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# Indonesian Rice Price Policy: Sufficient for Self-Sufficiency?

K A. Parton, R.R. Piggott and E.M. Treadgold

Department of Agricultural Economics and Business Management
University of New England
Armidale NSW 2351

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## 1. Introduction

In 1985 it was proclaimed that Indonesia had achieved self-sufficiency in rice. To achieve this target had required considerable policy intervention in terms of both output price support and input subsidies. Prior to achieving self-sufficiency, the government expenditure costs of these policies (and the welfare costs) tended to be overlooked. This was perhaps understandable given the high level of revenues that the Indonesian government was collecting from taxes on oil and the desire to attain the morale-boosting reward which would come when self-sufficiency was achieved.

Since 1985 there has been some introspection about the costs of achieving self-sufficiency using the price policy instruments. Although a prime policy objective remains one of balancing increases in rice consumption with increases in output, emphasis is now given to achieving this at minimum government cost, with minimum welfare losses and with minimum disruption elsewhere in the economy. In this last regard, there has been an acknowledgement that past rice price support policy has had a detrimental effect on the secondary food crops by drawing resources away from them. The desire is now to avoid this and to encourage production and consumption of these crops.

The current paper reports on the application of a price policy model to these issues. Of particular interest was discovering a mix of policies which would come closest to achieving the various targets. Given that Indonesia can expect rice consumption to continue to expand for some time to come, a significant finding is that considerable government expenditure will be required to encourage output expansion in order to match this growth in consumption.

## 2. Background

Indonesia has a system of five-year national plans called *Repelitas*. Since the start of this system in 1969, the food-producing sector has received special attention. At first this was because growth in agriculture was essential if overall economic growth was to be achieved. Though still a significant sector of the economy, accounting for just over 25 per cent of GDP in 1986 (BPS 1987a), alternative goals relating to employment and self-sufficiency became predominant during the period from 1972 to 1985.

The years 1972 and 1973 saw instability in international commodity markets associated with a four-fold increase in crude-oil prices. Although there were gains to Indonesia as an exporter of oil, some turbulence was transmitted to the domestic economy, and especially the Indonesian policy-making process.

First, foreign exchange earnings increased and this led to domestic money supply creation. This would probably have created a larger inflationary problem had the government not restrained its own fiscal activity by maintaining a budget surplus. Another effect of the international oil price increases was to increase the Indonesian government's revenue from taxation on oil companies. This was to enable the government to increase its development expenditure especially in agriculture, while maintaining the budget surplus.

Next, the world rice market suffered a severe shortage in 1973 and 1974. Despite having the required foreign exchange from the sales of oil, Indonesia was unable to purchase sufficient imports of rice as its major supplier, Thailand, restricted exports (Timmer 1986, p.5). A significant effect of this was to stimulate a new drive on the part of policy decision makers in Indonesia for domestic food security and especially for self-sufficiency in rice. The policy response was to establish both output price supports in the form of higher floor prices for rice producers and input subsidies across a number of purchased inputs. These have continued as the main thrusts of agricultural policy. One consequence of these policies has been the achievement of self-sufficiency in rice in 1985, and the continuation of production at close to self-sufficiency since.

Events of the early 1980s combined to alter the set of policy objectives further. Falling international prices of oil meant that the country has faced severe balance of payments problems throughout the decade. In addition, government expenditure has been constrained as oil revenues have fallen. As a result some development projects have been deferred, and overall economic growth has been less than it would otherwise have been. Sundrum (1988, p.37) estimates the rate of economic growth as 2.9 per cent per annum between 1981 and 1986. This compares with an average growth rate of 7.7 per cent from 1967 to 1981.

Throughout this unstable period, food security and the attainment of self-sufficiency in rice remained a dominant objective. In each year between 1977 and 1984 producer support prices for rice were increased in real terms. In addition, substantial subsidies for fertiliser were continued. These rice policies were a considerable drain on the budget at a time of restricted government revenue. It is clear that the attempt to achieve rice self-sufficiency was being given priority.

In the years following 1985, when rice output first exceeded rice consumption, there has been continuing questioning about the level of support given to rice producers. Apart from the problem of finding the required level of finance to support the policy, there was

concern that agricultural resources were being drawn away from the production of the palawija, or secondary food crops. The policy stance towards the palawija was one of neglect in comparison to the enormous policy efforts devoted to rice. However, following the attainment of self-sufficiency in rice, there have been reductions in real producer prices of rice and in the level of fertiliser subsidies. One effect has been to encourage palawija production (EIU 1989, p.22) while rice output has continued to grow. Another is that government expenditure, particularly on fertiliser subsidies, is expected to fall considerably.

Currently, there are several sub-strands to the government's growth policy. There are continuing attempts to reduce dependence on oil both as a foreign exchange earner and as a contributor to the budget. This has achieved partial success as exports of commodities like manufactured timber products have expanded. However, oil remains the dominant export product. Second, the government has been encouraging foreign investment, and Schwarz (1989, p.74) argues that the flow of funds from abroad, particularly into investments in the manufacturing sector, has 'helped rescue GDP growth from mid-decade stagnation'.

Such efforts have partly directed attention away from the food production sector. However, with consumption of rice increasing as the population and income levels increase, the self-sufficiency must be regarded as fragile. The policy stance is one of attempting to keep output expanding while keeping government expenditure on food policy programs to a minimum. This is a fairly difficult path to follow given the size of the food producing sector. In addition, despite significant recent employment growth in the manufacturing sector, the government must ensure that farm incomes are kept high enough for agriculture to absorb labour.

## 3. Policy Instruments and the Food Crop Model

The main price-policy instruments used for rice and maize are subsidies on various inputs and output price support through a floor and ceiling price scheme. In the case of rice, the key instruments are floor prices, which are used to maintain a minimum market price for rice delivered to the agricultural cooperatives (KUDs); various input subsidies (which apply to these inputs irrespective of the crop to which they are applied); ceiling prices, which limit the amount that consumers must pay to purchase rice; and storage-cost subsidies. The introduction of implicit export subsidies on rice in 1985 added a new policy instrument to the list. While there is a floor price policy for maize, BULOG intervention in the maize market is relatively slight compared with the rice market. This is, in part, because of the greater political importance of rice and the fact that marketing channels for maize are less-clearly defined. Control over imports and exports is the principal means by which the government

influences the maize market. BULOG is the sole importer of wheat but does issue processing contracts to the private sector. Output price policies have not been effective for the other food crops, though farmers growing these crops do benefit from the input subsides that have been used.

