WORKING PAPER 48

Effects of Trade Liberalization on Agriculture in Indonesia: Commodity Aspects

Erwidodo and
Prajogo U. Hadi

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The CGPRT Centre

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In co-operation with ESCAP member countries, the Centre will initiate and promote research, training and dissemination of information on socio-economic and related aspects of CGPRT crops in Asia and the Pacific. In its activities, the Centre aims to serve the needs of institutions concerned with planning, research, extension and development in relation to CGPRT crop production, marketing and use.

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Abbreviations

AFTA	:	ASEAN Free Trade Area
AMS	:	Aggregate measurement support
APEC	:	Asia and Pacific Economic Cooperation
ASEAN	:	Association of South East Asian Nations
BI	:	Bank of Indonesia
BIMAS	:	Bimbingan Masal (Mass Guidance)
BPPC	:	Badan Penyangga Perdagangan Cengkeh (Clove Trade and Marketing Board)
BPR	:	Bank Perkreditan Rakyat
BRI	:	Bank Rakyat Indonesia
BULOG	:	Badan Urusan Logistik (National Logistic Agency)
CEPT	:	Common Effective Preferential Tariffs
CGPRT	:	Coarse grains, pulses, roots and tuber crops
CIF	:	Cost, insurance and freight
EEC	:	European Economic Community
EPTE	:	Export processing entreports
ERP	:	Effective rate of protection
EU	:	European Union
FDI	:	Foreign direct investment
FOB	:	Free on board
GATT	:	General Agreement on Trade and Tariffs
GDP	:	Gross domestic product
HGB	:	Hak Guna Bangunan (building rights)
HGU	:	Hak Guna Usaha (utilization for business rights)
ITPC	:	Indonesia Trade Promotion Center
KUK	:	Kredit Usaha Kecil (Credit Scheme for Small Scale Business)
KUPEDES	:	Kredit Umum Pedesaan (rural general credit scheme)
MFA	:	Multi Fiber Agreement
NAFED	:	National Agency for Export Development
NGO	:	Non-govermental organization
NRP	:	Nominal rate of protection
NTB	:	Non tariff barriers
SBI	:	Sertifikat Bank Indonesia (Bank Indonesia Certificate)
SBPU	:	Surat Berharga Pasar Uang (Money market security)
SITC	:	Standard International Trade Classification
UR	:	Uruguay Round
VAT	:	Value added tax
WTO	:	World Trade Organization

Foreword

Responding to the growing concern for the effects of trade liberalization on regional agriculture, the CGPRT Centre has implemented a three-year research project "Effects of Trade Liberalization on Agriculture in Selected Asian Countries with Special Focus on CGPRT Crops (TradeLib)" since March 1997, in collaboration with partners from ten countries: China, India, Indonesia, Japan, Malaysia, Pakistan, the Philippines, the Republic of Korea, Thailand and Viet Nam. In all these countries, important issues regarding trade liberalization were investigated with an identical research framework by national experts.

The investigation covers major crops which might receive either favorable or unfavorable effects of trade liberalization both in export and import. I believe that the project will provide broad and practical knowledge on various aspects of the effects of trade liberalization; moreover, the information will be useful for researchers and policy planners not only in participating countries but also in other countries in the region. However, I would like to note that, since this project was conceived and started before the current currency and economic crisis began in the middle of 1997, the analysis handles basically the period before the crisis with available current information.

I am pleased to publish **Effects of Trade Liberalization on Agriculture in Indonesia: Commodity Aspects** as the report of the second phase of the country study of Indonesia. A report of the first phase of the country study, which includes institutional and structural aspects on the same subject, was published recently. I certainly hope these reports will be fully utilized for the improvement of agricultural trade and the encouragement of regional agriculture.

I thank Dr. Erwidodo and Dr. Prajogo U. Hadi of Indonesia for their intensive research and the Center for Agro-Socioeconomic Research for allowing them to work with us and for providing continuous support. I am very much obliged to Dr. Boonjit Titapiwatanakun for his devoted contribution to the project as the regional advisor. I would also like to express appreciation to the Government of Japan for funding the project.

Haruo Inagaki
Director
CGPRT Centre

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Executive Summary

In general, this study is aimed at analyzing the effects of trade liberalization on production, consumption, trade and marketing of selected CGPRT commodities, namely rice, soybeans, maize, cassava, and potatoes in Indonesia. The analysis is undertaken at both the aggregate and farm levels. Specifically, the objectives of the study are (i) to review production, marketing and trade-related policies on selected commodities, (ii) to measure the effects of trade liberalization at both national and farm levels, particularly on production, export, import, farm income, as well as producer, consumer and government surpluses, and (iii) to draw policy recommendations to minimize adverse impacts of trade liberalization.

Effects of the trade liberalization prior to the economic crisis

At the macro level, unilateral trade liberalization through tariff reductions for import substitution would reduce the wholesale price, producer price, supply quantity and producer surplus, but increase demand quantity, import and consumer surplus. The eventual effect would be an increase in net surplus, suggesting an improvement in social welfare. The extent of change, however, would be dependent very much on the transmission elasticity of tariffs on wholesale price, the transmission elasticity of wholesale price on producer price, and the price elasticity of supply and demand. Higher tariff transmission elasticity would have a large negative effect on producer surplus, but also a larger positive effect on consumer surplus and eventually a larger positive effect on social welfare.

At the farm level, tariff cuts would reduce the producer price. Due to own-price and cross-price effects, a decline in producer price would reduce the use of inputs such as fertilizer and labor, which subsequently reduces yield and net revenue. As reflected in price transmission elasticity, the magnitude of the effects at the farm level would be dependent on the marketing system of the respective commodities. It is likely that the more efficient the marketing system, the higher the elasticity of price transmission. In the case of rice and potato in West Java and soybean, maize and cassava in East Java, the marketing systems can be considered efficient. Further improvement in the marketing systems would therefore improve the producer prices.

Rice

The removal of implicit import tariffs for rice (reduction by 16.4%) would increase the demand for rice by 2.36% or 796,700 tons. Meanwhile, the supply of paddy would decline by 2.83%, or decline from 51.1 million tons to 49.7 million tons in response to the drop in producer price of paddy. The import quantity would increase by around 1.7 million tons, from 2.04 to 3.7 million tons. The net welfare gains for a 16.4% cut of implicit tariff would be around RP 1,832.2 billion. At the farm level, the gross revenue and total variable cost of rice farms would decrease by 13.9% and by 5.7%, respectively, resulting in a reduction of net revenue of 21.7%, from Rp 892,119 to Rp 698,373.

Implementation of Uruguay Round trade liberalization is expected to lift the world market price of rice by 7%. The analysis shows that this price change would increase the wholesale and producer prices by 6.63% and 6.76%, respectively. The increase in the domestic wholesale price would reduce the demand for rice by 1.27% (427,650 tons), but increase production of paddy slightly by 1.52% (30,940 tons), an increase from 51.102 million tons to 51.133 million tons. Import quantity would decline by around 446,840 tons, from 2.040 to

1.593 million tons. The net welfare would be around Rp 1,069.30 billion. At the farm level, the Uruguay Round trade liberalization would increase net farm revenue by 11.7%.

The economic crisis has forced the government to abruptly deregulate its domestic rice market. The December 1998 deregulation liberalized rice markets including removal of the BULOG monopoly on importation of rice. There has been growing concern recently about the potential adverse effects of this situation. In order to reduce potential adverse effects, the government has been considering implementation of an import tariff on rice. The analysis found that the net welfare loss for imposing a 15% import tariff is around Rp 588.3 billion per year.

Soybean

The decrease in the domestic wholesale price following the tariff removal would increase the demand for soybean by 35,500 tons or 1.61% higher than the base year level. In contrast, the supply of soybean would decline by 1.6% (32,300 tons), or from 1,680 thousand tons to 1,648 thousand tons in response to the drop in producer price of soybeans. Import quantity would increase by around 67,800 tons, from 533,600 tons to 601,400 tons. The net welfare gain resulting from tariff removal on soybean imports is estimated around Rp 32.3 billion. At the farm level, removal of the tariff would reduce net revenue of soybean farms by 4.6% from Rp 872,629 to Rp 832,354.

The 7% increase in the world market price of soybean arising from the Uruguay Round trade agreement would increase the wholesale and producer prices by 5.01% and 4.39%, respectively. The increase in the domestic wholesale price would in turn reduce the demand for soybean by 2.14%. Meanwhile, the production of soybean would increase by 2.57%, from 1,680 thousand tons to 1,693 thousand tons in response to the increase in the producer price of soybean. Import quantity would decline by 61,150 tons, from 533,600 tons to 472,450 tons. The net welfare loss resulting from implementation of the Uruguay Round trade liberalization would be around Rp 69.14 billion. At the farm level, gross revenue and total variable cost of soybean farms would increase by 4.6% and 0.4%. The net revenue would increase from Rp 872,629 to Rp 925,860, by 6.1%.

Maize

The decrease in the domestic wholesale price following the tariff removal of 5% would increase the demand for maize by 302,700 tons or 1.8% higher than the base year level. In contrast, the supply of soybean would decline by 159,000 tons. The import quantity would increase by around 461,700 tons. The net welfare gain resulting from tariff removal on maize imports is estimated around Rp 36.3 billion. These social welfare gains are attributed to the gain by consumers, which is much higher than the loss borne by producers as a result of tariff removal. The consumer surplus is estimated around Rp 136.3 billion. Due to tariff removal, the government would give up income of around Rp 12.9 billion per year. At the farm level, the tariff removal would likely reduce net revenue by 4.86%.

The increase in world price would have severe effects on the maize economy. The quantity imported and consumer surplus would decrease by 4,490 tons and Rp 177.8 billion, respectively, while producer surplus would increase by 133.8 billion. The social welfare of the society, in effect, would get worse because of a decline in net surplus by Rp 44.0 billion. At the farm level, on the other hand, the farmer's income would be better-off from additional net revenue of 4.74% or Rp 34,814 per hectare per season.

