allocating resources so quickly unless they understand in advance the need and can trust the logistics agency to spend the money, with adequate financial controls, for the intended purposes.

Communication across agencies is especially important in building the understanding of the resource requirements for successful implementation of food-price stabilization schemes for extended periods of time. Clearly, a full understanding of these requirements might lead to a decision that stabilization is too expensive. A common mistake, however, is to decide that stabilization is worthwhile on the basis of *gross* underestimates of the costs, with subsequent under-financing of the logistics agency. Speculative attacks on the agency cause it to fail, thus exacerbating price instability and significantly jeopardizing

36. If poor consumers have systematically higher-cost access to credit, or are less able to predict price movements, they will be differentially prone to large changes in their rice consumption.

37. Pinckney's analysis of the Kenyan experience with these issues presents several operational guidelines for coping with the deviation between planned and actual intervention levels.

credibility in all government activities because price-stabilization schemes are usually among the most visible of government interventions.³⁸

Such government failures are a major justification for the free-market approach to agricultural pricing, but they are not inevitable. Relevant policy analysis that is effectively communicated to policy makers can be an important input to more successful policies. However, the gaps in present approaches to improving policy analysis are painfully obvious. Academic scholars and methodologists are drawn to narrower and narrower topics that are amenable to formal mathematical treatment, whereas practitioners become more and more disenchanted with the perceived irrelevance of the new techniques.³⁹ To some extent, the experience with Indonesia's stabilization policies is a counterexample, where practice and methodology have evolved together. There is much to be learned from a closer look.

Part 4: Indonesia's Experience in Stabilizing Rice Markets

Indonesia's Food Logistics Agency, BULOG, is widely regarded as a successful example of institution building in an area of the economy where government intervention in other countries has generally been counterproductive. BULOG's terms of reference at its founding in 1967 were twofold: stabilization of rice prices and provision of monthly rice rations to the military and civil service. Its success in carrying out this mandate led to other tasks. By the late 1980s BULOG was still charged with its original role in rice markets but also was responsible for handling or monitoring sugar, wheat, corn, soybeans and soymeal, and a number of lesser commodities. The Chairman of BULOG was also the

38. See Salant (1983) for an analysis of the conditions leading to successful speculative attacks on public food agencies, and their impact on price stability, and Rodrik (1989) for an analysis of the effects of government policy changes on their credibility with investors.

39. The debate over the costs and benefits of price stabilization is a clear case in point. The dynamic and macroeconomic benefits posited in this paper are not mathematically tractable in a general model without very specific empirical parameters, which immediately cost the model its generality and credibility.

Minister of Cooperatives, and BULOG's enormous influence in rural markets was used to foster the development of Indonesia's village cooperatives. From a ragtag staff assembled hastily from the Quartermaster Corps of the Army shortly after the New Order government of President Suharto was established in 1966, BULOG has grown in size, stature, and influence in the Indonesian economy to such an extent that it now rivals the former Pertamina petroleum empire.

Inevitably, such growth and influence raise questions about BULOG's performance, the costs and benefits of the services it carries out, and its appropriate role in the future as the rest of the Indonesian economy is progressively deregulated under pressures to expand non-oil exports and shift the source of economic growth more to the private sector. BULOG has largely escaped these "winds of deregulation" so far, although not the notice of the World Bank, IMF, USAID, and others who see substantial distortions introduced to the Indonesian economy by agricultural regulations, including BULOG's interventions. Most attention has focused on non-rice commodities, especially wheat, sugar, and soybeans, where the distortions are quite visible, as the discussions at the Agricultural Roundtable late in 1987 showed. But BULOG's interventions in the rice economy are also under scrutiny, along with crop-specific acreage controls implemented by the Ministry of Agriculture, the fertilizer subsidy which is such a large share of the agricultural development budget, and irrigation subsidies. A combination of new budget realities, a shift in development thinking about the efficacy of free markets, and major structural change in the Indonesian economy in the past twenty years has focused attention on BULOG's role and mission in rice markets.

This paper is intended as the beginning of a scholarly and documented history of Indonesia's experience with rice price stabilization and market interventions. Much of that history is available up to the late 1970s; more recent experience is still not documented for the public record.⁴⁰

40. See in particular, BULOG (1971), Timmer (1975b), and Mears (1981).

The process of institution building (and remodeling) is inherently historical.

Naturally, in an ideal world analysts would be able to pull fully functioning agencies off the shelf whenever needed and throw them in the trash bin when their usefulness is gone. This is impossible, despite the assumptions of much price policy analysis that somehow implementing agencies will appear and disappear gracefully when it is time for domestic prices to equal border prices. The dynamics of building and dismantling institutions is poorly understood, especially when the policies to be implemented by the agency being built significantly influence how hard it will be to reduce its role and size. [Timmer (1988), p. 355]

The history of BULOG offers a unique opportunity to build some of this understanding, starting with how the mission of the agency was formulated in the first place. This dimension of institution building is little acknowledged in the wider applause for BULOG's success in the next phase, establishment of an implementing agency that was able to respond to its radically new mission and a rapidly changing rice economy. Agency leadership and staff-training efforts have received most of the attention, but the extent of BULOG's integration into macro policymaking and access to financial resources also played key roles. In the 1980s, BULOG has been used to "fine tune" agricultural price policy with respect to goals for production, consumption, and overall food security. The analytical and operational capacities needed for such sophisticated interventions into agricultural policy would have been unthinkable even a decade before.

Parallel to the organizational and institutional efforts to strengthen BULOG's implementation capacity was a series of analytical debates over the appropriate policies to be implemented. Although the basic mission laid out by Mears and Afiff in 1968 was not challenged, all of the key parameters in the stabilization model were subject to continuous review.⁴¹ The size of the marketing margin to be permitted between BULOG's floor price and ceiling price, the size of buffer stocks needed to supply monthly distributions and market operations, the price of fertilizer relative to the floor price and relative to world prices (and consequently, the size of the fertilizer subsidy) are issues that have received extensive analytical treatment by economists inside and outside the government. As world

⁴¹. The original policy memorandum was published in 1969. See Mears and Afiff.

rice prices fell in the mid-1980s and Indonesia developed rice surpluses, analytical attention turned to the impact of rice prices on production, on the health of the rural economy, and ultimately, to consideration of the dynamic dimensions of rice price stability on the Indonesian economy and society.⁴²

Building an Institution to Stabilize Prices, 1968-1983

The economic and political chaos of the mid-1960s took its toll on Indonesia's rice economy; yields and per capita consumption were lower in 1966 than in 1958. The chaotic conditions also generated widespread support for measures to stabilize the economy, and this meant rice. As an editorial in an influential newspaper put it in late 1967 during another surge in rice prices, "rice is the barometer of the economic situation in Indonesia" (*Harian KAMI*, September 14, 1967). To most Indonesians, no return to normalcy was possible without stability in rice prices. BULOG was created in 1967 to fulfill this mission. The institution was not created *de novo*, however, as a review of earlier efforts reveals.⁴³

Legacy of the Dutch, 1650-1940.-- Rice policy has been a function of rice prices for the entire recorded history of the Indonesian archipelago. Sunan Amangkurat I (1645-1677) prohibited the export of rice from Java in 1655 in response to a severe drought that sent rice prices up by 300 percent [BULOG (1971)]. For the next two centuries rice prices were very unstable around a steeply rising trend, and in 1847 appeared the first recorded imports of rice to Java, from Saigon.

Basic Dutch policy was to minimize controls, subject to broadly satisfactory welfare levels for producers and consumers, although the latter generally fared better. In 1863, for instance, the import duty on rice was annulled following a bad harvest. Efforts were made to increase production to keep rice prices low, and when prices fell drastically in -----

42. See Pearson, et al., (1990).

43. The following historical treatment of antecedents to modern Indonesian rice price policies is drawn from Timmer (1975).

the 1880s as part of the world-wide overproduction of cereals, the Dutch response was to require that all government needs be supplied from domestic supplies. In 1911 poor crops and the approaching world war sent rice prices up again, and again exports were prohibited.

A long period of declining rice prices began in 1930 due to Asian overproduction and the world economic crisis. Other food prices fell in step with rice prices, and farmers could not pay their taxes. The limit to the functioning of the free market had been met.

In March 1933, the Government decided to intervene. It put an end to the free import of rice and restricted it by a system of licenses. This meant more than merely a checking of free importation; it signified the intent to work toward a system of self-supply with regard to rice. Javanese rice which until then had been offered chiefly in local markets had to find its way to all the Outer Provinces. In the few rice-surplus areas of these provinces, such as Bali, Lombok and South Celebes, an inter-insular rice trade had to be started. It was necessary to replenish its stock and had to become familiar with the intricacies of a purchasing system covering all the scattered home supplies. Care had to be taken to insure a stable price so as not to raise the cost of living in the rice-consuming districts. In short, no failure of crops and no record harvest in a single territory of the vast archipelago could ever be allowed to become the occasion of a just reproach that the Government had neglected the obligations which it had undertaken to be responsible for a steady and regular supply of rice. . .

Real strategy was expected of the leaders. Here a district might be temporarily closed to outside supplies and designated to supply itself; there it might be desirable to shut out foreign supplies and at the same time to organize an inter-provincial supply; in yet another place a primitive traditional barter had, as with a conjurer's wand, to be transformed into a modern export trade. Measures had to be taken on quality, packing, freight rates, time of delivery, etc. Rice mills had to shoot up from the ground. . .

The prices at which the imported rice was sold to the public were controlled; if they appeared to be much higher than the c.i.f. value, the price level was reduced to reasonable proportions by the expedient of sending further supplies to the district concerned. Provision had to be made, too, that stocks were not left over at the end of the period of scarcity, which might be used by speculators to repress the prices of the new harvest. . .

Another insoluble difficulty is posed by the contrary interests of producer and consumer. The price of the intensively raised Java rice will usually be higher than of that raised on the South Asiatic mainland. Is it permissible to keep the price of rice high by artificial means in times when the prices of Netherlands Indian export products are decreasing? Already it has occurred that the Government has had to support Javanese rice exports to the Outer Provinces with export premiums in order to hold down the price

of rice in these provinces, while at the same time it was compelled to raise the import duties on foreign rice. . .