In addition to these price policies the government devotes considerable resources to the development and dissemination of improved technologies. The BIMAS programs were designed to increase production through the use of improved seeds, fertilisers, pesticides, water management, improved cultural practices and the development of farmer cooperatives. A parallel scheme, INMAS, aided farmers with access to capital and a desire to use modern inputs. Yet another of this type of scheme is INSUS. Under this scheme about 50 to 100 farmers with contiguous plots were encouraged to make joint decisions about seeds, planting times, and crop choices other than rice. Hence, some policy instruments can be viewed as supply shifters (e.g., fertilizer subsidies and technological innovations), while others encourage output expansion along supply functions (e.g., producer price supports).

The food-crop model is designed to analyse the impact of the various price policies that are currently used by the Indonesian government. It is composed of a set of partial equilibrium demand and supply equations for each of eight commodities. The commodities covered are rice, maize, cassava, sugar, groundnut, soybean, sweet potato and wheat. They account for more than 90 per cent of the country's calorie intake. Given a set of policy parameters such as output price supports or input subsidies, this model can be solved for the quantities of production, and amounts of government revenue and expenditure, export receipts, payments for imports, and economic surpluses.

The model is capable of analysing the price policies for the various commodities mentioned above, viz. the floor and ceiling price scheme, input subsidies and export subsides. These policies involve the government in the regulation of four types of prices, viz. consumer and producer prices of food, farm input prices, and export prices of food. Changes in the various policies are simulated in the model by alteration in the level of these prices. The impacts on the various quantity and expenditure levels are taken to represent the effects of policy changes. Therefore attention is focused on the implications of altering the agricultural price policies of Indonesia for the government's budget, for producers and consumers of the affected commodities, and for the other sectors of the economy.

The food-crop model is described in the following set of equations.

(1) $q_{si} = b_o + b_i p_i + b_j p_j + b_k p_k \quad j=1, ..., n; k=1, ... m$

(2) $q_{di} = c_o + c_i\, p_i + c_j p_j + c_y\, y \qquad j=1, \ldots, n$

The variables $q_{si}$ and $p_i$ are quantity supplied and price, respectively, of commodity i (i=1,...,8); the $p_j$ are prices of other food crops; and the $p_k$ are input prices. On the demand side, $q_{di}$ is the quantity demanded of commodity i and y is income.

These equations define the data needs of the analysis. To make the model operational requires a set of demand, supply and income elasticities together with base period prices and quantities for each commodity. The Appendix outlines the current base values for each year together with a description of sources. Given uncertainty about the value of the elasticities, sensitivity analysis is a key component of any policy appraisal.

## 4. Policy Evaluation

In this section, an evaluation of food price policy is described. After describing the base policy situation in 1988, an analysis of the policies pursued by the Indonesian government from 1985 to 1988 is completed. This policy analysis has three components. First, the net social costs and government costs are revealed by comparing model solutions with and without the policies that were actually pursued. Second, there is an evaluation of the net social and government costs of achieving the rice self-sufficiency levels of 1985 to 1988, but by different levels of the policy instruments. Third, the unconstrained maximisation of net social benefit using fertiliser subsidy policy is described.

### 4.1 The policy situation 1985 to 1988

In 1985 self-sufficiency in rice was proclaimed. Since then production and consumption have expanded in parallel, with the country maintaining a small deficit or surplus year-by-year. Except for sweet potatoes, the other food crops considered in the analysis showed an upward trend in production with yields also increasing in general (see Table 1 and Appendix 1). At face value, given that overall production of these food crops has been expanding more rapidly than population growth, this seems a favourable outcome. However, within the Indonesian government there has been some concern about the fiscal costs of the policies that have been adopted to achieve this outcome. In particular, the fertiliser subsidy policy has received close scrutiny.

In 1985/86 the cost of fertiliser subsidies is estimated to have been about 42 per cent of total development expenditures for agriculture and irrigation (World Bank 1987, p.16).

Table 1

Indexes of Output of the Major Food Crops (Mean of 1983-85 = 100)

| | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|
| Rice | 104.12 | 105.96 | 106.92 | 111.23 |
| Maize | 88.33 | 120.77 | 105.16 | 135.70 |
| Cassava | 104.58 | 99.03 | 106.80 | 115.09 |
| Sugar | 105.94 | 127.86 | 134.43 | 137.40 |
| Groundnut | 103.94 | 126.38 | 104.92 | 115.94 |
| Soybean | 120.00 | 169.24 | 160.14 | 175.17 |
| Sweet potato | 99.27 | 92.74 | 92.47 | 99.17 |

The actual costs for the fiscal years 1985/86 to 1987/88 were Rp 477 billion, Rp 467 billion and Rp 756 billion respectively (BPS 1989a). The response to this problem was three-fold. There were some minor attempts to improve the efficiency of fertiliser distribution and marketing. Second, prices to farmers have been increased, but again this was only a marginal change. Third, it was decided to finance the fertiliser subsidy from sources outside the budget. This last adjustment is the one which has the potential to have the largest effect on reducing the budget cost of the fertiliser subsidy. It achieves this by deferring payment of subsidies to the state-run fertiliser factories, and permitting the factories to finance losses by borrowing from the banks (Booth 1988). Thus given that farmers pay the same price for fertiliser, a component of the government's current budget deficit is transferred to the fertiliser factories for longer-term financing.

The wholesale market situation for rice, the main food crop, in 1988 is shown in Figure 1. The picture is fairly representative of the four years of our survey in which there was either a small surplus or a small deficit in rice production (see Appendix 1). The domestic demand and supply curves take these positions under the influence of the fertiliser subsidy and price support policies. The quantity A (=25.97 million tonnes) was produced and B (=26.77 million tonnes) was consumed. The difference of 0.79 million tonnes consisted of imports and stock changes. The close-to-self-sufficiency position was maintained by a domestic price regime above the international market, with BULOG (the state agency) importing rice at a price roughly 52 per cent of the average domestic price. This type of relationship between domestic and international prices has been maintained between 1985 and 1988 so that BULOG has been collecting an implicit import tax in the rice-deficit years and paying an implicit export subsidy in the rice-surplus years.

In the first part of the analytical work the effects of the policies that were followed by the Indonesian government between 1985 and 1988 were estimated. Figure 2 provides a comparison in the 1988 rice market between the actual situation and the estimated position if all policy intervention had been removed. As a result of removal of the fertiliser subsidy the supply curve for rice and the other domestically produced food crops shifts to the left. The domestic demand curve for rice shifts right under the influence of the cross-effect of rising prices of other food commodities. Given that price support is removed also, the domestic and intervention prices are equalised at Rp 487.1/kg. and about 4.85 million tonnes of rice are imported.