Cassava

A 6% increase in world price would eventually decrease the quantity demanded by 0.04% or 7,000 tons. In contrast, a similar rate of increase in the world price would eventually

increase the quantity supplied by 0.44% or 74,900 tons. These changes would generate a potential increase for export by around 81,900 tons. As a consequence, consumer surplus would be expected to decrease by Rp 109.4 billion and the producer surplus increase by Rp 110.7 billion. The net surplus would increase by approximately Rp 1.3 billion. This is to say that any increase in the world price of cassava would eventually improve social welfare. At the farm level, the world price change would increase the net farm revenue by 4.39% or Rp 85,666 per hectare per season.

Potato

The decrease in the domestic wholesale price following the tariff reduction (from 22 to 17%) would increase the demand for soybean by 4,400 tons or 0.42% higher than the base year level. In contrast, the supply of potato would decline by 2.8% (29,900 tons), from 1,035 thousand tons to 1,005 thousand tons in response to the drop in producer price of potato. Import quantity would increase by around 43,000 tons, from 2,100 tons to 36,500 tons. As a result, the net welfare gains from tariff removal would be around Rp 10.4 billion. At the farm level, this 5% tariff reduction would reduce net farm revenue by 7.9%, from Rp 10,356,164 to Rp 9.533,752 per ha per season.

Effects of the economic crisis and related policy reforms

Since the economic crisis hit the country, the government has undertaken massive policy reforms in agriculture, including: (i) eliminating the BULOG import monopoly over wheat, wheat flour, sugar, soybeans, garlic, and quite recently rice, (ii) reducing tariff rates on all food items to a maximum of 5% and abolishing local content regulations, (iii) removing restrictive trade and marketing arrangements for a number of commodities including local content requirement, and (iv) deregulating trade in agricultural products across district and provincial boundaries including cloves, oranges, and livestock. It is expected that consistent implementation of these reforms will restore investor confidence and allow more efficient and productive investment.

Despite the ongoing reforms, the economy remains in a deep crisis. The massive currency depreciation has serious implications on domestic demand, the banking system, corporate balance sheets, inflation, trade and the balance of payments, government finances, and eventually growth, incomes, employment, welfare, and poverty. The most immediate effect of the exchange rate depreciation was a collapse in domestic demand. The collapse of domestic demand overwhelmed producers of import substitutes who might otherwise have benefited from the exchange rate depreciation. Exporters of manufactured products have been handicapped by a shortage in trade finance due to lack of confidence among the trading partners. The main gainers were exporters, especially those exporting agricultural and natural resource based products.

The currency depreciation caused inflation to soar. Inflation over the 12 months to the end of June 1998, reached 59%. The bulk of this increase was caused by a rise in the price of tradable goods, especially food and clothing. This has serious implications on the welfare of the poor. Agricultural supply shocks due to weather problems combined with the high inflation have sharply reduced consumer purchasing power and triggered an alarming rise in the number of food insecure families. Up to now, the government is retaining a targeted subsidy on rice, particularly to food insecure families, and it is still seeking the most appropriate mechanisms to deregulate trading in this staple and to make the price affordable.

Weather problems and the economic crisis have pushed Indonesia into a serious food crisis. In terms of rice, the supply shocks occurred after several years of slow growth of rice production. The monetary crisis, which has disrupted agricultural input and output markets, seriously affected the food supply. Rice production, in the form of dried paddy, dropped from

51 million tons in 1996 to 49 million tons in 1997 at a rate 4.1%. According to the second production forecast of the Central Bureau of Statistics, rice production in 1998 is forecast to drop further by 6.5%, to a total amount of 46.3 million tons. Similar situations occurred in the production of other food crops. The case of soybean was the worst, and its production declined continuously during the 1995-1998 period.

The decline in domestic food supply has been partially offset by an increase in food imports. Imports of rice, soybeans and sugar, in particular, have increased significantly to offset the low level of domestic production. The import of wheat has also increased to meet an increasing demand in relation to the food and social safety net program. The decline in rice production in 1997 has been offset by a rice import of 3.6 million tons plus 4.3 million tons of wheat import.

Whether it is timely to undertake abrupt policy reforms in agriculture when the delivery system has collapsed is now a controversial policy issue. Many argued that before the subsidies were removed, the government should have secured an effective food delivery system in order to reach those who are food insecure. In terms of fertilizer subsidy removal, negative reaction spread out not long after the policy was announced, since fertilizer not only disappeared from the market but their prices were too expensive. Many people suggested that subsidy elimination should instead be done gradually.

Policy recommendations

Trade liberalization would act to redistribute income between consumers and producers. In the case of import substitution commodities, such as rice, soybean and maize, trade liberalization through tariff reduction would increase the social welfare of the society. In the case of export commodities, such as cassava, an increase in world price resulting from trade liberalization would also increase the social welfare of the society. The negative effects arising from trade liberalization can be attenuated if the government could act to help enhance productive efficiency. In addition, government policies should also act to better redistribute the welfare gains arising from trade liberalization.

Since the effects of unilateral trade liberalization on import substitution commodities would likely reduce the welfare of producers, at least in the short-run, attempts should be made to prevent producers from income squeeze. Agricultural policy reform should be directed to further increase farm productivity and marketing efficiency. Introduction of improved production technology, provision of farm credits, and improvement of infrastructure such as transportation facilities, are among other policies expected to minimize the negative effects, and at the same time, open opportunities to gain from trade liberalization.

Government intervention on rice remains a debatable policy issue. Although the rice trade has been liberalized, the government is still attempting to use a floor price and market operations program to support producer incomes and stabilize consumer prices. Three options might be considered. At one extreme, the government could abandon all efforts to stabilize domestic rice prices, abolish the public procurement and distribution system, and rely solely on private trade. The question is whether domestic producers and consumers would be willing to accept the consequences of considerable price volatility. Another extreme option would be to restore the government monopoly on rice imports and return to its pre-1998 rice price stabilization policy. The compromise option would be to retain many of its previous rice policy objectives, while implementing them in a more transparent and cons-effective way.

1. Introduction

1.1 Background

The completion of the Uruguay Round (UR) negotiation and the establishment of the World Trade Organization (WTO) in January 1995 have accelerated liberalization initiatives in all trading nations. The main elements of the UR agreement include commitments on enhancing market access, dismantling of quantitative restrictions and subsidies as well as non-tariff barriers by all members. In line with the UR commitment, there have been growing regional trade liberalization initiatives. In the Asia and Pacific Economic Cooperation (APEC) forum, members have committed to undertake further trade liberalization in the region. Similarly, there have been strong needs among the ASEAN members to accelerate the realization of the ASEAN Free Trade Area (AFTA).

Concern about the effects of trade liberalization on agricultural production has been growing. Despite the above commitments that are in place, debate on the potential effects of trade liberalization continues. Protests against governments have been accelerating, not only in the developing countries, but even much more intensely in developed countries. Moreover, the economic crisis, which hit a number of countries and regions, has stimulated growing sentiment against trade liberalization initiatives. Some opponents believe that the main beneficiaries of liberalized global markets are the developed nations, and hence they argue that market liberalization in the developing nations should be undertaken more carefully, in a gradual rather than in abrupt manner. Interestingly, the economic crisis has induced Indonesia to embark on a more liberalized market economy. The crisis induced reforms and their potential effects remain debatable issues up until today.

In order to smoothly proceed with the adjustment process towards a more liberalized market economy, the effects of trade liberalization, especially those on agriculture in developing country like Indonesia, need to be analyzed. As reflected in its title, the project entitled: "*Effects of Trade Liberalization on Agriculture in Selected Asian Countries with Special Focus on CGPRT Crops*" is aimed at assessing the effects of trade liberalization in selected Asian countries on the production, marketing and trade for selected food commodities at both the aggregate and farm levels. The effects on national welfare and farm income will also be analyzed. Furthermore, it will specify policy options for improving the welfare of farmers.

1.2 Objectives

In general, the study is aimed at analyzing the effects of unilateral trade liberalization on production, consumption, trade and marketing of selected CGPRT commodities, namely rice, soybeans, maize, cassava, and potatoes in Indonesia. The analysis will be undertaken at both the aggregate and farm levels. Specifically, the objectives of the study are as follows:

i to review production, marketing, and trade-related policies on selected commodities in question;

ii to measure the effects of trade liberalization at both national and farm levels, particularly on production, export, import, farm income, as well as producer, consumer and government surpluses; and

iii to draw policy recommendations to minimize adverse impacts of trade liberalization.

1.3 Organization of the report

This report is organized into four chapters. The first chapter presents the background, objectives, the organization of the report, and the summary of the first report of this study (Erwidodo 1998). The second chapter presents the analytical methodology including selection of commodities, location, and analytical framework. The third chapter starts with reviews on production, marketing, and trade including related policies, followed by an analysis of the effects of liberalization at the aggregate level. The fourth chapter analyzes the impacts of trade liberalization at the farm level, especially related to cost of production and farm income. The fifth chapter describes impacts of the economic crisis, which started in mid-1997. The last chapter presents conclusions and policy recommendations.

1.4 Summary of the first report

This summary draws from the first report of this study (Erwidodo 1998). The completion of the Uruguay Round has been widely haled as a major turning point for the world trading system and a milestone for developing countries in particular. In previous rounds of multilateral trade negotiations, developing countries focused most of their attention on obtaining preferential access to developed country markets; few of them participated actively in the core business of the negotiations, namely the exchange of market access concessions. In the last Uruguay Round negotiation, however, many developing countries were very active participants both individually and in coalitions with developed countries. They made important market access offers in the conventional area of reducing tariff protection on manufactures trade, and in areas such as trade in services and trade in agricultural products that were new to the trade liberalizing process.

The extent and impact of trade liberalization remain controversial and debatable policy issues. Those referring to standard economic theory believe that trade liberalization will bring substantial benefits for all participating countries. The possibilities for expanded trade offered by the multilateral commitment to liberalization are extremely important for all countries to increase export earnings and to maintain rapid growth of their economies. On the other side, those who are not totally convinced on the benefits of trade liberalization believe that it can potentially undermine national goals, since the total adjustment costs in the short run can be much higher than the potential benefits from trade liberalization.

Prior to the Round, the multilateral trading rules for agriculture were largely ineffective, with a plethora of non-tariff barriers being used to provide high and variable rates of protection in both developed and developing countries. Export subsidies were a particular source of discord, with export subsidies by the EU and USA depressing and destabilizing world prices. Farmers in developing countries have been adversely affected by depressed and highly variable world prices and the disposal of marketable surpluses by developed countries.