The peculiar character of both the raw material and the final product of the rice hulling mills made it inadmissible to allow a free growth of these plants. Danger was seen in the withdrawal of too much rice from the producer-consumers in some areas and the increase of the share of the Java mills in the paddy crops sold in five years from 12 to 21.5 percent. Therefore, in 1940, the provisions of the regulations under the industrial ordinance were applied to rice hulling mills with a capacity of 2 1/2 H.P. or more. In addition, the mills were organized and their sales centralized, on condition that they keep to the paddy purchase and rice selling prices fixed by government directive. To compensate for this restriction of liberty, the Government declared its readiness to take over any unsaleable rice surplus at the official. [Boeke (1946), pp. 112-115.]

A specialized government agency was clearly needed to implement this revolutionary degree of interference in the functionings of the rice market. It was established in April 1939 as the *Sticting Het Voedingsmiddelenfonds*, or VMF. Its finance for imports was gained from the *Javasche Bank* with government guarantee; finance for purchase of domestic rice was arranged through private banks.

Looking back with a half-century perspective reveals how thoroughly the Dutch actions of the 1930s laid the path for what was to follow. The physical apparatus in the form of rice mills, transportation and communications networks, and the legal and institutional apparatus in the form of the VMF and regulations carefully organizing all aspects of trade in rice were put in place. In addition, and perhaps most importantly, a philosophy was established.⁴⁴ It argued that rice was too important to be left alone and that the proper government response was direct intervention in the market place, frequently with trade barriers, price ceilings and floors, and an ultimate reliance on cheap foreign imports to maintain stability. Whether an efficient Dutch civil service adequately implemented these policies is a question without a full answer. Whether an inexperienced, underpaid, and demoralized Indonesian civil service could implement similar policies drawn from this inherited philosophy is a question with all too final an answer, as the history of the first two decades of the new Republic shows.

44. Some would argue that this philosophy had always been dominant in Dutch thinking. For a review (in Dutch) see de Vries (1937); in English, see Booth (1988).

Efforts by the New Republic, 1945-58.-- After the chaos of the war years and the fight for full independence, rice policy settled into the old Dutch pattern. The VMF was renamed BAMA (*Jajasan Bahan Makanan*, or Foundation for Food) in 1950, but its activities were unchanged. In 1952 this became the JUBM (*Jajasan Urusan Bahan Makanan* or Foundation for Food Affairs), again with little changed activities.

Continuing inflation in 1950 and 1951 did bring a new policy that was a glimpse of the future: rice rations were distributed in kind to civil servants and the military (and their families) to protect their income. No longer was the government rice agency interested solely in avoiding high rice prices during scarcity and low prices during surpluses. It now had fixed distribution commitments that had to be honored, month in and month out. A government that cannot pay its civil servants and army will fall. First claim on foreign exchange for imports and on the rupiah budget for domestic purposes went to rice.

The move to making partial salary payments in rice, while perfectly understandable and indeed laudable on welfare grounds, clearly served over time to politicize further a commodity that historically was already nearly beyond the control of normal market forces. Almost lost sight of for the next decade and a half was the fact that rice was not at all political to the rice farmer. To him it was traditional, cultural, and economic, but it was not political. These widely divergent views of the basic foodstuff were to cause periodic upheavals in the Indonesian government.⁴⁵

Not that the farmer was forgotten during this time; he was the source of the great bulk of Indonesia's food supply. Perpetual shortages of foreign exchange to buy foreign rice frequently caused the government to turn hopefully to the countryside for increased output. Early attempts, for example, the *Kasimo* welfare plan announced in 1952 which aimed at self-sufficiency in rice by 1956, followed the early Dutch colonial extension of

⁴⁵. These upheavals paralleled those in Europe in the 17th and 18th centuries. See Lipton (1977) for a review of the causes of the urban bias that underlay these clashes between urban politics and rural economics.

olie vlek, or "oil spot" method.⁴⁶ Good farming techniques were demonstrated at critical locations in the countryside and were to spread gradually from there. The Dutch experienced satisfactory qualitative results, but the rate of progress was much too slow to keep up with expanding population.⁴⁷

The early Indonesian plans were never adequately staffed or funded. Still, rice prices were stable from 1952 to 1954, and plans were made to eliminate imports in 1955 on the basis of the promising trends. But yields on Java in 1955 were lower than in the previous years, the JUBM was caught without stocks when rice prices started to rise sharply, and the production program fell apart in the scramble to arrange emergency imports.

Massive imports that arrived in 1956 were used to push rice prices down. Prices declined throughout most of that year and even dropped during the three pre-harvest months in 1957. But the "feeling of ease" in the rice market--that sense among urban consumers that there was adequate rice available--had been disturbed. Imports continued for the next few years on a large scale: an average of 770,000 tons per year from 1956 to 1958 compared with only 225,000 tons from 1953 to 1955. And yet rice prices more than doubled from early 1957 to late 1958 as part of the inflation created by budget deficits. The "feeling of ease," now badly shaken, was not to return for a decade.⁴⁸

Sukarno's Guided Economy, 1958-66.-- Physical rice rations had gradually been phased out in favor of cash payments for civil servants during the quiet years of the early mid-fifties. Rations for the army and police were never discontinued. But the rising prices in 1957 and 1958 brought a predictable response: reinstatement of physical rations for all civil servants and their dependents. Authority given earlier to provincial

46. See Higgins (1957) for a review of these and other efforts in the 1950s to stabilize the Indonesian economy.

47. Similar techniques to spread the "New Husbandry" that underlay the English Agricultural Revolution in the 18th century were calculated by Coke of Norfolk, one of their most vocal proponents, to have spread at the rate of a mile a year! See Timmer (1969).

48. An excellent account of the events during this time and government's response with respect to rice price policy is contained in the official BULOG history (1971).

governors to set the price of paddy at which the JUBM would buy supplies was extended to the ceiling price at which the JUBM could sell. This action, coupled with the increased reliance on physical distributions, fragmented Indonesia's rice markets very badly. Governors of surplus regions kept prices extremely low to serve the interests of their urban consumers and to reduce budget demands for providing rations for their civil servants and military, while governors of deficit regions, mostly in the outer islands, found ways to tap local export earnings in order to import rice. Jakarta was supplied by the central government's capacity to allocate foreign exchange for rice imports and through residual supplies of the JUBM.

The costs of this strategy were becoming apparent before the end of the decade. In a clash between using foreign exchange for fertilizer or for rice imports, rice in the short run always won over rice in the long run. As Indonesia's balance of payments deteriorated, the reality of the impact of monthly distribution requirements on Indonesia's rice policy was a mortgaging of the future for the present. It was a mortgage that became increasingly expensive in terms of current foreign exchange.

Once again the government, now under the banner of Sukarno's Guided Democracy (and economy), turned to the farmer for help. But an ambitious three-year program for self-sufficiency collapsed in the wake of the politicization of rice by Sukarno. It was "the main food of the people whose distribution and spreading in the guided economy was not allowed to be made an object of trade or of speculation" [BULOG (1971).] As the domestic economy deteriorated under the brunt of exploding government deficits, spiraling inflation, and negative investment, the rice economy crumbled as well. To pick the worst years, rice production dropped by 13.6 percent on Java from 1960 to 1964.

If only the rather modest trends of the late 1950s--an increase of 1.5 percent per year in production--could have been maintained on Java, output in 1966/67 would have been 5.61 million tons instead of 4.82 million tons, or 16.4 percent higher than what was actually realized.

The production problems on Java in the early 1960s were caused jointly by declining area harvested and declining yields. Yields dropped continuously from a 1962 high of 1.23 tons of milled rice per hectare to a 1966 low of only 1.13 tons per hectare, which was no better than in 1958. Compounding

the problem of lower yields, and partly causing them, was a prior decline in area harvested. This was mostly due to a deterioration, through neglect and lack of funds, in the rather sophisticated irrigation network on Java. As the extent of controlled irrigation declined, so did the area successfully double cropped. Inadequate and uncertain water supplies led to lower yields. [Afiff and Timmer (1972), pp. .]

The failure of the farmer to treat his rice in the political spirit desired intensified the foreign exchange demands of imported rice. From 1961 to 1963 over a million tons a year were imported, and then the foreign exchange simply ran dry. Imports the following three years averaged only 290,000 tons and rice prices spiraled out of control.

Since marketing is the glue that holds an economy together, the economy in the mid-1960s was quite literally coming unglued. Typically, the highest retail rice price in provincial capitals in Indonesia would be four times the level of the lowest retail price. The entire economy, rice marketing an important and special example, was unable to perform the very basic tasks of marketing--matching the seasonal and the regional price differences to the costs of storage and transportation.

But the government's penchant for intervention made matters far worse. Rice mills could operate only for the government. Despite attempts by the central government to regain control of regional rice price and trade policy from regional administrators, authority and proper communications were lacking, and most regional administrators protected their own local interests before thinking of Jakarta. Since the national government was unlikely to be of much help in times of shortage, most regional administrators simply prohibited the export of rice from their regions, no matter how low prices fell. Rice trade was easily taxed, especially at military checkpoints, and it probably provided the bulk of finance for surplus and deficit regions alike. "Rice policy, such as it was, emphasized consumer interests and local revenue generation. It is no wonder that production suffered and prices were unstable."⁴⁹

49. Quoted from Afiff and Timmer (1972), p. 135. A great deal more could be added about the details of efforts to stabilize rice prices during the Sukarno era, but the essence is conveyed above. The BULOG reference volume (1971) is the best source of information about these years.

The Stabilization Years of the New Order, 1966-70.-- Rice as a tool of stabilization and stable rice prices as the intended result date back at least to Sunan Amangkurat I. But no government since Dutch colonial times pursued the goal with quite the same intensity, resources, or skill that the Suharto government brought to the task, beginning in the last third of the 1960s.