More details of the effects of the policies that were followed are shown for rice in Table 2 and for the secondary food crops in Table 3. The general effects for rice are that output was stimulated significantly by the policies (by about 14 per cent in 1988) while

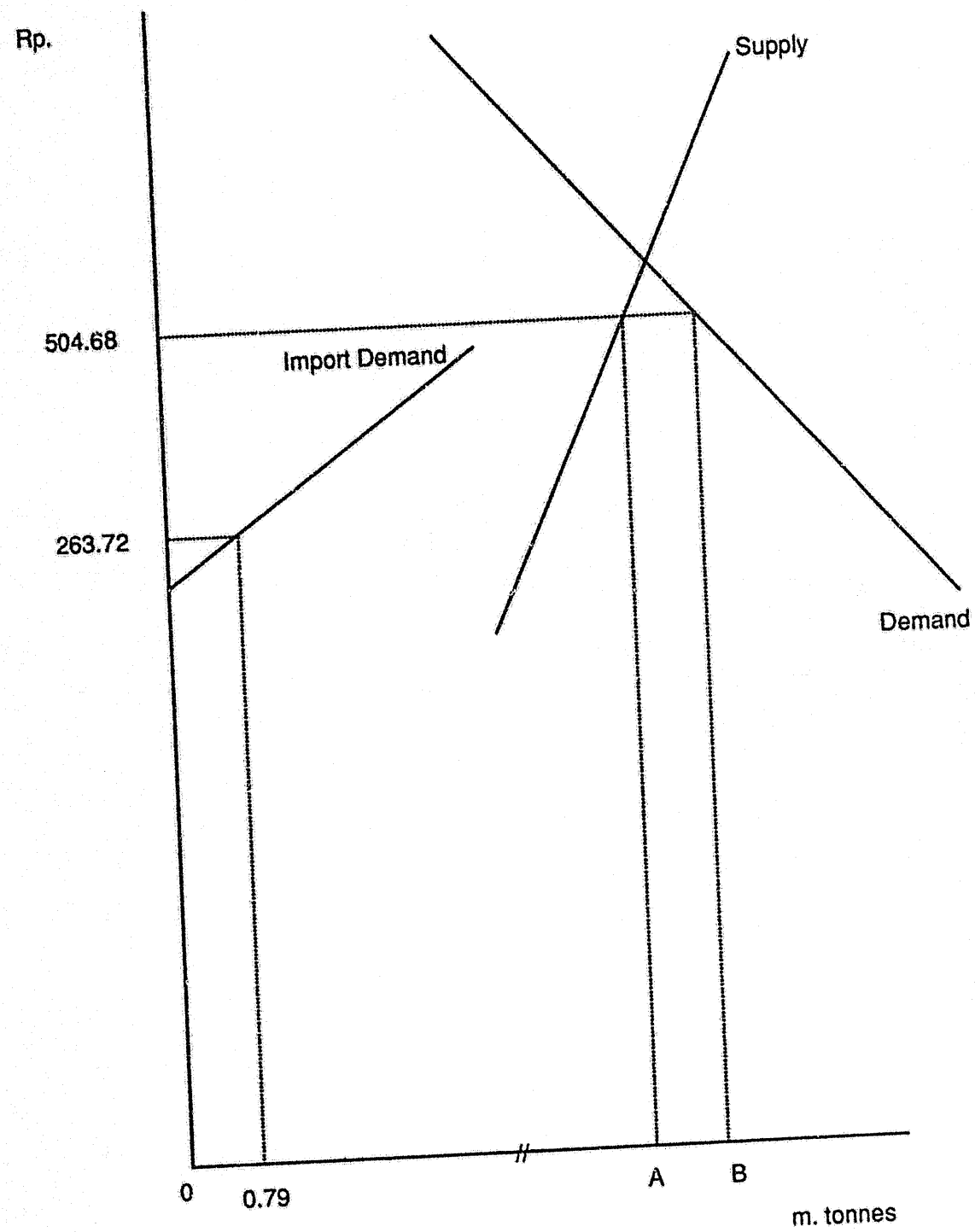


Figure 1 The Indonesian rice market in 1988

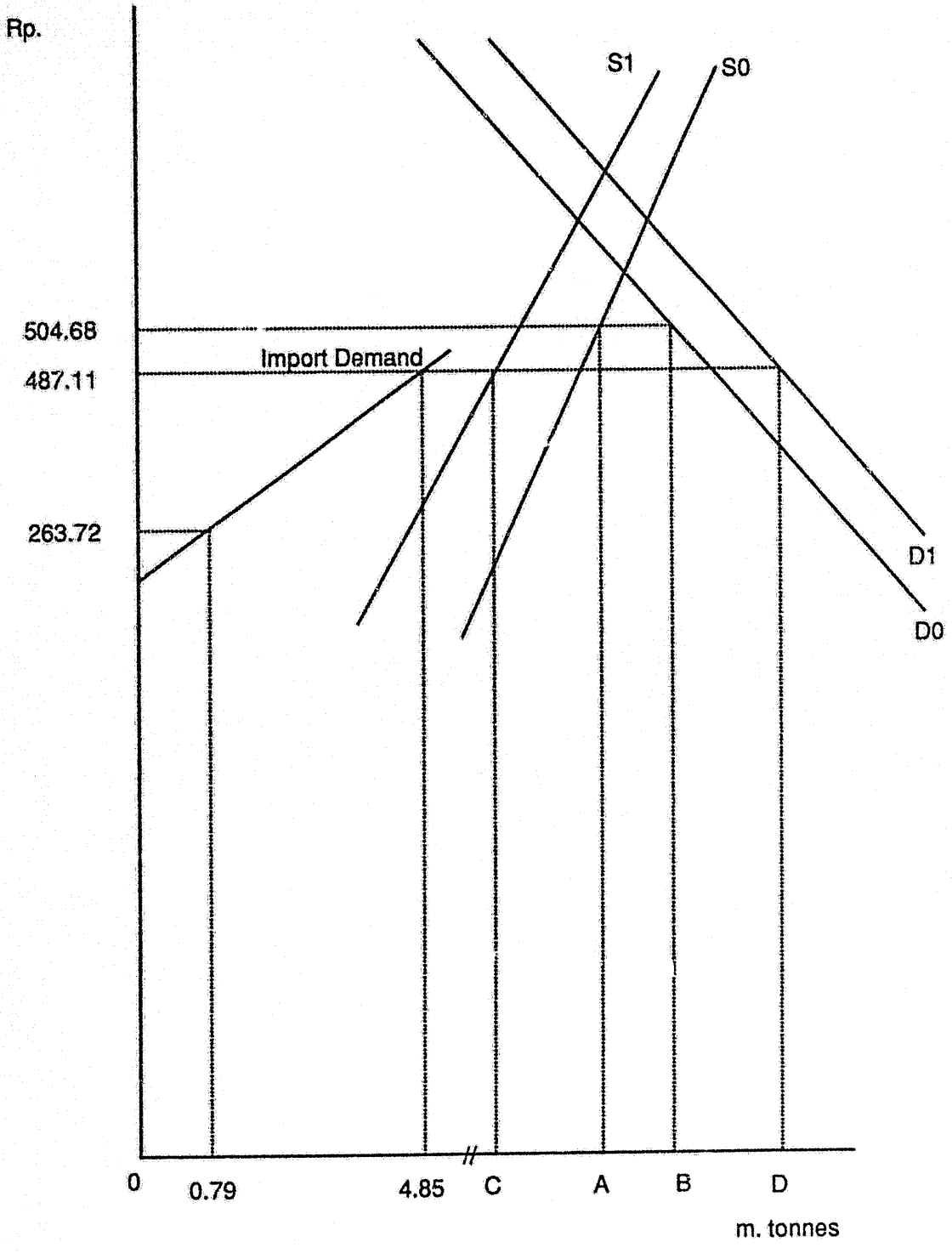


Figure 2 Comparison between the actual situation in the rice market in 1988 and a no-policy situation

Table 2

The Effect of Fertiliser Subsidies and Price Support for Rice on Production and Consumption of Rice

| | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|
| | ('000 tonnes) | | | |
| (a) Actual Situation | | | | |
| Production | 24,316 | 24,744 | 24,970 | 25,975 |
| Consumption | 23,987 | 25,162 | 24,990 | 26,770 |
| Surplus | 329 | - 418 | - 20 | - 795 |
| (b) Situation without fertilizer subsidy and price support | | | | |
| Production | 21,552 | 21,912 | 21,529 | 22,716 |
| Consumption | 24,113 | 25,594 | 25,946 | 27,536 |
| Surplus | - 2,561 | - 3,682 | - 4,417 | - 4,820 |
| (c) Sensitivity analysis (Situation without fertiliser subsidy and price support, with import demand elasticity increased from -3.0 to -6.0 at Rp. 330/kg) | | | | |
| Production | 21,017 | 21,199 | 20,710 | 21,829 |
| Consumption | 25,170 | 27,047 | 27,586 | 29,366 |
| Surplus | - 4,153 | - 5,848 | - 6,876 | - 7,537 |

Table 3

The Effect of Fertiliser Subsidies and Price Support for Rice on Production and Consumption of Secondary Food Crops ('000 Tonnes)

| | Actual Situation | | | | With policies removed | | | |
|---|---|---|---|---|---|---|---|---|
| | 1985 | 1986 | 1987 | 1988 | 1985 | 1986 | 1987 | 1988 |
| Maize | | | | | | | | |
| Production | 4330 | 5920 | 5155 | 6652 | 3673 | 5077 | 4353 | 5673 |
| Consumption | 4375 | 5984 | 5373 | 6678 | 4399 | 5976 | 5305 | 6627 |
| Surplus | - 45 | - 64 | - 218 | - 26 | -726 | - 899 | - 952 | - 954 |
| Cassava | | | | | | | | |
| Production | 14057 | 13312 | 14356 | 15471 | 13518 | 12848 | 13832 | 14926 |
| Consumption | 12496 | 12094 | 13206 | 14552 | 12692 | 12251 | 13351 | 14722 |
| Surplus | 1561 | 1218 | 1150 | 919 | 826 | 597 | 481 | 204 |
| Sugar | | | | | | | | |
| Production | 1677 | 2024 | 2128 | 2175 | 1545 | 1879 | 1955 | 2010 |
| Consumption | 1854 | 1942 | 2087 | 2133 | 1722 | 1797 | 1916 | 1968 |
| Surplus | - 177 | 82 | 41 | 42 | - 177 | 82 | 39 | 42 |
| Groundnut | | | | | | | | |
| Production | 528 | 642 | 533 | 589 | 501 | 610 | 502 | 558 |
| Consumption | 545 | 676 | 579 | 617 | 517 | 644 | 549 | 586 |
| Surplus | - 17 | - 34 | - 46 | - 28 | - 16 | - 34 | - 47 | - 28 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Soybean | | | | | | | | |