Uruguay Round liberalization will expand access for Indonesia's exporters to major export markets, particularly in industrial countries. Considerable emphasis in the round was placed on the reduction of tariffs and removal of non-tariff barriers. The tariff reduction among the major export outlets will provide enhanced market access for Indonesia's exporters. Global tariff barriers on industrial products of export interest to Indonesia will be reduced by around 42%. Tariffs in industrial countries will decline to an average of around 4%. The simple average tariffs for all products (except petroleum) will fall to 4.4% in Japan, 6.0% in the European Union, and 6.5% in the United States.

Many of Indonesia's most important export products will face larger than average tariff cuts in the major industrial export markets. The largest cuts apply to wood, pulp, paper and furniture items (69%), mineral products and precious metals (59%), oil seeds, fats and oils

(40%), and coffee, tea, cocoa, and sugar (34%). Export earnings from the items in these groups comprise 21 to 50% of the total export earnings. Substantive tariff cuts will also apply to certain export items such as fruits and vegetables (36%), spices (35%), grains (39%), and other agricultural products (48%).

A substantial proportion of Indonesia's exports will enter duty free to major markets following the Uruguay Round. More than three-quarters of Indonesia's export to Japan and nearly half of exports to the United States and the European Union will be duty free. This is a substantial increase in duty-free access to major markets compared with the situation prior the Uruguay Round.

Indonesia will also benefit from various aspects of agricultural trade liberalization. Improved market access in this area will involve not just reductions in tariffs but the elimination of quantitative restrictions. The comprehensive binding of tariffs on agricultural items is the beginning of GATT discipline and liberalization in a sector which has been highly protected for many years.

In addition to tariff reduction, the Uruguay Round has resulted in greater security of market access through an expanded number of tariff bindings. For developed countries, tariff bindings will cover 99 and 100% of trade in industrial and agricultural items, respectively. For developing countries, the corresponding values are 59 and 100%. The guarantee that tariff bindings provide for market access is important. Industrial countries have bound their tariffs at actually applied levels so that the bound tariff levels following the implementation of the Uruguay Round will be those actually in effect after the agreed tariff reduction is implemented.

Estimated impacts of Uruguay Round trade liberalization

The general consensus of pre-Uruguay Round studies and the modeling work is that following trade liberalization commodity prices will be higher than they would have been without liberalization. This will mean that countries that are net exporters of these commodities will gain from liberalization while countries that are net importers may lose. Developing countries may in fact be able to gain from agricultural liberalization, if they reform their domestic policies simultaneously and also act to redistribute income domestically for instance between consumers and producers, who gain from the higher commodity prices.

Three factors should serve to attenuate the price increases resulting from agricultural reform. The first one is the introduction of more rapid technical change, which would accelerate productivity gains, and that the price rises would be reduced by this endogenous technological change. Secondly, simultaneous liberalization of agricultural policies by developing countries will serve to dampen these price rises, especially when indirect effects as well as the direct effects of protection are taken into account. Developing countries can both reduce any adverse price effects and enhance the benefits of liberalization by industrial countries, if they simultaneously reform their agricultural policies. Lastly, the estimates for increased prices of agricultural commodities resulting from trade liberalization are overstated because agricultural reform will in fact be a gradual process, with the general equilibrium effects of movements of resources between sectors creating other economic opportunities and dampening the overall adverse effects.

The Uruguay Round agreement will result in significant increases in world income, which will be widely distributed among developed and developing countries. Real wage impacts are generally expected to be positive, particularly in developing countries. The largest gains accrue to East Asian WTO members such as Indonesia, Malaysia, Republic of Korea, and Thailand. They committed themselves to implement a relatively progressive liberalization in both agriculture and manufactures. Substantial gains are coming from the competitive textiles and clothing industries resulting from the abolition of the Multi-Fibre Agreement (MFA). Since these countries are expanding their production and export of labor intensive products, the demand for labor grows strongly and real wages increase significantly.

Several previous studies indicate that most of the gains from trade liberalization arise as a consequence of a country's own liberalization. In particular, the efficiency gains which result from market opening are a benefit which accrues directly to the country undertaking trade liberalization. Liberalizing countries may also gain from greater exploitation of scale economies, from increases in the range of goods available to their producers and consumers, and from more rapid transfer of technology. There may be benefits to the country's trading partners if its import expansion is large enough to improve the exporter's terms of trade.

Unilateral trade liberalization can increase real income in a number of ways for instance by allowing consumers to purchase their needs from the most efficient source, by scaling back production of goods which are not efficiently produced domestically, by increasing production of goods which are most efficiently produced at home, and by increasing the volume of trade on which remaining trade taxes are collected. Further gains may be achieved by greater exploitation of scale economies in production, and from improvements in the range and quality of specialized products available to producers and consumers. In addition, countries may gain from liberalization of their trading partners, particularly if this increases the demand for their exports, and hence their terms of trade.

A particular concern raised by developing countries was the possibility of adverse terms of trade effects resulting from agricultural trade liberalization. It is obvious that the enormous agricultural protection provided by many developed countries was depressing world prices of many agricultural products both by protecting the domestic market from importing and by generating surpluses to be disposed of on the world markets with the help of export subsidies. Reductions in domestic supports and subsidies will benefit countries which reduce their own distortion and those which are net exporters of the products whose world prices rise, but may harm net importers of goods whose prices rise.

The very limited degree of agricultural liberalization under the Uruguay Round has one fortunate side effect. It implies that the adverse terms of trade effects imposed by the Uruguay Round liberalization are much smaller than had been previously expected. Previous studies indicated that it would cause the world prices of most agricultural products to rise by less than 2%. It worth noting that the changes of terms of trade are inherently a zero sum game, while efficiency gains are a positive sum game, where all countries can potentially gain.

Estimated impact of Uruguay Round on Indonesia's agriculture

Several studies consistently show that Uruguay Round trade liberalization is expected to have a very strong and positive impact on the Indonesian economy, and that Indonesia stands to gain considerably in terms of stimulus to both its trade and income. The results also indicate that if Indonesia does not pursue trade deregulation along the lines of its trading partners, then not only will it suffer a loss of export competitiveness, but it will actually experience a decline in net social welfare.

The results indicate that trade reforms, along with efforts to increase technical efficiency, are necessary for Indonesia to enjoy the largest benefits from the Uruguay Round. The results also confirm the notion that the more Indonesia deregulates its domestic economy, the larger the gain it can capture from global trade liberalization. In other words, the increase in Indonesia's exports and income will not come about at the expense of its trading partners. The extent to which Indonesia will benefit, as will others, will depend not only on the reduction of barriers in the markets of Indonesia's trading partners but also on the efforts to open Indonesia's own market.

The simulation results show that Indonesia's export value (volume) could increase by 10.4% (12.38%) more than it would otherwise have done, following complete implementation of the trade liberalization agreed in the Uruguay Round. The round is estimated to increase household and factor incomes by 2.0% and 4.2%, respectively. In terms of increased income,

implementation of the Uruguay Round commitments is estimated to result in a net social benefit of around $782 million. This represents 0.75% of the GDP in 1992.

These positive macroeconomic impacts should contribute to improvement of the Indonesian balance of trade and current accounts. It is interesting to note that the net gain is more than three times larger (around $2,828 million) if, in addition to deregulating its trade policy, the government also promotes increased productive efficiency in all sectors of the economy. Consumers are thus major gainers through the increase in household income and wages, despite increased domestic prices for all products in the sectors examined.

The simulation results show that China, EU, North America and Latin America are shown to be potential export markets for Indonesian rice, indicated by large positive percentage changes in rice exports to these regions. The results also show that Indonesia could expand exports of other agricultural products such as coffee, palm oil, rubber and other estate/industrial crops to the European Union, Sub-Saharan Africa and Australia/New Zealand. Exports of livestock products are also estimated to increase, especially to the EU and the rest of world. However, Indonesia's exports of forestry, fishery and agricultural-processed products are shown to decline to all export destinations. A decline in the export of forest products to Japan could have a considerable impact on foreign exchange earnings, since Japan is currently the major export market.

It is worth noting that the dynamic effects arising from Uruguay Round trade liberalization should not be omitted. In other words the results coming from the comparatively static CGE analysis need to be interpreted cautiously. The simulation results obtained from such an approach do not take into account the dynamic gains which trade liberalization may generate. Strong linkages exist between trade and investment, and in turn between investment and growth. Trade liberalization would reinforce these linkages, increasing productivity and stimulating investment. Moreover, the quantitative impact of the Round over time will be larger as well, due to the qualitative improvement it will impart to the international trading system.

2. Selection of Commodities, Location and Methodology

2.1 Selection of commodities

Rice, maize, soybean, cassava and potatoes are the commodities selected for this study. The first four commodities are the main food crops produced in Indonesia, while potato is considered a vegetable crop of future importance due to its increasing demand. Selection of these commodities was based on the following reasons.

Rice, in particular, is the staple food of the Indonesian people. Rice contributes more than 65% of total calorie consumption, and around 50% of total protein intake. This commodity is not only considered economically and socially important, but is also considered a politically sensitive commodity. Rice plays a key role as a "wage" good, since it is widely used in wage determination, and its price, therefore, has significant inflationary power in the economy.

Maize is the second most important food of the Indonesian diet. For human consumption, maize is usually mixed with rice. It is also an important feed component for which demand is continuously increasing as a result of rapid development of feed industries in the past two decades associated with the rapid development of the poultry industry. Indonesia used to be net exporter of maize, but has turned into a significant net importer since 1995.

As a processed food, soybean is an important protein source in the Indonesian diet. The attention given to soybeans has been stimulated primarily by rapidly rising demand for soybeans, and in turn its import, as a result of rapid expansion of food and feed industries in Indonesia. The government reacted to the increasing demand for soybeans by launching a special intensification and extensification program to boost soybean production. In 1986, the government of Indonesia proclaimed a policy objective of self-sufficiency in soybeans. This policy objective was recently restated in the *Gema Palagung* program, in which soybean self-sufficiency is targeted for achievement in the year 2002.