The abortive coup attempt late in 1965 seemed the climax of a nightmare, except the unreality of the previous half decade turned out to be real. The year ended with a 1,000 to one revaluation of the rupiah. By March of 1966, when leadership was transferred to the triumvirate of General Suharto, Adam Malik, and the Sultan of Yogyakarta, an evaluation showed no rice in the warehouses of the food agency (then called BPUP), no foreign exchange in the treasury, and an inflation rate of 600 percent per year. The first task was to find new supplies of rice.

In the months December 1965 to March 1966, there was an acute shortage of rice, particularly for government employees and members of the Armed Forces. There were sufficient stocks in the free market, but depletion of government stocks led the authorities to reverse the earlier decision to stop imports. . .

Some Indonesian experts doubt whether Indonesia needs to import rice in the sense that domestic production is insufficient if properly distributed to meet reasonable minimum requirements of the population. Even these experts, however, agree that imports of rice (or the order of \$30 million) will be unavoidable because the Government is unable, organisationally and politically, to purchase from domestic sources the rice needed by the Armed Forces and for distribution in kind to government employees. To import rice for these purposes is both easier (to the cities by ship for abroad than by land transport from the villages) and cheaper (at the unrealistic official exchange rate applied to government transactions). Any attempts to do without rice imports would run into strong opposition from the politically powerful beneficiaries, the military and the bureaucracy. ["Survey of Recent Developments," *Bulletin of Indonesian Economic Studies*, 1966.]

The importance of obtaining rice for these groups, especially the military, is reflected by the highly uncertain political situation immediately following the coup attempt. The military had crushed the coup, but Sukarno was still in power. His sympathies, moreover, remained with the coup organizers, and so the military was left to fend for itself. To do so, a network of national logistical commands was set up

(KOLOGNAS) to provision the military and civil service. It obtained some rice domestically, but the bulk of its supplies came on special arrangements from Burma and Thailand and from a surprisingly fast offer of PL 480 rice from the United States.

There was no hope for stability in 1966. The budgetary process was too disrupted, the political situation much too unsettled, and the economy too shattered for hopes of anything but mere survival. And although rice prices increased more than threefold during the year, the country did survive, and by early 1967 General Suharto emerged sufficiently powerful to set the country on a course of stabilization. The military emergency over, the KOLOGNAS network was disbanded and replaced with BULOG, the presently functioning Food Logistics Agency, directly under the control of the President.⁵⁰

For once, the stabilization strategy involved more than massive injections of imported rice. From budget deficits double and triple the total government revenue, the budget was to be balanced, quarter by quarter.⁵¹ From government loans with annual interest rates of 6 percent per year in nominal terms and negative real rates, loans henceforth charged a real positive rate of interest commensurate with the capital scarcity in Indonesia. *Monthly* interest rates early in 1967 from the State Bank ranged from 6 to 9 percent depending on the priority of the sector involved. By mid-July it was possible to reduce them to 3 to 5 percent per month.

The food supplies side of stabilization required a double-edged attack. Large imports of food aid commodities, mostly rice and wheat flour, were arranged to keep rice prices under control directly. But the counterpart rupiah funds were channeled to the government's Development Budget, which in the first few years was to draw almost exclusively on aid financing for support. The Routine Budget was financed entirely from domestic revenue collections, especially import duties. Ultimately the surplus from the -----

50. This administrative arrangement is important. It means that BULOG is not a "budget agency" directly responsible to the Ministry of Finance, and its employees are outside most civil service restrictions, especially on salaries.

51. Although revenues generated from foreign loans counted in balancing the domestic budget.

Routine Budget was also channeled to the Development Budget, and this surplus became quite large when oil prices went up in the early 1970s.

The inflation rate was reduced from 650 percent in 1966 to 120 percent in 1967. Still, the year was very nearly a disaster for the new government because rice prices were less stable than the overall price level in the economy as a whole, something of a reversal for Indonesia. Early in the year rice rations were discontinued; the rice agency simply ran out of supplies. The situation eased as the wet season harvest arrived in May and some imports also started coming in. The old trade-off between short run and long run was resolved in the historic fashion, but new sentiments were being heard.

There was a strong case for using . . . foreign exchange to buy fertilizer rather than rice. There was indeed increasing recognition of the short-sightedness of a price policy which, by artificially keeping down the price of rice while allowing the price of imported fertilizer to rise through currency depreciation, made it uneconomic for farmers to buy fertilizer to expand rice production. But to tackle the problem by raising the price of rice was enormously difficult politically; and to reduce the price of fertilizer would require new subsidies in the teeth of the Government's resolve to abolish subsidies. ["Survey . . .", 1967.]

Still, the Ministry of Agriculture did agree to carry a subsidy on urea fertilizer of 3 rupiahs per kilogram, permitting a reduction in its price from Rp 21.5 per kilogram to about Rp 18.

Despite the government's resolve to keep rice prices low and despite a fairly successful domestic purchase program that brought in over 500,000 tons of milled rice in the face of obvious administrative and financing difficulties, limited supplies in the world export market due to strong competition from China, Japan, and the Philippines meant there was not enough rice available to meet demands. A severe food shortage gripped Indonesia when the dry season crop turned out to be sub-average. From the harvest low at the end of May rice prices doubled by the end of October and redoubled by mid-January 1968.

One result of the rice crisis was an increase in the cost of living in September which ruled out any possibility of keeping the rate of price inflation for 1967 as a whole within the 65 percent target. Since the cause was from the side of supply, not demand, this did not necessarily imply a

serious impairment of inflation control, however painful the additional burden on those with low and relatively fixed incomes. Until the next harvest, the food situation seemed likely to remain a major preoccupation for the Government, not least for its political implications. The student newspaper's editorial comment that "rice is the barometer of the economic situation in Indonesia" was bad economics but important politics.

Provided, however, the food situation remained manageable, politically as well as socially, the September rice crisis, not unlike the August banking crisis, might in retrospect appear to have been a blessing in disguise. After the deliberate increase in public utility charges and other previously subsidized prices in February, the uneconomically low price of rice had remained as the single most important distortion of the price structure. Until September [1967] it seemed doubtful whether the Government would be willing to court political trouble by raising the price of rice closer to the cost of imported rice or to the level at which it would pay farmers to buy fertilizer to produce more rice. The September crisis forced the Government's hand. ["Survey . . ." (1968).]

The crisis refreshed short memories as to the key role of rice in any stabilization scheme. At the time, it accounted for 31 percent of the Jakarta cost of living and had important indirect effects on other economic sectors due to its dominant role as the wage good.

But the psychological and political significance of the price of rice is much greater still. It was the fact that to most Indonesians the price of rice is the touchstone of price stability which made the confidence reactions to the sudden rise in the price of rice in September and again in January so devastating. If . . . both the rise in the cost of living and in the exchange rate went further in December and January than the domestic monetary situation would have led one to expect, the main explanation is undoubtedly the collapse of confidence that followed the government's loss of control over the price of rice. ["Survey . . ." (1968).]

The hard-learned lessons of 1967 had immediate returns in 1968. The government decided to pay farmers an incentive price for their surplus rice, based on the *Rumus Tani* (farmer's formula), which says the price of milled rice and urea ought to be about the same for the farmer. In combination with a major new production effort as part of the BIMAS (mass guidance) program, these incentives meant that 1968 was a good year for price stability.⁵² An excellent harvest and the incentive price paid by BULOG permitted domestic purchases of 600,000 tons. Imports exceeded 625,000 tons. Prices in Jakarta in -----

52. The BIMAS program has been the subject of extensive discussion and review. See in particular the DPIS Report (1983) and Booth (1988).

December 1968 were actually lower than in December 1967, and they continued to decline through the preharvest period from January to March 1969. Prices continued to fall throughout the 1969 harvest to very low levels, as BULOG was unable for administrative reasons to buy more than 200,000 tons despite a good wet-season harvest. A poor dry season, plus a shift in crops away from rice by farmers disappointed in the prices of the wet-season crop, left supplies smaller than anticipated. BULOG's failure to purchase adequate quantities domestically and reduced concessional imports, due to a good harvest and low prices, meant inadequate stocks late in 1969 to keep rice prices stable. The situation was brought quickly under control, again with emergency imports--with seriously inadequate accounting--but the experience served to burn anew the just-healed scars of 1967.

Surviving the World Food Crisis, 1970-1974-- Although the First Five-Year Development Plan (REPELITA) was drafted in 1968 and inaugurated April 1, 1969, it was a document for the seventies. It was formulated on a premise of stability which came to full fruition in the 1970-72 period, and it was built around self-sufficiency in rice. The plan fortunately did not spell out program details. The failure of the production program (BIMAS *Gotong Rojong*) and the BULOG domestic purchase program in 1969 required major changes if self-sufficiency were to be achieved. And major changes in both areas were soon forthcoming. The poor performance of the BIMAS *Gotong Rojong* was interpreted as a failure of the command nature of the program. When it was suddenly discarded in mid-1970 (after President Suharto traveled incognito to several rice-growing areas to talk with farmers), the program was replaced by a highly incentive-oriented "perfected BIMAS" organized around village units. The program stressed getting profitable inputs, subsidized credit, and information out to the farmers and letting them decide whether and how much to participate. Fertilizer distribution was partially turned over to the private market, with a charge to sell for no higher than the ceiling price of Rp 26.6 per kilogram for both urea and triple super phosphate (TSP). The price required a subsidy to distributors of Rp 7-8 per kilogram (in 1971) which was covered from the

Development Budget. From the very beginning of the Government's efforts to support incentive prices, a fertilizer subsidy was an integral component of the calculations.