| Production | 870 | 1227 | 1161 | 1270 | 773 | 1079 | 1024 | 1129 |
| Consumption | 1143 | 1602 | 1420 | 1785 | 1156 | 1617 | 1431 | 1799 |
| Surplus | - 273 | - 375 | - 259 | - 515 | - 383 | - 520 | - 407 | -530 |
| Sweet potato | | | | | | | | |
| Production | 2161 | 2091 | 2013 | 2159 | 2123 | 2057 | 1976 | 2122 |
| Consumption | 2161 | 2091 | 2013 | 2159 | 2123 | 2057 | 1976 | 2122 |
| Surplus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wheat | | | | | | | | |
| Consumption | 1317 | 1610 | 1688 | 1588 | 1321 | 1612 | 1683 | 1586 |

demand was lower. The effect on consumption was stronger in the later years as the gap in price between the higher-priced domestically produced rice and imports increased.

Given that there is some uncertainty about the effect of Indonesia's trading in rice on the international market, some alternative estimates were made to assess the importance of different values for the import elasticity of demand. The results of a sensitivity analysis in which the elasticity of import demand was altered from -3.0 to -6.0 are shown in the last section of Table 2. Clearly the magnitude of the impact of the price support and fertiliser subsidy policies is dependent on this elasticity. Nevertheless, using either of the elasticity levels, the analysis shows the effects of the policies to have been to stimulate rice production and to reduce consumption.

Table 3 shows the effects of fertiliser subsidies and price support for rice on the secondary food crops. The fertiliser subsidy tends to expand production of these crops, while price support for rice tends to reduce production. The analysis reveals that the first of these influences is stronger for all the crops studied; their output being higher in the solutions with the policies included. The crops most strongly affected are maize and soybean.

On the consumption side the influences of the two policies are more complex. For maize, sugar, groundnut and sweet potato the overall impact of the policies is that consumption increases. The dominant underlying effects are the price reductions following output expansion under the influence of the fertiliser subsidy and the cross-price effect of an increase in consumer price of rice. For cassava and soybean consumption falls as a result of the policies. This is because there is only a small price-reducing effect of the fertiliser subsidy, with price being largely determined by international market influences. Hence, the consumption level of the two crops is determined by a positive cross-price effect as the price of rice rises, and a negative cross-price effect as the prices of other crops fall. Overall, the second effect is larger than the first.