Cassava is considered an important food crop, not only as a staple, but also as raw material for feed and food industries, and a source of foreign exchange earning. Unfortunately, cassava is frequently associated with poverty, as it is usually consumed as a staple by the poor. This labels cassava as an inferior commodity, and in turn makes cassava development in Indonesia very slow. Yet, when we look at future potential and its prospect to generate income through its linkages to various industrial activities, cassava can be regarded as an important and promising food crop.

Potato in Indonesia is considered a horticultural crop. It is traditionally used as an additional vegetable in soups and has lately developed rapidly to include chips and french fries. Potato ranks sixth among the major vegetable commodities. Demand for potato in Indonesia increased substantially in the last decade, due to rapidly growing fast food and processed food industries. The increased consumption is particularly rapid, coming from high income classes in urban areas, compared with those in rural areas.

2.2 Selection of location

In order to better analyze the effects of trade liberalization at regional as well as farm levels, a representative location for each commodity in question was selected. A location is selected based on the following criteria: (i) it is considered as a center of production of the

respective commodity, (ii) it is also a major consuming region, (iii) it is strongly affected by trade liberalization, and (iv) it is accessible and not costly to reach.

Based on these criteria, Java was selected. West Java was selected to represent rice and potato producing regions. The locations of rapid surveys were Karawang, Sukamandi and Cianjur for rice, and Pangalengan for potato. East Java was selected for maize, cassava, and soybeans. The rapid survey areas were Bojonegoro and Pacitan. Although not formally selected, Central Java was the site for some surveys.

2.3 Selection of methodology

The analysis utilizes both primary and secondary data sets. Primary data were collected using a rapid survey approach in each selected location. Semi-structured questionnaires were used in the survey. In addition, primary data sets, which are available in the Center for Agro Socioeconomic Research (CASER), have been heavily utilized. Secondary data sets are mainly obtained from the CASER database.

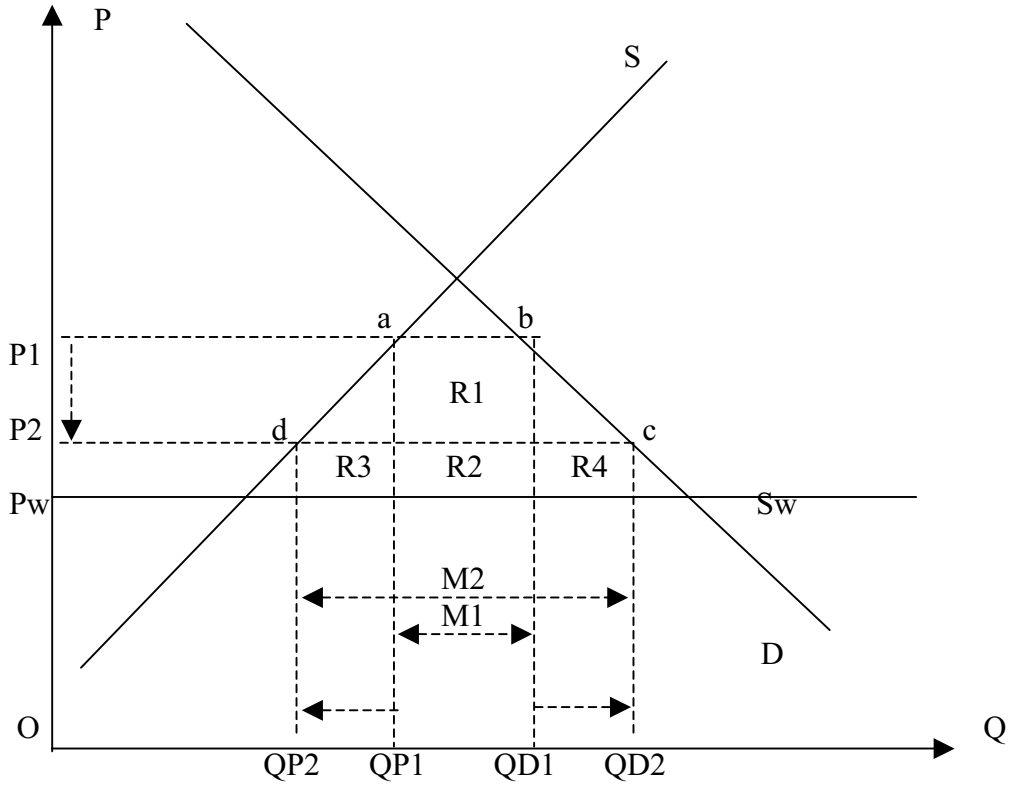
To examine the aggregate effects of trade liberalization, both qualitative and quantitative analyses are used. The qualitative analysis is undertaken using time series data by observing and calculating trends of the development of area, production, yield, import, export, and domestic consumption of these commodities. Effects on trade and marketing are analyzed using indicators such as price, marketing margin, and related indicators for export and import. At the aggregate level, cost and benefit analyses using standard farm budgeting formats are also used to examine the degree of profitability of each commodity.

The effect of trade liberalization is also quantitatively examined by using the concept of static partial welfare analysis. This partial welfare analysis is based on supply-demand analysis of the respective commodity, in which the impact of any policy change on producer, consumer and government surpluses is calculated. The following is an illustration of partial welfare analysis for examining the effects of tariff reduction for an imported commodity. Calculation of the changes on producer, consumer and government surpluses are illustrated using graphical presentation, as shown in Figure 1.1.

For illustration, assume that before trade liberalization, Indonesia imposed a 20% tariff on soybean import. As a result, the domestic price of soybean was at P1, which is equal to the given constant world price of Pw plus the amount of import tariff (that is the tariff rate 20% over world price). At the domestic price of P1, the total domestic demand for soybean was 0QD1 tons, of which the domestic production was at 0QP1 and the rest (QP1QD1) was imported. The tariff revenue collected by the government is represented by the area of rectangular R1+R2, the amount of tariff (P1-Pw) multiplied by the quantity imported (QP1QD1).

From this simple partial model, the impact of tariff cuts (trade liberalization) on domestic price, production, consumption, and trade of soybeans can be assessed. Under the assumption that tariff is the only trade barrier (all non-tariff barriers were removed), the reduction of tariff, say from 20% to 5%, would have the following impacts: (i) domestic price would decrease to P2, (ii) total domestic demand would increase to QD2, (iii) total production would decrease to QP2, (iv) total import would increase to QP2QD2, and (v) government tariff revenue would change to area R2+R3+R4. From the welfare standpoint, consumers will gain due to the decrease in price and increase in quantity demanded, which is represented by the area of P1bcP2. In contrast, the producers will lose because of the decrease in both price and production, which is represented by area P1adP2. The net social welfare gain will be the summation of the consumer surplus gain, the loss in producer surplus, and the tariff revenue collected by the government.

Figure 1.1 Effect of tariff reduction (small importing country).



Pw = World price (Sw = World supply)

P1 = Pw + T1 (P1 = Domestic price; T1 = Tariff)

P2 = Pw + T2 (P2 = Domestic price; T2 = Tariff)

where T1 > T2

Effects of tariff import cuts are the following:

1.	Tariff	T1	T2
2.	Price	P1	P2
3.	Total demand	QD1	QD2
4.	Total production	QP1	QP2
5.	Total import	QP1QD1	QP2QD2
6.	Government revenue (tariff)	R1+R2	R2+R3+R4
7.	Consumer surplus gain	P1bcP2	
8.	Producer surplus loss	P1adP2	
9.	Government surplus gain	R3+R4-R1	

Some data and parameters are needed, namely tariff rates, price elasticity of demand, price elasticity of supply, price transmission elasticity, the base level of price, import quantity, and production quantity. In the analysis, wholesale price is used to avoid the difficulty of estimating stocks. In other words, it is assumed that total demand is simply a summation of quantity produced and quantity imported, or the difference between quantity produced and

quantity exported. Price elasticity of demand and supply for each commodity as well as tariff and price transmission elasticity are estimated using statistical data.

Trade liberalization scenarios used in the analysis are those included in the previous deregulation package undertaken by the government. Therefore, the analysis was basically a type of ex-post evaluation. To make the results more interesting and useful, some efforts are also undertaken to analyze current policy issues. There are a number of relevant policy issues which need to be addressed in relation to the economic crisis. The crisis-induced reforms in agriculture, particularly liberalizing the domestic rice market, have been controversial policy issues. Removal of BULOG's monopoly and the fertilizer subsidy as well as the government initiative to implement an import tariff on rice are among the other important policy issues.

Farm level effects of trade liberalization are analyzed using a partial budgeting approach. Trade liberalization would change domestic market prices, including the price received by farmers. With this partial budgeting approach, the change in farm-gate price resulting from trade liberalization is simply imputed into the farm budget to calculate a new farm profitability.

Two effects can be considered in the analyses, namely the immediate effect and the longer-term (delayed) effect. The first effect is an immediate effect on gross farm income due to any change in the commodity price. This change in output price will not alter the production cost. This is true if the crop is ready to harvest when the change in output price occurs. The second effect would be the appropriate measure to use if the change in output price is assumed to occur in the beginning of planting season. The production cost will be expected to change as the farmer may reduce or use more inputs in response to output price change. This cross-price effect can be measured if we know the cross-price elasticity of output and inputs. Soybean farmers, for example, will likely reduce the use of fertilizer or other inputs if the price of soybean drops due to tariff cuts on importation of soybeans.

The first effect is very obvious and easy to measure simply by multiplying the new price by a given yield of the respective commodity. However, the second is not obvious and is more complicated to measure. The net effect at the farm level will depend on the magnitude of cross-price effects of such a change. In order to better picture the actual situation, some modification was undertaken in the partial budgeting analysis. Some behavioral parameters, own and cross-price elasticity parameters of input demand and production (yield) were imposed into the farm budgeting analysis. In this study, since the estimates of cross-price elasticity parameters are available, some efforts are devoted to measuring the second effect.

As mentioned before, the effect of trade liberalization on farm income is transmitted through a price linkage equation. A reduction of import tariffs, for example, will cause domestic prices of the respective commodity, at both the wholesale and farm level, to decline. The decline in the domestic price will depend on the magnitude of the transmission elasticity of tariff reduction to the wholesale price, and the transmission elasticity of the wholesale to farm price. These elasticity parameters are, to a considerable extent, affected by the marketing system and marketing efficiency. A high price transmission elasticity reflects high marketing efficiency. Once the change in price is identified, the farm level effects, such as those on yields, inputs, and farm income can then be calculated.