The second innovation was to implement an effective floor price for stalk paddy. With the lesson learned several times over that farmers do not like to repay debts with stalk paddy at below market prices, BULOG was instructed to prevent the price of village dry stalk paddy from falling below Rp 13.2 per kilogram. Earlier attempts to use the Rumus Tani as a guide to price failed due to great uncertainties on the part of local BULOG agents as to just what price to pay. In 1968, for example, it ranged from a low of Rp 27 per kilogram for milled rice in Lombok, to a high of Rp 46 near Jakarta. Such regional variations might have made sense in terms of the realities of local fertilizer prices, but they did little to help integrate the Indonesian rice economy. With a national fertilizer price ceiling established, it was possible to establish a national floor price. Although the floor price was stated as Rp 13.2 per kilogram for stalk paddy in the village, it was implemented by having BULOG pay Rp 36 per kilogram of milled rice at the rice mill.

With such forceful actions taken on behalf of the farmer, the government felt it could likewise commit itself to a nation-wide ceiling price for rice. Medium quality rice in urban markets was not to sell for more than Rp 50 per kilogram. This permitted an expected spread of between Rp 8 to Rp 10 per kilogram between the seasonal low price and the seasonal high price. Although this margin was very narrow in terms of prevailing interest rates, the private trade did seem to find it profitable to carry stocks in 1970 and 1971, partly perhaps because of increased supplies from the second harvest.

By mid-1972 the new programs looked like major success stories. Rice production was exceeding the high targets set in REPELITA, BULOG was so successful it took over handling responsibilities for wheat flour and sugar, and the National Planning Agency (BAPPENAS) and Ministry of Finance were trying to find alternative sources of revenue to take the place of food aid counterpart funds, which seemed about to disappear.

Instead, the generally good weather from 1968 to 1971 ran dry (throughout most of Asia). In addition, BULOG moved quickly to improve its buying standards in order to reduce storage losses, and ended up buying very little rice in 1972. In a repeat of 1969 (and 1967), the dry season was poor, BULOG stocks ran out, and imports were suddenly hard to find. The government lost control of the rice situation and reverted to emergency imports as the solution. More than a million tons of very expensive rice poured into Indonesia from mid-1972 to mid-1973, before the world market for rice all but disappeared. A year earlier it had seemed that no imports at all might be needed. Urban rice prices went through the ceiling price of Rp 50 per kilogram in late 1972 and were more than double that level by mid-1973.

The Drive to Self-Sufficiency, 1975-1983.-- By the mid-1970s it was possible to see just how important stability of the rice economy was to the overall success of the development program, and its vulnerability to events in the world rice economy. A new Chairman of BULOG had been appointed during the crisis, General Bustanil Arifin, the former deputy for logistics who was recalled from his position as Consul General in New York. Financial constraints were nearly eliminated as petroleum dollars flowed into the Ministry of Finance after OPEC succeeded in raising oil prices. The disappearance of rice supplies from world markets in 1973 clearly established the political vulnerability of relying on large imports of rice. Farmer welfare received substantially more attention in the late 1970s as the political goal of rice self-sufficiency was translated into operational terms. Since the civil service and military were no longer so dependent on rice rations to maintain their real incomes, the pressure was off BULOG always to keep monthly distributions as the top priority. It had the resources to meet these requirements without difficulty.

From 1975 to 1983 BULOG implemented the government's floor and ceiling price policy and delivered monthly rations to the Budget Groups without a hitch. The changed external constraints noted above account for part of this success, but internal developments also played a major role. With the enthusiastic support of the Chairman,

massive and expensive efforts at staff recruiting and training were designed and carried out by Sidik Moeljono, the head of the expert staff. Supporting the floor price received top priority as a way of stimulating domestic rice production, a crucial task because of the perceived unreliability of the world rice market. From 1974 to 1978, persistent problems with disease and pests associated with the new rice varieties kept upward pressure on rural prices, so maintaining the floor price was relatively easy at the prices actually set, which merely kept pace with inflation. As world rice markets returned to normal in the late 1970s and Indonesia's foreign exchange reserves remained ample, BULOG turned increasingly to imports to meet rising demand in urban markets. Imports from 1977 to 1980 averaged nearly 2 million metric tons per year, or about one-fifth of the total amount of rice traded internationally.

The combination of disease and pest problems, which led to the widening import gap, and deteriorating rural-urban terms of trade as a by-product of Dutch Disease, which caused severe problems of rural poverty, forced a reevaluation in 1978 of development strategy and the role of rice in it. Once again, BULOG was ill equipped to take the lead in rethinking its mission in the context of broader objectives and constraints. It was not a key player in either of the two basic policy changes in 1978 that set the rural economy in a new direction: the surprise devaluation of the rupiah in November 1978, which was partially intended to provide "exchange rate protection" to the rural economy; and the decision to keep fertilizer prices constant while continuing to increase the floor price for rice at about the rate of inflation.⁵³ *Nominal* urea prices were unchanged from 1976 to 1983, and they were increased only slightly in 1983. When IR-36, an IRRI rice variety resistant to the most troublesome pests and diseases, was introduced on a nationwide basis in 1978, the stage was set for a surge in rice production that would transform BULOG's role. By 1984, the country was self-sufficient in rice, domestic procurement replaced imports as BULOG's sources of supply shifted, and the agency's success in defending the

53. See Timmer (1984a) and Warr (1984).

floor price was widely cited as a key factor in the unprecedented increase in rice production.

Managing Self-Sufficiency, 1984-1989

The switch in primary source of supply had a radical effect on the management of BULOG. Far more logistical capacity was required; local warehouses, mills and transportation facilities were needed as domestically produced rice had to be stored and transported to points of distribution--a more complicated task than ordering imports for delivery at the time and location desired. Financial operations became much more complex when the variance in domestic procurement increased and the average time rice stayed in storage (and storage losses) rose. BULOG's outstanding credits from the Central Bank became a significant proportion of total bank credit for the whole economy. The agency became a significant macroeconomic actor.

Comparative experience would suggest that this was a dangerous time for the agency. It needed huge sums of money on a flexible basis for fixed investments, seasonal inventory, and operational expenses. *None of this financing was provided in the Routine Budget of the Ministry of Finance.* Finding funding mechanisms was a major challenge. They had to be sufficiently stable to permit long-range planning, sufficiently flexible to accommodate large variations in procurement financing on short notice (before rural market prices fell below the floor), and yet not too distorting to the rest of the economy. Senior leaders in the agency and their advisors worked closely with senior members of the economic team (the EKUIN ministry and the "Economic Cabinet") and their advisors to find pragmatic solutions. Several measures contributed to keeping BULOG's finances off the front burner of political concerns.⁵⁴ Although some individual components of the agency's finances were public knowledge and officials in the Ministry of Finance reviewed BULOG's costs each year in order to calculate the "book price" for sales to the -----

54. These measures included interest rate subsidies on an open line of credit at the Central Bank, annual increases in book profits from revalued rice inventories as nominal rice prices rose each year, "cost-based" pricing for rice delivered to the Budget Groups, and profits from trading additional commodities put under BULOG's responsibility.

Budget Groups, no one outside BULOG understood all the components of the financing mechanisms. It is probably true that no one inside BULOG knew how the individual components related to each other or how dependent they were on the external dynamics of Indonesia's rice economy.

Those dynamics changed radically as Indonesia approached and then surpassed self-sufficiency in rice. Substantial surpluses emerged in 1985, BULOG's warehouses were still full from the record 1984 procurement, and support of the floor price was unsuccessful. Rice prices fell 20 to 30 percent below the floor price in many areas. Once again, BULOG was unprepared for an unexpected new mission, managing surplus stocks. A major external study undertaken in August 1985 revealed several fundamental problems with the design of rice policy and BULOG's structure to implement it. The structural problems related mostly to financing mechanisms; the report concluded that without significant changes, BULOG would be bankrupt before the end of the decade.

It is worth reviewing this episode in some detail to illustrate the broad range of analytical, financial, and management problems inherent in any operational effort to implement a price stabilization policy in the context of self-sufficiency. Three serious problems for Indonesia's rice economy appeared in 1985:

(1) Large domestic procurement relative to very small market operations and subsequent build-up and aging of BULOG stocks;

(2) Low prices to farmers during the main harvest in February-April, 1985, with *short-run* consequences for incomes of larger rice farmers; and

(3) Rice prices that had remained very stable at the retail level for over two years, with consequences for the role of the private sector in rice storage, *long-run* income prospects for rice farmers, and the financial viability of BULOG under its existing funding arrangements.

To a substantial extent, all three problems were triggered by the collapse of the world rice market, where prices were over \$400 per ton in 1981 but had fallen to below \$200 per ton by mid-1985 for qualities similar to those produced and consumed in Indonesia. If world prices for these qualities had remained at \$400 per ton, there would have been no "rice crisis" in Indonesia. BULOG's "surplus" stocks would have been a valuable export commodity, prices for farmers would easily have been supported, and normal seasonal patterns of rice prices would be seen by allowing urban retail prices to rise during the four to five months before the main harvest. The underlying cause of the problem was thus a fundamental change in world market forces.

From both a short-run and a long-run perspective, however, some of the problems could be traced to Indonesian rice policy and the success with which its various components had been implemented. In addition, even if the problems were *caused* by international market forces, they remained *Indonesian* problems. Consequently, adjustments of domestic policies and changes in their implementation were the only sensible response.

In the long-run, Indonesia contributed to its own problems by the success of its rice production program. The conversion in the early 1980's of Indonesia from an importer of 1 to 2 million metric tons of rice annually to a net exporter had a dramatic effect on the world rice market. Although all grain prices were low in the mid-1980s, rice prices are depressed even relative to long-run relationships with wheat or corn. This shift in relative prices was due largely to the withdrawal of Indonesia from regular import status. Attempts by Indonesia to solve its rice surplus problems by exporting sizable quantities in current market conditions exacerbated this depressing effect.

BULOG's short-run implementation of rice price policy also created some of the problems. Successful defense of the floor price in 1984 yielded 2.5 million metric tons of domestic procurement; somewhat less successful implementation in 1985 yielded 2.0 million tons. With large production, huge stocks, and stable prices, market operations to supply urban consumers were minimal. Two acute problems were then caused by these

efforts to implement the existing price policy: large BULOG stocks of deteriorating quality caused very high storage costs at the same time that sales revenues were sharply diminished due to small market operations; and efforts to improve the quality of rice procured in order to enhance its storability had a significant depressing effect on prices received by farmers for their gabah, just as in 1972. Both problems would have been solved quite easily if world rice prices were \$400 per ton. But expectations at the time, however, suggested (only partially correctly) that low prices were likely to prevail in the foreseeable future, and so domestic policy changes were identified to solve the problems.