Estimates of the components of net social benefit of the policies that were followed are shown in Table 4. Given the number of interactions among commodities that are embedded within the model it is difficult to describe the underlying commodity-by-commodity elements of each of the aggregates. Nevertheless, some commentary on rice is provided given that it is by far the dominant crop, and effects in the rice market comprise a large proportion of the overall outcome.

Table 4

Effect of Price Support and Fertiliser Subsidies on Producers, Consumers, Net Government Cost and Overseas Producers (Eight Crops)

| | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|
| | | (Rp. billion) | | |
| Change in producer surplus | 734.07 | 1053.79 | 1692.89 | 1628.54 |
| Change in consumer surplus | 39.01 | - 171.24 | - 598.77 | - 446.31 |
| Net government cost | 772.65 | 754.15 | 1043.99 | 939.56 |
| Net social benefit in Indonesia | 0.43 | 128.40 | 50.13 | 242.67 |
| Change in producer surplus abroad[1] | -180.38 | -368.02 | -536.52 | -621.53 |

1 The overall change in consumer surplus abroad would be positive, but too dispersed to be estimated.

In 1985 the domestic price of rice was lower than it would have been if the fertiliser subsidy and price support policies had not been in place. The converse is the situation in the other three years. As a consequence there is a consumer surplus gain in rice (and across all commodities in aggregate) in 1985, but losses in 1986, 1987 and 1988.

The change in producer surplus is positive in each year. It has two components. The first is the positive effect of the shift to the right in the supply function resulting from the fertiliser subsidy. Second, there is a change in producer surplus as a consequence of a change in the level of rice price support. In 1985 this effect is negative for rice and positive in substitute commodities as the producer price of rice is lower than it would otherwise have been without the policies. In the remaining years the opposite is the situation.

There are two components of the net government cost. First, the fertiliser subsidy involves a cost equal to the procurement cost from both domestic manufacturers and importers less the subsidised resale price to farmers. Second, there is an export subsidy in 1985 (a cost) and an import tax in 1986, 1987 and 1988 (a revenue) which enables the domestic price of rice to be maintained.

The sum of changes in producer and consumer surpluses and net government cost resulting from the fertiliser subsidy and price support policies is the net social benefit in Indonesia. Although small in relation to the redistributional effects of the policies, the estimate of net social benefit is actually positive. This benefit to Indonesia occurs as a result of its domestic policy imposing social costs on rice exporting countries. These social costs are indicated in the final row of Table 4. They occur because of the fact that the international rice market is a residual market and Indonesia's trading actions in the market have significant influence on the price.

## 4.2 Maintaining self-sufficiency in rice by means of alternative policies

In order to further appraise the policy options available to the Indonesian government, the policy space close to the set of policies actually followed was examined. That part of the assessment related to reduced fertiliser subsidies is reported here. The policy alternative described maintains the level of self-sufficiency in rice achieved in each of the four years studied by reducing fertiliser subsidies and increasing price support to rice producers. The fertiliser price was adjusted upward by 20 per cent to represent the effect of the government's attempting to reduce its budget commitment to subsidy expenditures. The response was a fall in rice output which would have reduced the level of self-sufficiency if the second policy of increasing the producer price of rice had not been introduced. A

countervailing price support policy which increased producer prices by about 10.9 per cent was required to maintain self-sufficiency at its original levels year-by-year.

The impact of these policy changes on net government cost and other significant aggregates is shown in Table 5. While the changes do result in reduced fertiliser subsidy costs, there is overall an increase in net government cost. In other words the policy mix involving a higher proportion of price support and a lower proportion of fertiliser subsidy, while maintaining rice self-sufficiency, is more costly to the government.

The other major effect of the policy change is a transfer to producers measured by a considerable increase in producer surplus. Overall the policy change amounts to a transfer from the government to producers, with consumers and the net social benefit being almost unaffected. Given the pressure on the Indonesian government to constrain its expenditure over the study period, it is easy to see why this policy alternative is unattractive.

An additional unattractive feature of the policy is its negative effect on production of secondary food crops (see Table 6). Maize production is affected the most, falling by about 5.5 per cent. On the consumption side the effects of the policy change are slight. Sugar, groundnut and sweet potato, which have a strong price response to the falling supplies, suffer slight falls in consumption. Meanwhile maize, cassava and soybean which have a limited price response have slight consumption increases.

While there are other policy manipulations of this type which can be analysed, they are, for various reasons, considered infeasible. For example, we did assess the impact of reducing fertiliser subsidies while maintaining rice self-sufficiency by increasing both producer and consumer prices of rice. This does in fact reduce the overall net government cost, because consumers effectively pay for the price support to producers. However, such a policy is considered politically infeasible because it involves additional consumer price increases at a time when substantial price increases have already occurred.

Next, one could consider the opposite type of policies to these; that is increases in fertiliser subsidies and reductions in price support. Once again, there are political (and administrative) constraints. Lower prices for rice producers could only be achieved if consumer prices also were lowered. Indeed lower prices for producers would automatically flow on to lower consumer prices. It would be impossible to maintain a regime in which low producer prices co-exist with high consumer prices because the government does not exercise the necessary control over rice marketing. As a consequence, the type of policy adjustment which involves an increase in fertiliser subsidies is one in which both producer

Table 5

The Effect of Reducing Fertiliser Subsidies and Increasing Rice Price Support on Producers, Consumers and Government Cost (Eight Food Crops)

| | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|
| | (Rp. billion) | | | |
| Change in producer surplus | 728.03 | 886.50 | 1011.21 | 1063.70 |
| Change in consumer surplus | - 12.07 | - 10.25 | - 7.79 | - 10.08 |
| Change in net government cost | 698.17 | 855.83 | 1972.01 | 1022.77 |
| Change in net social benefit in Indonesia | 17.79 | 20.42 | 31.41 | 30.85 |
| Change in fertiliser subsidy costs | -254.99 | -309.21 | -360.49 | -409.00 |
| Change in producer surplus abroad[1] | + | + | + | + |