3. Aggregate Effects of Trade Liberalization

This section presents an analysis of the effects of trade liberalization on selected commodities in question (rice, soybean, maize, cassava and potato) on some indicators such as area, yield, production, export, import, prices and social welfare.

3.1 Rice

3.1.1 Area, production and yield

Although somewhat fluctuating, the long term growth of rice production in Indonesia has been very impressive at an average of 2.5% per annum over the 1969-1998 period. Table 3.1 and Figures 3.1 and 3.2 present the development of area harvested, production and yield of rice in Indonesia over the 1969-1998 period. Rice production increased at a rate of 5.0% per year during the period 1976-1990 but then started to slow down at an average rate of 0.5% during 1991-1998. During 1997-1998, in particular, severe drought added some more serious problems in domestic supply.

Production growth has been a combined result of area expansion and yield improvement. However, yield improvement has played a more important role than area expansion, particularly during the 1976-1990 period. Yield growth was 3.3% per year over the 1980-1990 period, slowing down at an average rate of 0.7% during the 1991-1997 period. In 1998, due to bad weather conditions of El Nino and La Nina, the rice yield even dropped significantly by 5.2%. The yield growth was very impressive during the period of 1978-1984, at 5% per year, as a result of a special rice intensification program (INSUS). This enabled Indonesia to achieve rice self-sufficiency for the first time in 1984. Since then rice yield has been declining. Java recorded the most impressive yield growth, particularly during the 1978-1984 period.

Expansion of area was relatively slow, reflecting increasing competition for limited land for both agricultural and non-agricultural uses in Java, and the high costs of opening new land in the outer islands off Java. The overall growth rate in harvested area was about 1.2% over the 1969-1998 period. Over the last decade, total harvested area of rice was relatively constant. The area was even declining in the last four years, from 11.4 million hectares in 1995 to 11.1 million hectares in 1998. This was due to the combined effect of land conversion in Java, bad weather and the economic crisis.

Up to 1998, Java still dominated rice production in Indonesia. The production share of Java, however, has been declining over the 1969-1998 period. Throughout the period 1969-1998, Java has accounted for over 50% of area harvested and around 58% of rice production. Yields on Java are 30-40% higher than in other regions. The dominant role of Java in rice production is attributable to the fact that most of the irrigated area is located in Java, and as a consequence the rice intensification programs took place in this region.

Table 3.1 Area, production and yield of rice in Indonesia, 1969-1998.

Year	Harv. Area (ha)	Production (ton)	Yield (ton/ha)	Growth (%) Area	Production	Yield
1969	8,013,623	23,553,847	2.939			
1970	8,135,078	25,269,238	3.106	1.5	7.3	5.7
1971	8,324,385	26,392,175	3.170	2.3	4.4	2.1
1972	7,983,400	25,351,110	3.175	-4.1	-3.9	0.2
1973	8,403,604	21,489,237	2.557	5.3	-15.2	-19.5
1974	8,518,598	22,464,376	2.637	1.4	4.5	3.1
1975	8,495,096	22,330,650	2.629	-0.3	-0.6	-0.3
1976	8,368,759	23,300,939	2.784	-1.5	4.3	5.9
1977	8,359,568	23,347,132	2.793	-0.1	0.2	0.3
1978	8,929,169	25,771,570	2.886	6.8	10.4	3.3
1979	8,803,564	26,282,660	2.985	-1.4	2.0	3.4
1980	9,005,065	29,651,905	3.293	2.3	12.8	10.3
1981	9,381,839	32,774,176	3.493	4.2	10.5	6.1
1982	8,988,455	33,583,677	3.736	-4.2	2.5	7.0
1983	9,162,469	35,303,106	3.853	1.9	5.1	3.1
1984	9,763,580	38,136,446	3.906	6.6	8.0	1.4
1985	9,902,293	39,032,945	3.942	1.4	2.4	0.9
1986	9,988,453	39,726,761	3.977	0.9	1.8	0.9
1987	9,922,594	40,078,195	4.039	-0.7	0.9	1.6
1988	10,138,155	41,676,170	4.111	2.2	4.0	1.8
1989	10,531,207	44,725,582	4.247	3.9	7.3	3.3
1990	10,682,357	45,178,751	4.229	1.4	1.0	-0.4
1991	10,281,519	44,688,247	4.346	-3.8	-1.1	2.8
1992	11,103,317	48,240,009	4.345	8.0	7.9	0.0
1993	11,012,776	48,181,088	4.375	-0.8	-0.1	0.7
1994	10,733,828	46,641,522	4.345	-2.5	-3.2	-0.7
1995	11,438,764	49,744,136	4.349	6.6	6.7	0.1
1996	11,569,729	51,173,506	4.423	1.1	2.9	1.7
1997	11,140,594	49,377,054	4.432	-3.7	-3.5	0.2
1998	11,055,760	46,443,044	4.201	-0.8	-5.9	-5.2

Source: Indonesia Statistics Yearbook, CBS (various issues).

Figure 3.1 Production and harvested area of rice, 1969-1998.

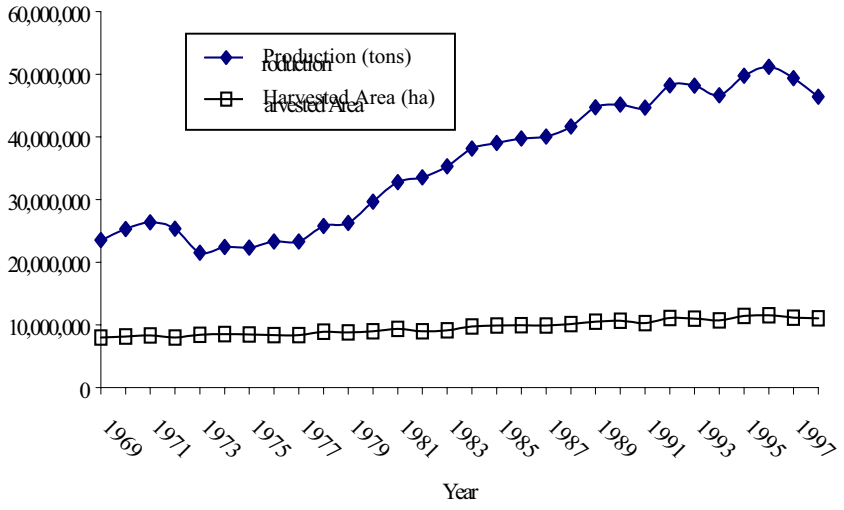
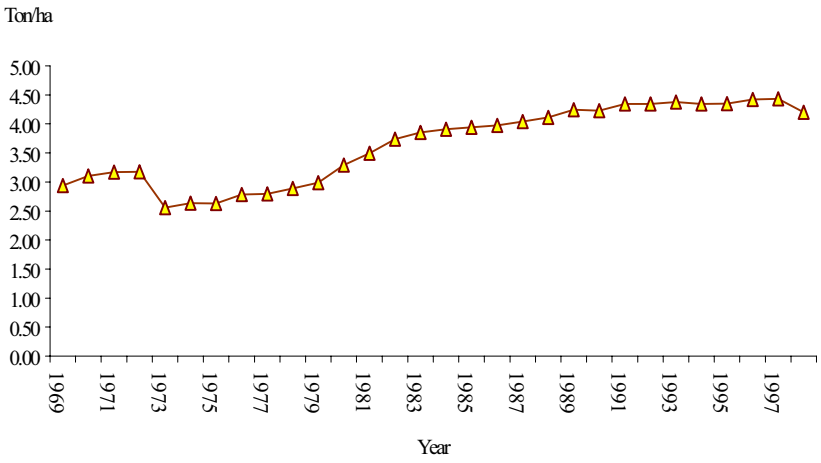


Figure 3.2 Yield of rice, 1969-1998.



3.1.2 Exports and imports

At present, Indonesia is one of the biggest net rice importers in the world. Interestingly, right after Indonesia declared its rice self-sufficiency in 1984, the import of rice climbed up the following year, from 382 tons in 1984 to 33,852 tons in 1985. Figure 3.3 and Table 3.2 indicate that the rice import has increased steadily since then. In the last five years, the rice import has increased substantially.

The import figures indicate that the trade liberalization era for the Indonesian rice market has gradually come into place since the late 1980s. This was in line with the policy of rice self-sufficiency launched in 1989, considering that self-sufficiency in a strict sense (no import is allowed) is very costly. BULOG was permitted again to import or export rice from the world market as long as it was done for price stabilization and favorable for the government budget. The new concept of self-sufficiency is more meaningful since it incorporates the "acceptable" levels of price and consumption (Trewin et al. 1993). To get an "acceptable" price, import must be allowed, particularly in the situation where domestic production is well below total demand as a result of drought, flood and disease attack.

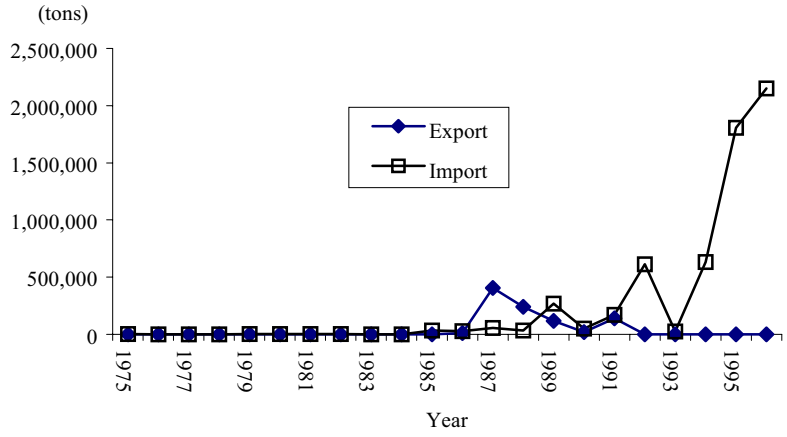
In 1996, the rice import was 2.04 million tons valued at US$ 676.6 million. This was a combined result of increased domestic supply shortage of rice due primarily to increased demand and domestic supply shock resulting from the drought. In subsequent years (1997-1998), a higher import quantity might be expected as a result of severe drought effects that could, in turn, drive up world rice prices. The total rice import was estimated to increase further in 1998 to around 4.2 million tons valued at US$ 1.08 billion. In the presence of the economic crisis and severe drought effects on production, rice imports could be expected to increase. In the presence of the economic crisis, where import price becomes high, rice imports would still take place, but the domestic price would be subsidized, which would in effect, increase the burden on the government budget.