The seriousness of these problems was stressed in the study team's report to the Government [Falcon Team (1985)]. Continued failure to implement the announced floor price would jeopardize the confidence that farmers had built up in the government to deliver on its policy promises. This confidence was a key factor in stimulating rice production. Farmers adopted new technology, used large quantities of fertilizer, and made farm-level investments on the basis of this confidence. A well-supported floor price had been and continued to be an important tool in the kit of policy interventions available to the Indonesian government in its efforts to foster agricultural development. Farmer confidence in the government's floor price was taken for granted because of the apparent ease with which it was created between 1975 and 1985. But few governments have been able to establish long-run trust on the part of their farmers, and most developing countries are envious of Indonesia's capacity to do so. The government was urged to give continued high priority to maintaining the trust of its farmers by implementing fully the policies that are announced.

The financial problems for BULOG were also very serious. Before 1984, BULOG was able to finance its cash flow requirements with a negotiated price for rice distributions to the Budget Groups. BULOG's costs were kept down through a subsidized interest rate on its outstanding credits with Bank Indonesia (BI) (now handled by Bank Rakyat Indonesia (BRI)). A "book profit" was shown each year by valuing the carry-in stock at the new negotiated price. When rice prices were rising and market operations

kept procurement and distributions roughly in balance (with import volumes used as the adjustment mechanism), BULOG's rice finances were healthy.

The situation in 1985 on the rice account was totally different. Imports were not available to balance the physical side of the ledger, cash flow was sharply reduced due to low market operations, and BULOG's cost price was significantly above market prices because of high storage costs on a very large rice stock. The financial integrity of BULOG as a food logistics agency was severely threatened by policies in place in mid-1985, and bankruptcy was almost inevitable unless fundamental changes were made in the mechanisms by which BULOG was funded.

The team identified five interrelated issues that arose from these three broad policy problems. Each issue presented major analytical and empirical problems in its own right. But each was, and is, also connected to the others in such a way that an overall, integrating framework of analysis is needed to ensure consistency of policy interventions. The analysis conducted was from the viewpoint of the entire economy, although no formal macroeconomic model was used to ensure full consistency of general equilibrium consequences of rice policy interventions.

The five major issues analyzed by the Team were sequential in the sense that resolution of the first issue lead to the second, and so on. This sequential logic is followed in the list of issues and in the subsequent discussion.

(1) What is the appropriate size of BULOG stocks on September 1, when they are normally at their maximum for the year? Three categories of stocks can be identified: (a) normal operating stocks, (b) iron stocks to ensure food security, and (c) stocks in surplus relative to requirements for (a) and (b). Earlier calculations (Timmer, 1984b) suggested that for September 1, 1985, these levels were approximately 1.5 million tons, 1.0 million tons, and 1.1 to 1.2 million tons, respectively. That is, more than a million tons of rice were surplus.

(2) What are the appropriate financing mechanisms to cover the cash flow requirements for each type of stock? BULOG's traditional funding mechanisms were adequate for the normal operating stocks, but a new line item in the national budget specifically for food security was recommended to finance the iron stock. Disposal of surplus stocks required sizable and transitional subsidies.

(3) What stock management mechanisms and operational guidelines can maintain the desired level of BULOG stocks? In the very short run, surplus disposal techniques include export subsidies, subsidized sales of low-quality stocks for domestic livestock feed, distributions through food-for-work or poverty alleviation programs, and subsidized development of industrial and food processing uses of rice, such as industrial alcohol, breakfast cereals, and rice flour. Over a period of two or three years, adjustment of fertilizer and gabah floor prices can change the rate of growth of rice production and thus alter BULOG's balance between domestic procurement and distribution. In the unlikely event of several years of poor production and a significant drawdown in BULOG stocks, imports could be arranged with relative ease. Subsequent events revealed that the constraint on obtaining imports was domestic politics, not foreign exchange availability or physical supplies in world markets.

(4) When stocks are approximately in balance, what policies and programs are needed to keep Indonesian rice production and consumption in domestic balance? Indonesia does not seem to have a competitive advantage in rice exporting, and imports are likely to be politically undesirable except in emergency situations. Finding a rice production strategy that just matches the growth in consumption is thus crucial to avoid paying substantial and continuing export subsidies. This issue is complicated by uncertainties about actual levels of consumption, especially because of the likelihood of significant smuggling of foreign rice in to or out of Outer Island markets when wide differentials exist between domestic and world prices. In addition, a serious lack of knowledge exists with respect to the role of rice prices in generating a dynamic rural economy. Plausible arguments can be made for both the short run and long run either

way--that the rural economy is better off *or* worse off when rice prices fall relative to other goods and services.⁵⁵

(5) What happened to domestic rice prices in 1985? Was there a serious failure in policy implementation, such that rural rice prices fell below the floor price, or did a combination of non-implementation factors, such as poor gabah quality or new marketing arrangements, cause the widespread reports of low rural rice prices from February to July? What does successful implementation of a floor price at E' LOG or KUD (Cooperative) buying stations mean for farm-gate prices, and who bears the burden of higher effective quality standards, which are required for BULOG stocks to have smaller quality losses during extended storage?

Answering some of these questions was easier than others. Great concern was expressed for placing the iron stock on a firm financial and managerial basis. Because holding the iron stock is in the food security interest of the entire country, a specific line item in the National Budget was proposed on the basis of national security and welfare. One obvious advantage of such a specific budget appropriation is the attention it focuses on Indonesia's success in achieving food price stability and self-sufficiency in rice production. These are not costless achievements, of course, and their continued maintenance is reflected clearly in the need for an annual Budget appropriation to cover the costs of food security.

A second priority was returning the rice economy to a longer run balance. After the two to three year period of surplus stock adjustment, rice production seemed likely to need to grow about 3 percent per year on average in order to match the trend in consumption growth. Although this rate is smaller than the growth in production of 4.8 percent per year from 1968 to 1984, and significantly less than the 7.2 percent growth from 1977 to 1984, maintaining a steady growth in rice production of even 3 percent per year is no simple task. By 1985 many of the easier gains in both yields and irrigated area

55. This uncertainty led to the commissioning of a major study of the Indonesian rice economy. See Pearson, et al. (1990).

planted to rice had been made. Maintaining growth in rice production in the late 1980s would depend on several factors.

(1) *Investments in rural infrastructure* at existing levels of funding. The major investments affecting rice production are in rehabilitation and construction of new irrigation systems, and both of these components are likely to be needed at roughly their present rate of development well past the turn of the century. More broadly, continued expansion of the road system, both trunk highways and farm-to-market roads, will pay large dividends by lowering marketing costs and increasing the integration of the rural economy with the urban growth centers. Similarly, much fuller development of modern communications systems in rural areas, widespread availability of reliable electricity, and facilitation of private marketing centers and transactions will simultaneously speed diversification and provide efficient signals to rice farmers about desired levels of production.

(2) *Expansion of agricultural research efforts on rice.* No slackening of research devoted to rice is possible given the vulnerability of modern varieties to a host of pests and diseases. In 1985, more than 60 percent of Indonesia's rice area was planted with IR-36 or close relatives, which were highly resistant to prevalent bio-types of pests but which, it was feared, would eventually succumb to attack. Before then, varieties resistant to the *new* pests needed to be made available, and this would not be possible unless rice scientists continued their development of diverse genetic characteristics in a wide range of seed types.

Higher yields were also needed, since area under rice cultivation grew only about 1 percent per year historically, and even this rate was expected to slow in the future. The relatively easy gains in yields achieved through short-maturity varieties, better water control, and higher fertilizer applications were already being reaped. Continued, and expensive, adaptation to local ecological settings would be needed to continue even a slower growth in yields for the next decade.

(3) *Major research attention to non-rice crops.* The share of rice in agricultural Gross Domestic Product (GDP) dropped from 37 percent in 1968 to about 27 percent in 1985, even in the context of its very successful production growth. Structural adjustment in the rice economy was expected to be more rapid in the last half of the 1980s, and farmers would need to find new sources of income. Secondary foodcrops for export, such as cassava and corn, or for import substitution, such as soybeans, could offer some farmers attractive returns relative to rice if higher yielding seeds, effective agronomic techniques, and efficient marketing procedures were available. An array of foods with high income elasticities for domestic consumption attracted some farmers who had access to urban markets. Fruits, vegetables, and livestock products all yield higher value-added per hectare than most staple food crops (although irrigated rice at the announced floor price is often competitive with even these higher-valued commodities). New varieties of fruits and vegetables with much greater disease resistance, improved market access and price information for farmers not immediately adjacent to cities, and encouragement of processing facilities for both domestic and export markets could soften the transition from the assured high incomes from rice cultivation to the riskier and more complicated horticultural and livestock husbandry base which must provide the long-run future for Indonesian agriculture, especially on Java.

(4) *Facilities and procedures for exporting bulk commodities* must be improved. As farmers diversify away from rice toward crops in which Indonesia has a comparative advantage, such as corn, cassava, and a wide range of tree crops, reductions in marketing charges, port and handling costs, and freight rates are needed for full international price incentives to reach the farmers.

(5) *Price policy* was a key factor in stimulating Indonesian rice production, especially since 1977. The floor price to farmers was kept at incentive levels in real terms, and fertilizer prices were heavily subsidized. There is no question that this incentive price policy paid high social dividends so long as Indonesia was a net importer of rice. In the circumstances of the mid-1980s, however, both the gabah price and the

fertilizer price needed to be re-examined. In the short run, holding the gabah price constant in nominal terms (almost the same as holding it constant in real terms, given Indonesia's low inflation rate), while increasing the fertilizer price, was expected to have desirable effects on BULOG stocks by reducing the rate of growth in rice production. For the longer run, however, renewed attention to increasing financial incentives to grow rice was likely to be desirable, both to re-establish production trends at roughly a rate of growth of 3 percent per year and to foster income and employment growth in the rural economy.