1 A small positive change as a result of increased imports of secondary food crops.

Table 6

The Effect on Secondary Food Crops of Reducing Fertiliser Subsidies and Increasing Price Support for Rice while Maintaining the Level of Rice Self-Sufficiency ('000 Tonnes)

| | Actual Situation | | | | Following a change in policy | | | |
|---|---|---|---|---|---|---|---|---|
| | 1985 | 1986 | 1987 | 1988 | 1985 | 1986 | 1987 | 1988 |
| Maize | | | | | | | | |
| Production | 4330 | 5920 | 5155 | 6652 | 4094 | 5597 | 4874 | 6289 |
| Consumption | 4375 | 5984 | 5373 | 6678 | 4382 | 5994 | 5382 | 6689 |
| Surplus | - 45 | - 64 | - 218 | - 26 | - 288 | - 497 | - 408 | - 400 |
| Cassava | | | | | | | | |
| Production | 14057 | 13312 | 14356 | 15471 | 13788 | 13056 | 14080 | 15174 |
| Consumption | 12496 | 12094 | 13206 | 14552 | 12554 | 12151 | 13268 | 14621 |
| Surplus | 1561 | 1218 | 1150 | 919 | 1234 | 905 | 812 | 453 |
| Sugar | | | | | | | | |
| Production | 1677 | 2024 | 2128 | 2175 | 1638 | 1979 | 2081 | 2127 |
| Consumption | 1854 | 1942 | 2087 | 2133 | 1815 | 1897 | 2040 | 2085 |
| Surplus | - 177 | 82 | 41 | 42 | - 177 | 82 | 41 | 42 |
| Groundnut | | | | | | | | |
| Production | 528 | 642 | 533 | 589 | 520 | 632 | 525 | 580 |
| Consumption | 545 | 676 | 579 | 617 | 537 | 666 | 571 | 608 |
| Surplus | - 17 | - 34 | - 46 | - 28 | - 17 | - 34 | - 46 | - 28 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Soybean | | | | | | | | |
| Production | 870 | 1227 | 1161 | 1270 | 842 | 1187 | 1123 | 1229 |
| Consumption | 1143 | 1602 | 1420 | 1785 | 1146 | 1607 | 1424 | 1790 |
| Surplus | - 273 | - 375 | - 259 | - 515 | - 304 | - 420 | - 301 | -561 |
| Sweet potato | | | | | | | | |
| Production | 2161 | 2091 | 2013 | 2159 | 2150 | 2080 | 2002 | 2148 |
| Consumption | 2161 | 2091 | 2013 | 2159 | 2150 | 2080 | 2002 | 2148 |
| Surplus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wheat | | | | | | | | |
| Consumption | 1317 | 1610 | 1688 | 1588 | 1318 | 1611 | 1690 | 1590 |

and consumer prices are lower. Such a policy would have higher overall government costs because the increased costs of fertiliser subsidies would not be offset by significant reductions in the cost of price support for rice.

### 4.3 An optimal policy?

A final issue that arises is the concept of the optimal level of fertiliser subsidy if the objective is the unconstrained maximisation of net social benefit. That is, ignoring the effects on foreign exchange saving, the level of self-sufficiency and distributional consequences, is there a fertiliser subsidy policy that maximises net social benefit? To examine this issue, the fertiliser price in the version of the model for 1988 was parameterised, holding all other policies at their original level.

The results for net social benefit and net government cost are shown in Figure 3. In terms of maximising net social benefit, the best option is a fertiliser subsidy policy which involves a fertiliser price higher by about 30 per cent than the actual price in 1988. The remarkable feature of Figure 3 is the size of the gradient of the net-benefits-to-the-government function. This is explained by the fact that, as the level of fertiliser subsidy is reduced, there are both direct and induced benefits to the budget. The cost of the policy is reduced directly, and the induced benefits flow in terms of higher import taxes collected.

However, the negative aspects of this optimal policy must also be acknowledged. It involves considerable losses to producers (reduction in producers surplus = Rp 478 billion), relatively small losses to consumers (reduction in consumer surplus = Rp 14 billion), an increase in foreign exchange cost of Rp 676 billion, and a fall in the level of rice self-sufficiency to 90.7 per cent from 97.0 per cent.

## 5. Summary and Conclusions

The overall objective of the research reported here was to assess the impacts of the food policies that were followed by Indonesia between 1985 and 1988, and to demonstrate the benefits and costs of some alternatives. There were three components of the work. First, by comparing the actual situation with a no-policy scenario, it was shown that there was a net social benefit of the policies that were followed. This arose principally because, by using policies to encourage domestic output, fewer imports of rice were needed so that the international price was forced down. Thus compared with the no-policy position, Indonesia benefited from the lower priced imports.