Table 3.2 Quantity of export and import of rice (tons).

Year	Export	Import	Year	Export	Import
1975	0	1,657	1986	10,979	27,765
1976	0	1,071	1987	405,123	54,982
1977	0	673	1988	240,691	32,730
1978	0	1,281	1989	118,641	268,321
1979	0	1,964	1990	19,922	49,577
1980	0	1,762	1991	138,574	170,994
1981	0	1,964	1992	175	611,697
1982	0	2,027	1993	0	24,317
1983	0	525	1994	0	633,048
1984	0	382	1995	0	1,807,875
1985	0	33,852	1996	0	2,149,758

Source: Trade Statistics, CBS, (various issues).

Figure 3.3 Quantity of export and import of rice, 1975-1996.



Source: Table 3.2.

3.1.3 Production, marketing and trade-related policies

There is no single policy responsible for Indonesia's success in the rice business. The success is instead attributed to combined efforts and policies over decades. Hence, a review on government policies is essential. In the case of rice, the main policies, which have contributed to the rapid growth in rice production and achievement of self-sufficiency, are the rice intensification programs, irrigation development, support for development and dissemination of modern varieties of rice, intervention in rice marketing and price support, and fertilizer subsidies.

3.1.3.1 Production policies

Indonesia has launched rice self-sufficiency programs since the early 1970s. Self-sufficiency in rice, being a basic foodstuff, has been justified on the grounds that it provides support for farmers and producers, as well as stability in the macro economy and politics. It has also been argued that Indonesia has monopsony power in the world market and that self-sufficiency is thus cost-effective. With a population exceeding two hundred million, Indonesia is one of the largest rice consumers in the world. This means Indonesia is a "big" country and its

rice consumption and production performance will have significant effects on the world rice market. Up until today, rice self-sufficiency remains a primary government concern although redefined somewhat by allowing certain levels of imports in some years and exports in other years.

The government effort to increase rice production was carried out by introducing the BIMAS rice intensification program in the mid-1960s. The program includes a recommended technology package, subsidized credit, and extension services. Due to limited government financial resources, a new version of this program, namely BIMAS Gotong Royong, was implemented in 1968-70, in which foreign companies provided financing and participated in the distribution of fertilizer and pesticides. The program was again largely a failure due to inappropriate institutional framework, lack of appropriate technology, input distribution problems, and low repayment rates.

A number of improvements were made in the BIMAS program. A central coordinating committee was established with direct links to the provincial agricultural extension service, which was responsible for extension under BIMAS. Banking services were more fully integrated with the program, with the Bank Rakyat Indonesia (BRI), in particular, providing trained staff for the program. In addition, private fertilizer distributors were permitted to participate in the program, improving competition in the distribution of fertilizer. The Government Logistic Agency (BULOG) was given responsibility to implement price support and stabilization policies.

These reforms, combined with improvement in irrigation and development of modern rice varieties, led to rapid development in the BIMAS program. The improved BIMAS program embodies three basic principles: (i) ideology of modern rice farming which consists of proper soil preparation, proper irrigation, improved seeds, proper fertilizer application and proper use of pesticides, (ii) credits to purchase a package of improved inputs, and (iii) intensive guidance (extension) for participating farmers. Other intensification programs have also contributed to rice production growth, including: (i) INMAS program begun in 1968, which provides modern inputs on the private market at the same subsidized prices extended to BIMAS farmers but without subsidized credit, (ii) INSUS, begun in 1980, which organizes farmers in better-irrigated areas into around 50 hectare production groups; and (iii) OPSUS, also begun in 1980, which provides free inputs for a limited period to farmers in frontier regions. INSUS and SUPRA-INSUS programs emphasized cooperative action of a group of participating farmers. These institutional innovations were aimed to better organize farmers in attempting to capture scale economies in production.

Investment in the expansion and improvement of irrigation has been another major contributor to the growth in rice production since 1969. In addition to investment in new irrigation, the government has made substantial investments in the rehabilitation of existing systems, and in the development of tertiary distribution systems within existing systems.

Irrigated area in Indonesia has grown at a rate of 1.6% per annum over the 1970-1985 period. The growth rate was steady, but at a lower rate of 1.2% per year over the period of 1985-1995. Further expansion of irrigation in Java is constrained to a large extent by the diminishing area available for new irrigation. Despite the lower growth rates in irrigated area on Java, Java still accounts for more than 50% of total irrigated rice area in Indonesia.

Government breeding programs and extension services through rice intensification programs assisted in the rapid spread of modern, high yielding, pest resistant varieties of rice in the 1970-1980s. Indonesia's rice breeding program has a long history, in particular with the establishment of the Rice Institute in 1956, focusing mainly on breeding and agronomy. In 1963, the research program was reorganized to include maize and sorghum and it was renamed the Cereal Institute. Since then, additional crops and research disciplines have been added, and in 1981 the institute was renamed the Central Research Institute for Food Crops (CRIFC). The institute has branches in Sukamandi, West Java; Sukarami, West Sumatra; Maros, South

Sulawesi; Malang, East Java; and Banjarmasin, South Kalimantan. CRIFC has worked closely with IRRI in the development, screening, and release of modern rice varieties adapted to Indonesian conditions.

Area harvested of modern rice varieties increased steadily at an annual rate of 15% over 1980-1985, at 5.5% over 1985-1990, and at 3.5% over the period 1990-1996. The growth curve follows the usual pattern for diffusion of new technology, with a period of rapid growth, followed by a slowing growth rate as the level of adoption increases. In 1970-1980, more than 90% of the modern variety area was on Java. Other regions have had higher growth from a low initial area. Sumatra accounted for about 15% of modern variety area in 1980-1985 and Sulawesi about 8%. The area with modern varieties in Indonesia, in general, increased from about 50% in 1970-1980 to about 75% of total rice area in the period 1980-1985 and more than 95% by the beginning the 1990s.

3.1.3.2 Price policy and price stabilization

In addition to the core objective, which is increasing rice production to meet the domestic demand, the rice self-sufficiency program also embodies three other objectives, namely (i) improving farm incomes and rural employment in the interest of achieving better income distribution within society; (ii) providing urban consumers with rice at a "reasonable'" and relatively stable price; and (iii) controlling the budget subsidies which must be given to producers and consumers in pursuit of the other objectives (Erwidodo 1990). A principle instrument in the pursuit of these objectives is pricing policy.

Rice was the first food commodity for which the government seriously intervened in the market. The basic philosophy of the rice price policy was (i) support for floor prices high enough to stimulate domestic production; (ii) ceiling price protection assuring a reasonable price for consumers; (iii) sufficient range between these two prices to provide traders and millers reasonable profits after holding rice between crop seasons; and (iv) appropriate price relationships domestically and internationally. Inter-regional price spreads were intended to be sufficient to enable traders to cover costs of rice movement from surplus to deficit areas, and domestic prices were to be insulated from world prices to avoid large fluctuation in the domestic market.

To enhance fertilizer use so as to increase rice and other food crop production, the government had fixed the maximum retail price (MRP) of this modern input since the outset of the First Five Year Development Plan. The kinds of fertilizer, for which prices were subsidized by the government, were urea, ZA, TSP (currently SP-36), and KCl. The policy had attempted to lower the fertilizer-rice price ratio over time. Such policy successfully brought Indonesia to rice self-sufficiency by 1984. In recent years, however, fertilizer prices are increasing more rapidly relative to rice floor-prices, which could have severe effects on food crop production, especially rice. The prime reasons for reducing fertilizer subsidies have been to avoid increased burdens on the government budget, to customize farmers to operate their farms with the most efficient input prices as well as to implement agreements specified in GATT.

To promote food crop production, subsidized credit called *Kredit Usaha Tani (KUT)* has been provided to farmers, especially for rice, maize and soybean cultivation. KUT is basically a credit package covering seeds, fertilizers, pesticides and labor costs for farm operation. The related interest rate was initially specified at 12% per annum. However, not all farmers were eligible for this credit due primarily to insufficient collateral availability. In more recent years, the interest rate has been increased to 14-16%, where the liquidity credit from the Central Bank (*Kredit Likuiditas Bank Indonesia, KLBI*) has been an important source of credit funds. Farmer eligibility is based only on the financial feasibility of the farm under this credit scheme. In early June 1998, the government declared that the current outstanding KUT of Rp 2.3 billion was considered to be written off. It was also asserted that new credit would be provided to farmers, especially rice producers. This policy aims to promote increased production of rice, while

mitigating the severe effects of the on-going economic crisis on farm income. However, it can be expected that such curing policy will generate serious moral hazards for the KUT borrowers. Probably, farmers will be reluctant to repay their farm credits.

In pursuit of food security and domestic price stability, the government has to make choice about a favorable level of rice import. In line with this, BULOG, as the sole rice importer, is responsible to maintain a minimum stock by importing and purchasing domestic production in order to stabilize the rice price. To facilitate BULOG market operations, the government provides soft credit extended by Bank Indonesia (BI). In order to effectively implement its price stabilization of rice, BULOG has built rice storage facilities throughout the country, with total capacity around 2.5 million tons, disseminated over 433 sites. During 1980-1995, for example, BULOG purchased on average about 1.72 million tons of rice or 6.5% of total domestic production annually.

Since rice self-sufficiency was achieved, import was no longer allowed. In order to maintain the buffer stock for price stabilization, BULOG was only allowed to purchase rice from domestic production. However, this policy of import restriction is also costly and less favorable for two main reasons. First, since 1981, the international price of rice tended to decline, which in turn induced a reduction of the gap price between domestic and international markets. Since the short run price fluctuation in the world market and domestic market was not always coherent, import restriction is not favorable, particularly when domestic prices were higher than those in the world market. Secondly, a price stabilization policy is costly, particularly due to the domestic purchasing and storage costs to maintain the buffer stock. Since BULOG operational costs are subsidized through the soft credit provision, BULOG's market operation for price stabilization burdens the government. If the government is consistent with this stabilization policy, the government budgetary burden, as a consequence, will increase because the achievement of self-sufficiency opens the possibility for rice surplus accumulation.