The impact on rural incomes of proposed policies designed to slow the rate of growth in rice production was quite uncertain. While it is clear that farm households that produce a surplus of rice for sale to the market are hurt by lower rice prices or higher fertilizer prices, such households comprise only one of three in rural areas. Roughly two-thirds of rural households are likely to be better off when rice prices are lower. They can devote a smaller share of their expenditures to rice and a larger share to other foods, to clothing, housing, education, health care, and so on. The multiplier impact from these additional expenditures may be just as large as the reduced multiplier effect when large rice farmers' incomes fall, although the evidence was simply too spotty at the time to make a judgment.

The long-run impact of lower rice prices is even more difficult to judge. Many "non-farm" jobs in the rural areas depend on the level of rice output, the input and output processing activities, and the small businesses created by investing profits from rice farming. Determining the role of rice prices in the dynamism of the rural economy became a high priority research topic so that rice policy for the rest of the century could be based on a real understanding of the degrees of freedom available for rice price interventions.⁵⁶

56. See Pearson, et al. (1990) for the preliminary results.

Both statistical evidence and press reports showed that rural rice prices during the main harvest in 1985 were significantly lower than in 1984, despite the government's announced intention to raise the gabah floor price from Rp 165 per kilogram to Rp 175 per kilogram. It is important to identify the main contributors to this price decline in order to have clearer operational guidelines to cope with the next major surplus.

(1) A number of KUDs had liquidity problems in February and March 1985, as the main harvest was coming in. In combination with tight credit for private traders as well, inadequate funds were available in rural areas to buy all the gabah farmers wished to sell. Much of the difficulty for the KUDs was cleared up by April, but low prices and continued high cost credit to the private trade continued to limit the capacity of farmers to sell their crop for cash. Many ended up selling to traders on consignment, taking whatever price the trader was ultimately able to obtain when a final sale was made either to rural markets or the KUD/DOLOG.

(2) DOLOGs tightened the tolerances permitted in deviating from their historic quality standards, and hence a somewhat higher proportion of submitted samples for purchase was rejected in 1985 than previously. But more importantly, the KUDs may have rejected even more potential purchases to ensure not being stuck with gabah or rice that the DOLOG might reject. The effect of tighter tolerances enforced by DOLOGs was to shift the costs of low-quality rice and gabah away from the DOLOG to the marketing sector. Since rice marketing is extremely competitive on Java, most of this cost burden was passed almost immediately down the marketing chain to farmers, in the form of lower prices.

(3) In some locations, local DOLOG warehouses were full shortly after procurement began, and traders were asked to deliver to other warehouses that still had space. The higher transportation costs incurred were passed down in the form of lower farm prices. Field reports also suggest there were sometimes "informal charges" for finding empty warehouse space, and these charges too ended up being borne by the farmers.

(4) There are reports that the physical quality of gabah harvested in 1985 was significantly lower than in previous years. This may be attributable to gradual deterioration in the seed used by farmers or to weather conditions during the harvest. Statistics from the Department of Agriculture show that as much as 80 percent of gabah and rice in rural markets failed to meet BULOG procurement standards.

Three key lessons emerge from the 1985 experience, even if weights cannot be attached to each of the four reasons listed above for the low prices. First, it is important to define the floor price clearly and precisely. It is *not* a "farm gate" guarantee--no country can do that--but rather a promise to buy a certain quality of rice or gabah at a reference buying station, a KUD or DOLOG warehouse. Farmers understand this perfectly well, but it is not clear that the press or some concerned citizens do.

Second, there is an entire *structure* of rice prices in the countryside, from the DOLOG buying price for high-quality, mill-dry gabah or rice, all the way down to a *tebasan* price for a standing field of still-green *padi*. A farmer may quite willingly and wisely sell the standing crop to a trader at Rp 120 per kilogram on the basis of an estimated yield in the full knowledge that the trader will eventually sell the harvested, dried, cleaned, transported, milled, and stored rice to the DOLOG some weeks later for the gabah-equivalent price of Rp 175 to 180 per kilogram. The government's floor price, even when perfectly implemented, affects the *level* of this structure of rural rice prices, not the structure itself.

Lastly, in a competitive rice marketing system such as that on Java and in other rice surplus regions, if DOLOGs will not accept low-quality rice the cost burden will very quickly be pushed back on the farmers. This will be "unfair" if they do not expect to bear this burden and if local facilities are inadequate for farmers or traders to raise the quality of harvested gabah to DOLOG standards. But the cost burden will settle on the farmers or on BULOG, and costs will be large until adequate grading and drying facilities are widely available in the countryside.

After the team's report was submitted, the government acted quickly. By January 1986, a special line item had been inserted in the Routine Budget in response to that concern. Although the budget allocation was never funded because of the collapse of oil prices later in 1986, it focused the attention of senior economic policy makers on problems with BULOG financing mechanisms and increased their understanding of the large costs of implementing a price stabilization policy.

Price policy was reconsidered and a new pricing model was proposed:

Floor price and fertilizer price policy should be thought of as a short-run tool to manage production trends, subject to constraints imposed by world price levels for both rice and fertilizer and availability of budget resources to finance wide price divergences. Price incentives have been particularly strong for the past eight years. Several years of reduced incentives will significantly improve BULOG's stock position without seriously jeopardizing rural incomes in the short run. Longer-run price policy needs a significant research effort before permanent changes could be made with confidence. [Falcon Team, 1985]

This call to use price policy to fine tune BULOG's stock position relative to trends in domestic production and consumption required yet another ratcheting upward in the agency's capacities to analyze and implement policies that affected the rice economy. The new pricing model was used to reduce incentives gradually to rice farmers. Rice production slowed its rapid expansion and rested at a plateau from 1986 to 1988 that left procurement sharply below the levels of the previous five years. BULOG's surplus stocks were exported and used for distributions to the Budget Groups; by late 1987 the agency was unable to inject enough rice into retail markets to maintain price stability.

The shortages caught everyone by surprise. The attention of most policy makers and analysts was still focused on surpluses and government initiatives to stimulate diversification out of rice just as an Asia-wide drought, plus reduced stocks in the United States due to export subsidies, flipped the thin international market back to shortage. With a relatively short delay, Indonesian rice prices followed world prices up, ending 1988 at rough parity. However, because Indonesia had maintained its domestic rice prices well above those in world markets during the worst of the surplus in 1985 and 1986, its price

increases were relatively smaller than those in the world market. Once again it seemed as though there was a longer run vision behind the stabilization program, although the abruptness of the domestic price increase was quite unsettling to many consumers and policy makers.

BULOG activities were badly disrupted during the episode. Because of the strict policy of self-sufficiency being enforced by the President, imports were not available to replenish stocks used in a vain effort to control price increases in late 1987 and early 1988. The Government's floor price had been announced before prices ran out of control and by the procurement season in February, 1988, BULOG's permitted buying price was well below the structure of rural rice prices. Even with special task forces, premiums paid through the KUDs, and direct appeals to rice traders, BULOG was unable to replenish its stocks from domestic sources. Prices rose sharply from May to July and then stabilized at levels that have been maintained through the end of 1989.

BULOG was able to "recall" rice shipped abroad in 1986 as well as obtain permission for small quantities of rice under PL 480. The roughly 400,000 tons of external supplies that arrived late in 1988 and 1989 were never called "imports" in public, but they did ease the agency through a difficult period before the excellent harvest in 1989 arrived. Excellent rains late in 1988 and very substantial price incentives for farmers, by some measures the highest since the late 1960s, produced a bumper crop. BULOG was able to procure over 2.5 million tons of rice, thus replenishing its buffer stock and returning the overall rice economy to an equilibrium not seen since the early 1980s.

At the start of the new decade, several crucial questions face policy makers with respect to the rice economy. Will Indonesia retain self-sufficiency in rice regardless of the consequences for domestic rice prices, or will imports (and exports) be used as a balance wheel to lower the costs of price stabilization? If no trade is permitted, is there an important role for BULOG in attempting to stabilize prices, or can fuller use of market adjustments be relied on to balance the rice economy each year? If BULOG is expected to stabilize prices, how large do buffer stocks have to be to manage self-

sufficiency within an acceptable band of price movements? What impact do substantial price movements, up or down, have on the rural economy? Several of these questions had been addressed since the mid-1960s as Indonesia's rice economy evolved and policies adapted to the change. Several were new or recast under the rapid succession of rice surpluses and deficits. The technical analysis used to address these questions has put Indonesia on economists' maps because the modeling has produced surprising and controversial results and fueled an exciting policy debate in Indonesia.

The Technical Debates

It might seem surprising that technical economic analysis played a significant role in the institutional development of BULOG. Although it might seem not very relevant to the organizational and institutional dimensions of building the agency, the argument here is precisely the opposite. The technical economic analysis conducted for BULOG, incorporated by it and other policy makers in defining its mission, and ultimately endogenized as an internal capability, provided two key elements in BULOG's success. From the time when Mears and Afiff laid out its original mission of price stabilization, careful economic analysis of the Indonesian rice economy provided the foundation for the agency's role and the feasible measures it could implement.⁵⁷ Although much of this analysis was conducted by foreign advisors in the first decade of the agency's development, its internal capacity to analyze its own problems and missions rose significantly in the 1980s. Staff members who were sent abroad returned with sophisticated analytical skills, and the agency invested heavily in upgrading its middle management through intensive courses on food policy analysis and applied problem

57. See Mears and Afiff (1969). The publication of this article, which was originally a memorandum to the chairmen of the Planning Agency and of BULOG, also foreshadowed another important dimension of Indonesia's approach to economic analysis in the food policy arena; a willingness to let the analysis be published after the policy debate was resolved. Such publication kept the analysis subject to professional scrutiny and attracted scholarly interest from analysts not immediately connected with the policy dimensions of the issues. The Bulletin of Indonesian Economic Studies, published in Canberra by the Australian National University, played a major role in this dissemination process in the early years of the New Order government. By the mid-1970s articles on Indonesian food and agricultural policy issues were appearing in Review of Economics and Statistics, American Journal of Agricultural Economics, Economic Development and Cultural Change, Food Research Institute Studies, and other leading journals.

solving. Consequently, technical economic analysis enabled the agency to structure its mission in line with realities in the rice economy. Its sharply enhanced capacity in policy analysis in the 1980s allowed it to be at the forefront of the policy agenda in the Economic Cabinet on issues of direct relevance to the agency, and this technical expertise assured representation in a broad set of policy debates that had indirect impact on BULOG.