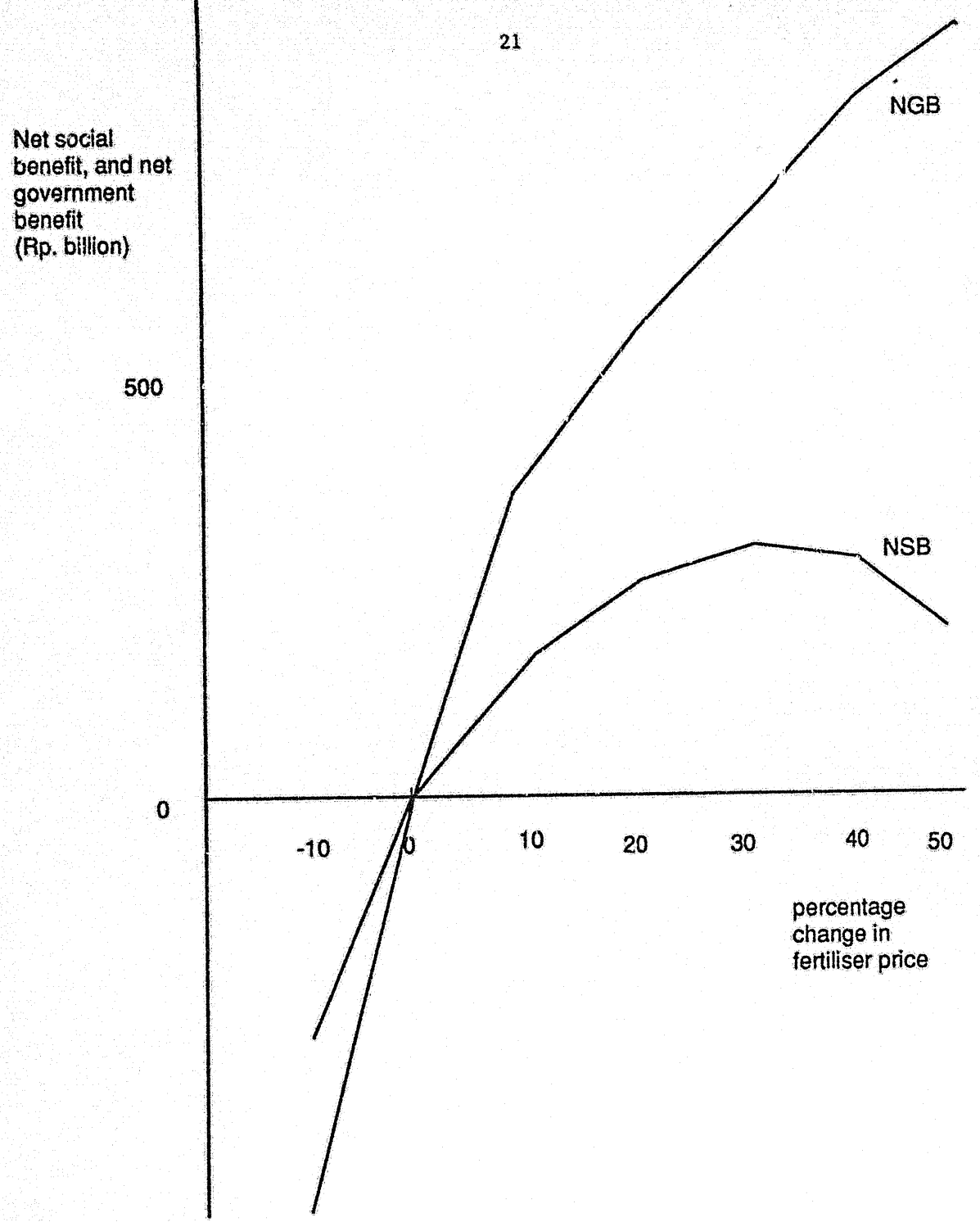


Figure 3 Parameterisation of the fertiliser price to find the optimal level of fertiliser subsidy (1988).

Second, if maintaining the level of rice self-sufficiency is imposed as the highest level objective, then there are a variety of policy combinations that would achieve this objective. For example, a reduced fertiliser subsidy could be replaced by higher output price support. The alternatives that were examined had virtually no effect on net social benefit. That is, there is a fairly flat net-social-benefit response function in the vicinity of the policies that were actually pursued when the self-sufficiency constraint is imposed.

Third, under an objective of unconstrained maximisation of net social benefit, it is possible to show both that there is an optimal level of the fertiliser subsidy policy, and that such a policy may have disadvantages in other dimensions. In 1988, the optimal policy was to increase the price of fertiliser by about 30 per cent.

Taken together, these results suggest that the outcomes actually achieved by Indonesian policy makers were encouraging. A balancing of its various objectives would seem to imply that a level of rice output just below self-sufficiency is appropriate. Such a level was achieved in 1986, 1987 and 1988. In this situation, the foreign exchange costs appear reasonable, revenues from import taxes can be raised to finance part of the fertiliser subsidy, and the support policies do not over-encourage rice producers at the expense of secondary food crops.

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Appendix 1

Table A.1

The Major Food Crops : 1985

| Commodity | Wholesale Price (Rp/kg) (1) | Floor Price (Rp/kg) (2) | Area ('000 ha) (3) | Yield (t/ha) (4) | Production ('000 tonnes) (5) | Consumption ('000 tonnes) (6) |
|---|---|---|---|---|---|---|
| Rice (milled) | 360.85 | 175.00 | 9902 | 3.90(b) | 24316 | 23987 |
| Maize | 208.34 | 110.00 | 2440 | 1.77 | 4330 | 4375 |
| Cassava | 59.93 | - | 1272 | 10.90 | 14057 | 12496 |
| Sugar (refined) | 604.17 | - | 273 | 91.20(c) | 1677 | 1854 |
| Groundnut | 1181.90 | (a) | 510 | 1.04 | 528 | 545 |
| Soybean | 508.35 | 300.00 | 896 | 0.97 | 870 | 1143 |
| Sweet potato | 70.53 | - | 256 | 8.40 | 2161 | 2161 |
| Wheat | 217.75 | - | - | - | - | 1317 |

(a) Floor price for groundnut last set at Rp.425/kg on 1 November,1981.
(b) Yield in gabah (threshed paddy)
(c) Yield in sugar cane

Sources: Fertiliser price: Rp. 100/kg (Hobohm 1987, p.25)

GDP 1985: Estimate Rp. 80,119.6 billion, constant prices, (BPS 1987a Table 2).

Col. 1 : Wheat, cif price, Tabor et. al. (1988, p.261) All others BPS 1989b. For rice, seeTable 2, Column 7.

Col. 2 : BULOG 1985; 1988.

Col. 3-5 : BPS Buletin Ringkas, December 1987 and BPS 1985, FAO 1986, Vol. 40, p.161 for sugar.

Col. 5-6 : BPS 1985.

Table A.2

The Major Food Crops : 1986

| Commodity | Wholesale Price (Rp/kg) (1) | Floor Price (Rp/kg) (2) | Area ('000 ha) (3) | Yield (t/ha) (4) | Production ('000 tonnes) (5) | Consumption ('000 tonnes) (6) |
|---|---|---|---|---|---|---|
| Rice (milled) | 431.15 | 175.00 | 9988 | 4.00(b) | 24744 | 25162 |
| Maize | 206.54 | 110.00 | 3143 | 1.88 | 5920 | 5984 |
| Cassava | 64.28 | - | 1170 | 11.40 | 13312 | 12094 |
| Sugar (refined) | 622.22 | - | 303 | 86.50(c) | 2024 | 1942 |
| Groundnut | 1141.00 | (a) | 601 | 1.10 | 642 | 676 |
| Soybean | 641.66 | 300.00 | 1254 | 0.98 | 1227 | 1602 |
| Sweet potato | 70.96 | - | 253 | 8.30 | 2091 | 2091 |
| Wheat | 217.23 | - | - | - | - | 1610 |

(a) Floor price for groundnut last set at Rp.425/kg on 1 November,1981.
(b) Yield in gabah (threshed paddy)
(c) Yield in sugar cane

Sources: Fertiliser price: Rp. 125/kg from 3 April 1986 (Hobohm 1987,p.25)

GDP 1986: Estimate Rp. 83,318.2 billion, constant prices, (BPS 1987a Table 2).

Col. 1 : Wheat, cif price, BPS Buletin Ringkas, March 1987, p.72, converted at exchange rate Rp. 1284 = U.S.$. All others BPS 1989b. For rice, see Table 2, Column 7.

Col. 2 : BULOG 1985; 1988.

Col. 3-5 : BPS Buletin Ringkas, December 1987, BPS 1986, FAO 1988, Vol. 42, p.207 for sugar.

Col. 5-6 : BPS 1986.