Noting the situation above, since the beginning of PELITA V (1989), the government has redefined the concept of rice self-sufficiency from absolute self-sufficiency to self-sufficiency on trend, which means that the self-sufficiency of rice is not evaluated any longer for a one year period but for a certain longer period. Even though there is no exact definition of the period considered for the evaluation, under the new concept of self-sufficiency, the market outlet of rice becomes wider because BULOG is permitted again to import/export rice from/to the world market as long as it is done for price stabilization and favorable for the government budget. The new concept of self-sufficiency is more meaningful since it incorporates the "acceptable" levels of price and consumption (Trewin et al. 1993). To get an "acceptable" price, import must be allowed, particularly when domestic production is well below total demand as a result of drought, flood and disease attack.

Due to implementation of the price stabilization policy, the domestic price has been more stable than the world price. Sudaryanto et al. (1992) found that during the 1972-1990 period, the coefficient variation of domestic rice price was 15.9%, much smaller compared to 53.0% of the world market price. This also indicates that BULOG has generally been successful in insulating domestic prices from short-run fluctuation in the world market prices. The price stabilization policy undoubtedly plays an important role in stimulating rice production. The stable price of rice at a profitable level has motivated farmers to increase rice production through both the intensification and the extensification efforts.

A different situation has occurred since the Indonesian economy was hit by the severe crises. The government has much less capacity to implement price stabilization policies. Moreover, the agenda of crisis-induced reform sponsored by the IMF has forced Indonesia to institute drastic and broad-based reforms, including in the rice industry. One of the conditions that the IMF insisted on, as a part of structural reforms included in the 15 January 1998 letter of intent, was that BULOG's operation and monopoly be limited to rice and that subsidies on rice and other food be scaled-back sharply. The crisis-induced reforms have had adverse short run

effects on rice. One direct effect was that the retail price of rice has become more unstable compared with previous years. The increased retail price of rice was in line with the movement of the currency and the world market price of rice. The most drastic reform in agriculture was launched in December 1998 when BULOG's monopoly on rice imports was removed and its role in rice distribution was reduced. In general, the December 1998 reform consists of the following aspects:

- The rice market is liberalized so general importers, including BULOG, are allowed to import and distribute rice.
- The support price system (e.g. floor price policy) of rice will no longer be implemented nationally, but will be regionally-based. The objective of this policy is to help farmers avoid price drops at the major harvest periods.
- The government purchase price is at least the same as in the price agreement, when the market price is below the agreed price, and at the market price, when it is above the agreed price. The agreed price is determined by economic agents at the respective regions.
- Special market operations (cheap price) at times of scarcity of distribute food to the needy with the involvement of local institutions.
- Fertilizer subsidies (urea, SP 36, and KCl) are eliminated while pesticide prices are determined by market mechanisms.

Along with the above measures, non-price production incentives are to be implemented in the form of: (i) adequate farm credit and simple procedures to ensure the implementation of technology packages, (ii) adequate funds for national seed systems to operate, and (iii) adequate funds to undertake applied research and extension services. The implementation of the above re-oriented policies is expected to have the following impacts:

- Rice prices will fluctuate following domestic harvest fluctuations and the exchange rate compared to the price under the BULOG era of policies.
- Rice prices will be higher compared to the current price as they may adjust in line with parity prices and market prices of other commodities, and the production cost will increase due to elimination of input subsidies.
- Non-price policy will increase efficiency and give incentives to farmers and at the same time reduce cost of production. This is also expected to prevent an excessive increase of price.
- As the rice price increases, per capita rice consumption is expected to decline and food diversification to other diets is expected to accelerate.
- One expectation is reduced burden on the government budget for input subsidies and market operation expenditures.

The fertilizer subsidy removal has increased credit prices per kg of urea, ZA, SP-36, and KCl to Rp 1,115, Rp 1,000, Rp 1,600 and Rp 1,650, with the rates of 147%, 53%, 146% and 94% from previous credit prices, respectively. To compensate for the increased fertilizer prices, the floor price of unhusked rice was increased to Rp 1,500 per kg by 50% from the previous floor price, and the credit interest rate reduced to 10.5% from the previous rate of 14.0%. Although the increase of the fertilizer price will increase production costs by Rp 310,187 per hectare, the farmers will gain additional income as the price of the product will also increase and the share of fertilizer to total cost is only 18.6%.

3.1.3.3 Marketing and procurement policy

The core objectives of marketing policies in rice were to guarantee proper implementation of rice price policies. In domestic marketing, the government through the national logistic agency (*Badan Urusan Logistik*, BULOG), local logistic depot (DOLOG), and village cooperatives called *Koperasi Unit Desa* (KUD) undertake rice procurement. Thus, KUD

buys rice from farmers and then sells it to BULOG. In the early years of the policy implementation, the government procurement was sizeable. Inter island as well as inter provincial marketing was also entirely controlled by BULOG so as to meet the demand-supply balance to stabilize the domestic price of rice. In total, the government procurement of rice accounted for only about 6-7% of national rice production.

As previously mentioned, the implementation of market operations has successfully stabilized the domestic retail price of rice. This also indicates that BULOG has generally been successful in insulating domestic prices from short-run fluctuations in world market prices. However, empirical evidence indicates that the government frequently has low capacity to undertake domestic procurement to guarantee the announced floor price received by farmers. This is particularly true during the peak harvest season, when farmers frequently receive a farm-gate price of rice well below the announced floor price. Despite this, in general, it is clear that price stabilization policy along with government market operation has played an important role in stimulating the rice production increase.

3.1.4 Effects of trade liberalization

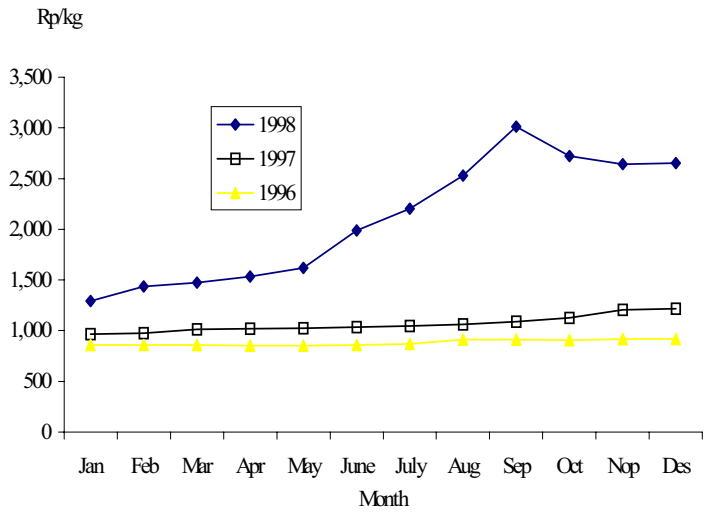
The extent and impact of trade liberalization remain debatable. Those referring to standard economic theory believe that trade liberalization will bring substantial benefits for all participating countries. The possibilities for expanded trade offered by multilateral commitment to liberalization are extremely important for all countries to increase export earnings and to maintain rapid growth of their economies. On the other side, those who are not totally convinced of the benefits of trade liberalization believe that trade liberalization can potentially undermine national goals, since the total adjustment costs in the short run can be much higher than the potential benefits from trade liberalization. The following is an assessment of the observed effects of rice trade liberalization at the aggregate level in terms of exports and imports and price movement. In addition, the analysis presents an estimate of net social welfare effects of rice trade liberalization with respect to the magnitude of producer, consumer and government surpluses.

Indonesia's rice market has been heavily protected, mainly by non-tariff barrier instruments. The import restrictions have been somewhat reduced since 1989, when the government declared its concept of *rice self-sufficiency on trend* for the first time. Despite heavy restrictions on imports, Indonesian rice imports increased substantially. This is mainly due to the fact that increases in domestic production could not meet the accelerating demand for rice. This is particularly true when there is a shortage in the domestic rice supply due to harvest failures. As discussed previously, since 1985 Indonesian rice imports have been continuously increasing. Looking at the import volume in the last few years (1995-1998), it is obvious that Indonesia has turned back into one of the biggest rice importers in the world.

Direct effects of trade liberalization can be seen from price development. The domestic price of a commodity is a function of the level of world prices and exchange rates. The notion of liberalized trade means that the domestic market is linked to a large extent to the world market. Any world price fluctuation will certainly result in fluctuation of domestic prices. Similarly, any shock on the domestic currency against the currency of the main trading partner will contribute a shock in domestic market prices.

This situation is now occurring in Indonesia. As shown in Figure 3.4, the domestic retail price of rice has been more unstable and increasing since drastic market reforms were undertaken by the government in response to the economic crisis. The increased retail price of rice last year was mainly caused by the depreciation of the rupiah, besides the somewhat increasing world market price that year. Since December 1998, the world market price of rice has been declining. This declining trend of prices in the world market has raised serious concerns on the possibility of losses incurred by farmers due to domestic price drops.

Figure 3.4 Monthly average retail price of rice, 1996-1998.



Source: BULOG (various issues).

The effects of implicit tariff reduction

The first scenario to assess is the effect of implicit tariff reduction in rice import by 16.5%. The impact of tariff reduction on domestic prices was estimated using transmission elasticity parameters derived from the estimated price linkage equation. A number of regression analyses were carried out to estimate the transmission elasticity of tariffs to the wholesale price, the transmission elasticity of wholesale price to producer price, the demand elasticity with respect to wholesale price and the supply elasticity with respect to producer price.

It is noteworthy that the regression analysis suffered from the limitation of reliable data on government intervention and hence, most of the estimated parameters are not sensitive and statistically not significant. This means that a tariff change has no effect on wholesale price. Theoretically, however, the level of the import tariff should have a positive association with the wholesale price. In this analysis, in order to better estimate the effect of tariff reduction, four alternatives of tariff transmission elasticity were used (0.25, 0.5, 0.75, and 1). As shown in Table 3.3, the 16.46% decrease in tariff would be expected to reduce the wholesale price by 4.11%, 8.23%, 12.34%, and 16.46%, for the respective tariff transmission elasticities of 0.25, 0.50, 0.75 and 1.00. In the case of rice and other food crops, empirical evidence indicates that tariff transmission elasticity would likely be around 0.75. In the following discussion, a tariff transmission elasticity of 0.75 is used, and hence the 16.46% tariff decrease would result in a 12.34% decline in the wholesale price.