Three areas in which technical analysis reinforced institutional development are discussed below, in roughly chronological order. Each has engendered professional debate, application of methodologies to other countries, subsequent methodological developments applicable to a wider range of issues and settings, and, often, renewal of the policy debate in Indonesia. This iterative process has enriched the field of policy analysis as well as Indonesian policy itself.

Marketing Margins.-- An underlying goal of early efforts at price stabilization was to integrate Indonesia's far-flung rice markets as well as to defend floor and ceiling prices in individual locales. Because BULOG was always intended to serve as a buyer and seller of last resort rather than as a monopolist in rice markets, margins over space, time, and form were important parameters in the design and implementation of price policy. Mears (1961) had researched his classic study on rice marketing in 1956, and many of its findings on marketing structure remained valid in the late 1960s. But as BULOG became more successful in implementing floor and ceiling prices and transportation networks were reestablished, the structure and size of margins changed substantially.

The most important margin for policy purposes was between the floor and ceiling price. This margin contained all three components of marketing functions, transformations in space (farm price to urban price), time (harvest price to pre-harvest price), and form (paddy to milled rice). Each component required analytical attention. The spatial margin was addressed first.⁵⁸ Integration of Indonesia's rice markets was -----

58. See Afiff and Timmer (1971) and Timmer (1974).

tested roughly by comparing the relative price spread across provinces between high and low prices during the same month; by 1971 this spread had narrowed dramatically from levels in the mid- and late 1960s, thus confirming that BULOG was succeeding in integrating regional rice markets.

Within regions, the spread between the floor price and the urban retail price during the same month was an important indicator for policy monitoring and for the role of the private sector. If the two locations were well connected by either private traders or BULOG activities, the urban price, when the size of the margin was known, could be used as an indicator of the agency's success in defending the floor price. Measuring the degree of market connection and the size of the margin turned out to be quite complex analytically. Early attempts in Indonesia stimulated a substantial literature on techniques and applications in other settings.⁵⁹ The results showed that the actual marketing margin was substantially larger than would have been indicated by differences between average annual prices; when the urban ceiling price was successfully defended, the flow of rice sometimes reversed between rural and urban sources. Consequently, urban prices had to be correspondingly higher during the harvest to be commensurate with a given floor price. Because rural paddy prices were difficult to collect on an unbiased basis, reliance was placed on urban prices as a quick indicator of rural prices. The model clarified the means of calculating these prices, thus giving BULOG improved short-run monitoring capacity.⁶⁰

The milling conversion ratio for rice was a key parameter of the model, but relatively little was known about the Indonesian rice milling sector in the early 1970s. An analysis of technology choice in rice milling revealed the rapid development of a small-scale milling industry on Java and illuminated two important factors of concern to policy

59. See Harriss (1979) and Ravallion (1986).

60. A major data-gathering and analytical effort is currently underway to update understanding of the structure of Indonesian rice markets. This time, much more effort is being devoted to determining the role of the private sector, especially with respect to storage activities. The study is being conducted under the leadership of Frank Ellis and the resident staff of the Integrated Planning Unit (IPU) at BULOG, with cooperation from a number of Indonesian universities.

makers. Rice milling carried out by thousands of small entrepreneurs was the appropriate choice of technique; these small mills were neither the most labor intensive or the most capital intensive.⁶¹ An intermediate technology was economically efficient, a lesson first shown empirically in this setting. In addition, the Indonesian planning process was shown to have a substantial bias in favor of capital-intensive projects. This finding legitimized longstanding concerns in the planning agency (BAPPEINAS) for creating employment and reducing poverty in addition to maximizing the rate of growth. Demonstration of the economic efficiency of greater employment creation meant the concerns could be integrated into the mainstream activities of the planning agency.⁶²

The analysis of choice of technique in rice milling also provided a concrete example of links between micro economic behavior and macro economic policy. All key "macro prices" that are influenced by government policy--exchange rates, interest rates, and wage rates--can be shown to be important determinants of technology choice and hence of employment levels, distribution of incomes, and efficiency of resource allocation. These micro-macro connections are crucial to understanding the impact on rural areas of basic economic development policy, and they are better understood in Indonesia than in most developing countries.⁶³

The temporal dimensions of rice marketing margins became a serious policy concern only when BULOG began to hold substantial buffer stocks from one crop year to the next. BULOG considered storage costs in the private sector in setting the width of the margin between the floor and ceiling price, but no significant analytical issues arose in determining the rough dimensions of these costs. Monthly interest rates to rice traders gave a first-order approximation. But by 1984, Indonesia was self-sufficient in rice, and -----

61. In particular, neither hand-pounding or large-scale integrated rice mills using mechanical drying and bulk handling were economically optimal.

62. Both topics are reviewed in Timmer (1975b).

63. A generic discussion of these micro-macro links is in Chapter 5 of Food Policy Analysis, by Timmer, Falcon, and Pearson (1983). They are discussed more concretely in the Indonesian setting, using the rice milling example as the vehicle, in Chapter 3 of Timmer (1986b). The volume by Pearson, et al. (1990) addresses the issues for the entire rice economy.

the pressing question was how large the agency's buffer stocks should be to ensure price stability. The prevailing political judgment was the more, the better (at least up to five million tons, or about double what the agency held at the time), but BULOG's storage costs were escalating rapidly. Some analytically defensible level was sought. BULOG sponsored several studies of the problem, both within the agency and with outside consultants.⁶⁴ The results were surprisingly similar: buffer stocks on the order of one million tons were adequate to ensure a low probability of imports (five percent); and additional working stocks of 1.5 million tons were needed in storage immediately after the domestic procurement season. When stocks exceeded this level, as they did in 1985, BULOG was plunged into a major crisis. It failed to support the floor price and faced imminent bankruptcy.⁶⁵ The million-ton buffer stock was then accepted as an appropriate size, and the government budget was used to finance the costs of storing it.⁶⁶

Each of these three components of the marketing margin between the floor price and the ceiling price--space, time, and form--influences private traders and the rice economy in separate and analytically distinct ways, and yet all are affected by the policy decision that determines the size of the margin itself.⁶⁷ On several occasions the government has consciously narrowed the margin in order to ease the food price dilemma--the opposite effects of any change in food prices on the welfare of producers and consumers. Because the private sector handles such a large share of rice marketed in Indonesia, a decision to squeeze the margin is a simultaneous decision to squeeze the private sector.⁶⁸ This squeeze thus alters the tasks for BULOG; a simple model of BULOG operations shows that its procurement and distribution role tends to be directly

64. See Dawe and Timmer (1990) for an updated and computable version of one of the models developed at this time.

65. See the Falcon Team Report (1985).

66. As noted above, the budget allocation was made, but funds were never paid to BULOG because of the general budget crisis in 1986 caused by the collapse of petroleum prices.

67. In recent years the ceiling price has not been formally announced, but traders know reasonably closely what prices BULOG will defend in different cities by observing market operations and by having regular discussions with DOLOG officials.

68. BULOG has never bought more than 12 percent of the total harvest or perhaps 25 percent of total marketings.

proportional to the extent it squeezes the private marketing sector, but the financial burden rises with the square of the squeeze.⁶⁹ The dependence of BULOG's role on the relative size of the marketing margin took on renewed importance in 1988. As noted, BULOG's reduced stock position and a political ban on imports allowed margins to widen. The drought-reduced crop and wide margins meant the agency could procure very little rice at its announced floor price. Suddenly, the monthly distribution requirements for the Budget Groups loomed large relative to BULOG's reduced stock position, and history seemed ready to repeat itself despite all the lessons learned in the previous twenty years. Perhaps the sharpest lesson is that technical analysis and a thorough understanding of the functioning of rice markets are still subordinate to political objectives. In this case, they were subordinate to the desire of President Suharto to maintain self-sufficiency in rice in Indonesia, an achievement for which he received a gold medal from FAO in November, 1985.

The Fertilizer Subsidy.-- A contentious debate has been waged since the early 1980s over the social profitability of Indonesia's fertilizer subsidy. Modest fertilizer subsidies had been used since the earliest days of the BIMAS Rice Intensification Program to stimulate adoption of the technological package that included high-yielding varieties along with fertilizer and pesticides. But the subsidy became a substantial budgetary factor only in the late 1970s and early 1980s after the nominal price of fertilizer had been held constant for over half a decade at the same time that the nominal floor price for rice nearly doubled, about in line with the general price level. By 1983, as budgetary pressures began to be felt after the first drop in petroleum prices, Ministry of Finance officials as well as World Bank analysts pointed to the fertilizer subsidy as an obvious place to cut expenditures and improve the efficiency of resource allocation.