Table A.3

The Major Food Crops : 1987

| Commodity | Wholesale Price (Rp/kg) (1) | Floor Price (Rp/kg) (2) | Area ('000 ha) (3) | Yield (t/ha) (4) | Production ('000 tonnes) (5) | Consumption ('000 tonnes) (6) |
|---|---|---|---|---|---|---|
| Rice (milled) | 489.58 | 190.00 | 9922 | 4.00(b) | 24970 | 24990 |
| Maize | 267.56 | 110.00 | 2626 | 1.96 | 5155 | 5373 |
| Cassava | 76.53 | - | 1222 | 11.70 | 14356 | 13206(d) |
| Sugar (refined) | 646.16 | - | 335 | 86.00(c) | 2128 | 2087 |
| Groundnut | 1250.94 | (a) | 551 | 0.97 | 533 | 579 |
| Soybean | 756.68 | 300.00 | 1101 | 1.06 | 1161 | 1420 |
| Sweet potato | 82.48 | - | 229 | 8.80 | 2013 | 2013 |
| Wheat | 237.62 | - | - | - | - | 1664 |

(a) Floor price for groundnut last set at Rp.425/kg on 1 November,1981.
(b) Yield in gabah (threshed paddy)
(c) Yield in sugar cane
(d) Net gaplek (dried cassava) imports converted back to cassava at rate 0.36

Sources: Fertiliser price: Rp. 125/kg (EIU 1988,p.31)

GDP 1987: Estimate Rp. 86,307.1 billion, preliminary figure, constant prices, (BPS 1987a, Table 2).

Col. 1 : Wheat, cif price, BPS Buletin Ringkas, March 1988, p.55, converted at exchange rate Rp. 1644 = U.S.$. All others BPS 1989b. For rice, seeTable 2, Column 7.

Col. 2 : BULOG 1985; 1988.

Col. 3-5 : BPS Buletin Ringkas, March 1989 , BPS 1987c, FAO 1988, Vol. 42, p.207 for sugar

Col. 5-6 : BPS 1987c (forthcoming).

Table A.4

The Major Food Crops : 1988

| Commodity | Wholesale Price (Rp/kg) (1) | Floor Price (Rp/kg) (2) | Area ('000 ha) (3) | Yield (t/ha) (4) | Production ('000 tonnes) (5) | Consumption ('000 tonnes) (6) |
|---|---|---|---|---|---|---|
| Rice (milled) | 504.68 | 210.00 | 10138 | 4.10(b) | 25975 | 26770 |
| Maize | 303.59 | 125.00 | 3406 | 1.95 | 6652 | 6678 |
| Cassava | 99.97 | - | 1303 | 11.90 | 15471 | 14552(d) |
| Sugar (refined) | 726.00 | - | 324 | 99.00(c) | 2175 | 2133 |
| Groundnut | 1676.38 | (a) | 608 | 0.97 | 589 | 617 |
| Soybean | 877.22 | 325.00 | 1177 | 1.08 | 1270 | 1785 |
| Sweet potato | 119.32 | - | 248 | 8.70 | 2159 | 2159 |
| Wheat | 239.56 | - | - | - | - | 1649 |

(a) Floor price for groundnut last set at Rp.425/kg on 1 November,1981.
(b) Yield in gabah (threshed paddy)
(c) Yield in sugar cane
(d) Net gaplek (dried cassava) imports converted back to cassava at rate 0.36

Sources: Fertiliser price: Rp. 135/kg (EIU 1988,p.31)

GDP 1988: Estimate Rp. 90,450 billion, constant prices, based on EIU, Country Report Indonesia, No.3, 1989, p.2 estimate of 4.8 per cent real growth rate of GDP for 1988

Col. 1 : Wheat, cif price, BPS Buletin Ringkas, March 1989, p.58, converted at exchange rate Rp. 1686 = U.S.$. All others BPS 1989b. For rice, see Table 2, Column 7.

Col. 2 : BULOG 1985; 1988.

Col. 3-5 : BPS Buletin Ringkas, October 1989, BPS 1988, FAO 1988, Vol. 42, p.207.

Col. 5-6 : BPS 1988.

Table A.5

Demand Elasticities used for Cross-Commodity Analyses

| | Rice | Corn | Cassava | Sugar | Gr.Nut | Soybean | Sw.Pot. | Wheat | Income |
|---|---|---|---|---|---|---|---|---|---|
| Rice | -0.60 | 0.04 | 0.03 | 0.02 | 0.03 | 0.03 | 0.02 | 0.04 | 0.36 |
| Corn | 0.34 | -0.80 | 0.28 | 0.02 | 0.02 | 0.03 | 0.03 | 0.04 | 0.01 |
| Cassava | 0.10 | 0.15 | -0.55 | 0.02 | 0.05 | 0.04 | 0.14 | 0.02 | 0.01 |
| Sugar | 0.04 | 0.02 | 0.02 | -0.70 | 0.02 | 0.04 | 0.02 | 0.02 | 0.50 |
| Gr.nut | 0.05 | 0.05 | 0.05 | 0.02 | -1.00 | 0.10 | 0.03 | 0.02 | 0.65 |
| Soybean | 0.08 | 0.04 | 0.04 | 0.03 | 0.12 | -0.90 | 0.02 | 0.03 | 0.50 |
| Sw.Pot. | 0.01 | 0.05 | 0.10 | 0.01 | 0.02 | 0.01 | -0.25 | 0.01 | 0.01 |
| Wheat | 0.12 | 0.04 | 0.01 | 0.02 | 0.01 | 0.02 | 0.01 | -0.80 | 0.55 |

Table A.6

Supply Elasticities used for Cross-Commodity Analysis

| | Rice | Corn | Cassava | Sugar | Gr.Nut | Soybean | Sw.Pot. | Fertiliser |
|---|---|---|---|---|---|---|---|---|
| Rice | 0.30 | -0.05 | -0.01 | -0.02 | -0.01 | -0.02 | -0.01 | -0.15 |
| Corn | -0.12 | 0.50 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.20 |
| Cassava | -0.08 | -0.01 | 0.20 | 0.00 | 0.00 | 0.00 | -0.02 | -0.05 |
| Sugar | -0.02 | -0.02 | 0.00 | 0.30 | 0.00 | 0.00 | 0.00 | -0.15 |
| Gr.nut | -0.01 | -0.02 | 0.00 | 0.00 | 0.40 | -0.02 | 0.00 | -0.10 |
| Soybean | -0.02 | -0.02 | 0.00 | 0.00 | -0.02 | 0.40 | 0.00 | -0.15 |
| Sw.Pot. | -0.01 | -0.02 | -0.02 | 0.00 | 0.00 | 0.00 | 0.25 | -0.05 |