At the same time, the Ministry of Finance was sponsoring a major review of the BIMAS program under the auspices of the Development Policy and Implementation Study, with technical assistance from the Harvard Institute for International Development

69. The model is developed in Timmer (1986b), pp. 63-66.

(HIID). The BIMAS Evaluation Study took a careful look at program design, management, and implementation and carried out valuable village-level surveys, which highlighted the extreme regional diversity with which the rather monolithic BIMAS approach had difficulty coping. The study team noted the rapid rise in fertilizer use on rice during the fifteen years of the program, but because fertilizer and rice *price* policy were not controlled by the BIMAS Secretariat, the role of prices was not discussed in the initial draft of the evaluation report. In the summer of 1983, the BIMAS analysts and the price policy analysts intersected; the result was a quick and rough study of the role of price policy in the rice production success. Using aggregate time series from 1968 to 1982, the study estimated a fertilizer demand function, a rice production function, and the social profitability of the fertilizer subsidy in total and at the margin.⁷⁰

The analysis and conclusions raised very troubling issues for most development economists. The trend of experience and thought in the late 1970s and 1980s had reinforced the emphasis by economists on the superior performance of economic growth under market prices rather than prices altered by government taxes or subsidies. The high and robust social profitability of Indonesia's fertilizer subsidy seemed to challenge these hard-won gains for the role of free markets. At the very least, the results confirmed what economists knew in principle but hoped to neglect in fact--that such pricing interventions could only be evaluated empirically. There were perfectly sound theoretical reasons why market failures might justify a fertilizer subsidy on *efficiency* grounds--the subsidy corrected a dynamic disequilibrium. No a priori arguments based on static models could settle the issue.

70. An early draft of this analysis was widely circulated in Indonesia and to analysts in the donor community, especially the World Bank. After widespread criticism of the conclusion--the fertilizer subsidy had been highly profitable in private and public terms in total, and remained profitable at the margin as long as Indonesia remained an importer of rice--a much more carefully documented and developed version was produced and published, with the same conclusions. See Timmer (1986a).

Accordingly, the debate has spurred a massive flow of empirical and semi-empirical research.⁷¹ Rather than narrowing the debate, however, the research seems to have divided the development community. The Ministry of Agriculture, for example, sponsored two separate multi-market studies, one relying on sophisticated profit function estimation using an extensive micro data base, the other using aggregate and regional time series data. The results were sharply divergent; the micro data suggested that fertilizer response was low and that farmers were insensitive to price, whereas the regional time series model, also carefully done in econometric terms, suggested that raising fertilizer prices would be very costly in terms of rice output and economic welfare.⁷² The two empirical approaches may not be as inconsistent as they appear if the time series analysis is capturing the "dynamic disequilibrium" in fertilizer use and learning by doing in the 1970s and early 1980s, while the cross section analysis, based on 1984 data, is reflecting the endpoint where most of the disequilibrium has been resolved by rapid adoption of high levels of fertilizer use. Unfortunately, such an endpoint was not visible in the time series analysis even when several alternative functional forms were tried. This suggests that there may be continuing dynamic disequilibrium that is not apparent in the static, cross section analysis.⁷³

The debate between the micro- and macro-based models is largely empirical, with an underlying methodological concern as to the appropriate extent to which production and consumption theory should dictate statistical specification and estimation techniques. This debate is clearly raising the quality of analysis with respect to Indonesian rice and fertilizer pricing policies and recommendations, especially to begin to reduce the size of the fertilizer subsidy, are similar. The models based on stylized parameters, however, have been less helpful. These multi-market and general-equilibrium models, while elegant

71. The latter is characterized by efforts to construct multi-market or simple general equilibrium models that rely on rough "stylized facts" which are assumed to capture Indonesian realities. Unfortunately, these models have turned out to be extraordinarily sensitive to small changes in these parameters, thus casting the debate back on "real" empirical grounds.

72. The micro-based analysis is in Tabor, et al. (1987). The macro-based analysis is in Rosegrant, et al., (1987).

73. The review of the fertilizer subsidy debate by Hedley and Tabor (1989) is conducted in a static framework and does not, unfortunately, reflect the dynamic impact of disequilibrium in farmer decision making on the social profitability of the subsidy.

analytically and preferable in theory, are so hampered by unrealistic model structure and sensitivity to minor parameter changes that their results have no policy significance. Learning to build such models in the Indonesian setting may remain a useful task, but they seem incapable of illuminating the policy debate in the near term.⁷⁴

Throughout the vigorous policy debate, Indonesian price policy for fertilizer has attempted to follow a consistent goal: to reduce the size of the budget subsidy commensurate with maintaining balance between production and consumption of rice. This balance is monitored by the level of BULOG's stocks. When stocks were large and surplus rice was being exported at subsidized prices, increases in the nominal floor price for rice were kept below the inflation rate while the prices of fertilizer rose by more than the inflation rate. In short, the fertilizer price was used in tandem with other prices and programs to fine tune the Indonesian rice economy around a trend of self-sufficiency. With imports very difficult to arrange for political reasons, fertilizer price policy adds a degree of freedom to an otherwise overconstrained set of policy objectives. Given Indonesia's substantial impact on the world rice market, this approach is perhaps the only way to guarantee food security for the country in the long run.

Rice Price Policy.-- The floor price of rice relative to the price of fertilizer and relative to the ceiling price are only two of several important price relationships for rice. Two others with substantial medium- and long-term significance are the real price of rice to the economy--that is, relative to the costs of other goods and services--and the cost of domestic rice relative to the cost of imports or exports. As with all the price relationships discussed so far, these two are closely related, although the foreign exchange rate enters as a key factor as well.

74. Both types of models are reported in World Bank (1987).

The impact of rice prices on production was included in the above discussion, but only with respect to fertilizer prices.⁷⁵ The issues to be treated here are broader: what are the consequences of policy with respect to the level and stability of rice prices for consumption, the health of the rural economy, and the stability of the macro (political) economy?

Indonesia has served for more than a decade as a testing ground for empirical and methodological inquiries into the impact of changes of staple food prices on the distribution of nutrient intake by income class. When a single commodity such as rice forms a large share of a consumer's budget, the Slutsky Equation requires that real income effects will cause substantial changes in consumption of rice as its price changes, even if the pure substitution term in the equation is zero. The income component of the equation varies systematically by income class because of Engel's and Bennett's Laws.⁷⁶ Economists and nutrition planners knew roughly that higher food prices hurt the poor in the short run. When the world food crisis hit in 1973-74, however, the lack of specific empirical knowledge hindered efforts to determine the impact of the higher prices on the poor and to target food aid with precision.

Using data from the three rounds of sampling a total of 50,000 households in the 1976 National Socio-Economic Survey (SUSENAS), commodity demand functions disaggregated by income class were estimated. For the first time, separate price terms for each class were included in the analysis. The results were robust and analytically satisfying: the pure substitution coefficient in the Slutsky Equation varied systematically by income class; and, after compensation for the income effect of the price change, the poor were shown to be substantially more responsive to price changes than the wealthy. These results have been confirmed with further work in Indonesia and other countries. They allow planners to determine with far more confidence than a decade ago the extent

75. Part of the debate on the fertilizer subsidy is over the biases introduced by using the relative price of rice to fertilizer as the measure of farmers' incentives rather than a broader measure that would reflect the role of other purchased inputs, especially hired labor, in the production process.

76. See Timmer, Falcon, and Pearson (1983), especially Chapter 2, for a fuller explanation of these relationships.

to which demand for food changes by income class when prices change.⁷⁷ The methodological problems involved in estimating these parameters have also stimulated a new area of work in econometrics.⁷⁸

High prices of rice during the world food crisis in the mid-1970s stimulated a concern for the impact of prices on poor consumers. By the mid-1980s rice prices in the world market had collapsed, and attention turned to the impact on farmer welfare and the health of rural economies. This has turned out to be a far more difficult problem both analytically and empirically. Analytically, the issue cannot be treated in a partial-equilibrium framework because of the significant spillover of effects from rice markets to labor, land, and credit markets in rural areas. Because of the importance of rice as a wage good and of rural-urban migration in determining equilibrium wages in the non-agricultural economy, changes in rice prices raise significant issues for general equilibrium as well. But as noted earlier, the computable general-equilibrium models constructed so far for the Indonesian economy have suffered from several serious problems: the structure of the models does not reflect the apparent complexity of market-clearing in rural Indonesia, investment functions from rural incomes are not included, and the parameters used are not based on solid empirical evidence.

The lack of understanding of rural dynamics in Indonesia, especially as driven by changes in rice prices, is very troublesome. Although substantial research is underway attempting to address these issues, there is neither an agreed methodological framework for organizing the research (especially the dynamic dimensions that capture the response of rural investments to changes in rice prices) nor a valid sampling procedure to guarantee that results from individual local markets can be aggregated with confidence to achieve an economy-wide understanding. On the other hand, this is the frontier of

77. The evolution of this analysis is reported in Timmer (1978), Timmer (1981), Waterfield (1985).

78. For a review, see Deaton (1986). An application of the most recent econometric techniques to Indonesian data is in Monteverde (1987). SUSENAS data have also been used to provide the parameters for an assessment of Indonesian rice price policy using a modern public economics framework. See van de Walle (1989). A systems approach has been used for food crops by Tabor, Altemeier, and Adinugroho (1989).

research on rural economics. Substantial progress is likely to be reported in the 1990s, and Indonesia is likely to serve as a home for much of that research.⁷⁹

Progress will be more difficult to achieve in understanding the contribution of price stability to social welfare. As was noted in Part 2, this is a topic of longstanding analytical interest to economists. Indonesia is likely to be a proving ground for examining the hypothesis that society places a large premium on stability of food prices for reasons that are not apparent in economists' models of the impact of price stabilization policies. If both producers and consumers demand price stability, there should be a way of including this desire in the specification of their welfare functions and testing empirically which models and specifications best explain actual behavior with respect to price changes. This approach involves macro dynamics and political economy, not just narrow micro economics. But if no microeconomic foundations can be found in consumer theory for the strong public desires for price stability, price stabilization policies will remain ad hoc, repeatedly subjected to attacks by economists and defended by policy makers. Such a hostile relationship on such a key element of national policy is not healthy for either side, especially when the economists implicitly carry with them the resources of outside donors and investors. Indonesia's record on rice price stabilization has been remarkably successful by historical and comparative standards. The technical analysis, both in amount and sophistication, that has supported implementation of the policy offers an excellent foundation for further research in three directions: the choice-theoretic basis in welfare economics of demand for price stabilization; the political economy of the supply of price stabilization that grows out of both popular support for price stability and an analytical understanding of the macro dynamic consequences of it; and the institutional responses that determine its equilibrium cost.

79. As already noted, an important first step in this research is provided by Pearson, et al., (1930).

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