This change in the wholesale price would then be transmitted to the producer price through price linkage equation of the wholesale to producer price. With the estimated price transmission of wholesale price (PWS) to producer price (PF) of 1.0198, as shown in Equation 1 (also see Appendix 3.2 for details), the farm-gate price would decline by 12.58%, or decline from Rp 330 to Rp 288 per kg (Table 3.3).

LPFR = -1.190237 + 1.09771LPWSR (Equation 1)
(2.33) (12.11)
Adj.R2 = 0.9297; DW = 1.762; n = 11 year (1986-1996)

where:

LPFR = Log farmgate price of rice
LPWSR = Log wholesale price of rice
Figures in parentheses are t-ratios.

As shown in Equation 2, the estimated price elasticity of demand for rice is –0.1914 (see Appendix 3.3). With this elasticity, the decrease in the domestic wholesale price would increase the demand for rice by 2.36% or 796,700 tons. Meanwhile, with an estimated price elasticity of supply of 0.2245 as shown in Equation 3 (see Appendix 3.4), the supply of paddy would decline by 2.83% (1.4 million tons), from 51.1 million tons to 49.7 million tons in response to the drop in producer price of paddy. Import quantity would increase by around 1.7 million tons, from 2.04 to 3.7 million tons. As a result, the net welfare gains for the 16.4% cut of implicit tariff would be around Rp 1,832.2 billion. The gain of consumer surplus would be Rp 4,910.5 billion, while the loss of producer surplus is estimated at around Rp 2,092.6 billion.

LQDR = 19.616567 – 0.191407LPWSR + 0.252962LYCR (Equation 2)
(13.68) (1.73) (2.84)
Adj.R2 = 0.8835; DW = 1.622; n = 11 year (1986-1996)
where:
LQDR = Log quantity demanded for rice
LPWSR = Log wholesale price of rice
LYCR = Log national real income per capita
Figures in parentheses are t-ratios.

LQSR = 9.556783 + 0.224509LLPFR (Equation 3)
(75.96) (9.40)
Adj.R2 = 0.8972; DW = 2.502; n = 11 year (1986-1996)
where:
LQSR = Log quantity supplied of rice
LLPFR = Log 1-year lagged farmgate price of rice
Figures in parentheses are t-ratios.

Table 3.3 Social welfare effect of 16.5% reduction of implicit tariff.

Item			
World price 1996 (US$/ton)	332		
Import parity price at wholesale (Rp/kg)	854		
Wholesale price at to (Rp/kg)	995		
Initial implicit tariff rate (%)	16.46		
New implicit tariff rate (%)	0		
Tariff change (%)	-16.46		
Producer price at to (Rp/kg)	330		
Supply of paddy at to ('000 t)	51,102		
Conversion paddy to rice	0.62		
Import quantity at to ('000 t)	2,040		
Demand for rice at to ('000 t)	33,723		
Demand elasticity	-0.1914		
Supply elasticity	0.2245		
Price transmission elasticity of PWS to PF	1.0198		
Effects of implicit tariff change:			
Tariff transmission elasticity	0.5	0.75	1
Effect on wholesale price (%)	-8.23	-12.34	-16.46
Change in wholesale price (Rp/kg)	-81.87	-122.81	-163.75
Wholesale price at t1 (Rp/kg)	913.13	872.19	831.25
Effect on producer price (%)	-8.39	-12.59	-16.78
Change in producer price (Rp/kg)	-27.69	-41.54	-55.38
Producer price at t1 (Rp/kg)	302.31	288.46	274.62
Effect on demand (%)	1.57	2.36	3.15
Change in demand quantity ('000 t)	531.12	796.68	1,062.24
Demand quantity at t1 ('000 t)	34,254.36	34,519.92	34,785.48
Effect on supply (%)	-1.88	-2.83	-3.77
Change in supply quantity ('000 t)	-962.70	-1,444.04	-1,925.39
Supply of paddy at t1 ('000 t)	50,139.30	49,657.96	49,176.61
Supply of rice at t1 ('000 t)	31,086.37	30,787.93	30,489.50
Import quantity at t1 ('000 t)	3,167.99	3,731.98	4,295.98
Effect on import quantity ('000 t)	1,127.99	1,691.98	2,255.98
Effect on consumer surplus (Rp million)	2,782,778.7	4,190,474.7	5,609,041.8
Effect on producer surplus (Rp million)	-1,401,769.0	-2,092,656.5	-2,776,879.4
Effect on imp. govt. revenue (Rp million)	-265,591.3	-265,591.3	-265,591.3
Effect on net surplus (Rp million)	1,115,418.4	1,832,226.9	2,566,571.2

Source: Calculated (see Appendix 3.1. for details).

The effects of Uruguay Round trade liberalization

The second scenario is the potential effect of a world market price increase as a result of Uruguay Round trade liberalization. According to FAO (1995), the implementation of Uruguay Round trade liberalization would be expected to increase the world market price of rice by 7.0%. As shown in Equation 4, the estimated elasticity of price transmission of the world price (PW) to wholesale price (PWS) is 0.9465 (see Appendix 3.5), while that of the wholesale price (PWS) to producer price (PF) is 1.0198 (see Equation 1). With these price elasticities of transmission, as shown in Table 3.4 the 7.0% increase in world price would increase the wholesale and producer prices by 6.63% and 6.76%, respectively.

LPWSR = -6.044867 + 0.946507LPCIFR (Equation 4)
(4.01) (8.20)
Adj.R2 = 0.8577; DW = 0.760; n = 11 year (1986-1996)

where:

LPWSR = Log wholesale price of rice
LPCIFR = Log world price of rice (CIF) in domestic currency
Figures in parentheses are t-ratios.

The increase in the domestic wholesale price would reduce the demand for rice by 1.27% (427,650 tons). Meanwhile, the supply of paddy would increase slightly by 1.52% (30,940 tons), from 51.102 million tons to 51.133 million tons in response to the increase in the producer price of paddy. Import quantity would decline by around 446,840 tons, from 2.040 to 1.593 million tons. As shown in Table 3.4 (see Appendix 3.6 for details), the net welfare loss resulting from implementation of the Uruguay Round trade liberalization (7% increase in world price of rice) would be around Rp 1,069.30 billion. This social welfare loss was attributed to loss on consumer surplus, which was much higher that the gain captured by producers as a result of the increased rice price. The loss of consumer surplus was Rp 2,209.07 billion, while the producer surplus gain was estimated at around Rp 1,139.77 billion.

These results should therefore be interpreted cautiously. As the analysis is partial and static, the result does not take account the general equilibrium effect of resource movement between sectors, which creates other economic opportunities and dampens the overall adverse effects. The results of the pre-Uruguay Round studies indicate that, following trade liberalization, commodity prices will be higher than they would have been without liberalization. This will simply mean that countries which are net exporters of these commodities will gain from liberalization, while countries which are net importers may lose. Addressing the question of possible loss from trade liberalization due to these upward price changes, Anderson and Tyers (1990) point out that developing countries may in fact be able to gain from agricultural liberalization in spite of this if they reform their own policies simultaneously and also act to redistribute income domestically between consumers and producers. Moreover, reform should ensure less fluctuation of prices and therefore more stability in world markets for agricultural products.

Three factors should serve to attenuate the price increases resulting from agricultural reform (Goldin and Knudsen 1990). The first is the introduction of more rapid technical change, which would mean that trade liberalization would accelerate advances in productivity and that the price rises would be reduced by this endogenous technological change. Secondly, simultaneous liberalization of agricultural policies by developing countries will serve to dampen these price rises, especially when indirect effects as well as the direct effects of protection are taken into account (Anderson and Tyers 1990; Zietz and Valdes 1990). The issue of reform sequencing is important in this regard; several studies point out that domestic reform and deregulation by developing countries will likely substantially cushion any negative impacts from international agricultural trade liberalization. Developing countries can both reduce any adverse price effects and enhance the benefits of liberalization by industrial countries if they simultaneously reform their agricultural policies.

Lastly, the estimates for increased prices of agricultural commodities resulting from trade liberalization are overstated because agricultural reform, coming on top of deeply engrained protective practices, will be a gradual process, with the general equilibrium effects of movement of resources between sectors creating other economic opportunities and dampening the overall adverse effects.

The effects of imposing an import tariff for rice

As mentioned before the economic crisis has forced the government to abruptly deregulate its domestic rice market. The December 1998 deregulation has liberalized the rice market including the removal of the BULOG monopoly on importation of rice. In other words, the Indonesian rice market and trade are liberalized. No imports tariff are imposed. Recently, however, there has been growing concern about the potential adverse effects of this situation. These concerns were mainly triggered by a decreasing trend of rice prices in the world market in the last four months. Some are afraid that, if no tariffs are imposed, the Indonesian rice market will be flooded by imported rice, and it in turn will negatively affect domestic rice production and farm income. In order to reduce these potential adverse effects, the government has been considering implementing an import tariff on rice. The regulation including the rate of tariffs is now being formulated. There has been indication that the rate of tariff will likely fall in the range of 10-25%. The following analysis is aimed at examining the impacts of such policy on social welfare using the base year of 1998, with the same elasticity and price transmission parameters. According to BULOG statistics, the wholesale price of medium rice in 1998 was Rp 2,450 per kg and the quantity of rice import (25% Thai Broken) was estimated around 4.2 million tons (Tabor et al. 1998).

Total domestic production of paddy in 1998 was 46.4 million tons, equivalent to 29.6 million tons of rice, using a conversion factor of 0.62. The result shows that the higher the import tariff imposed the higher is the net welfare loss. The following is a brief result of the analysis of imposing a 15% import tariff.

Table 3.5 shows that the net welfare loss for the 15% import tariff, assuming a tariff transmission elasticity of 0.75, is estimated around Rp 109.52 billion per year (see Appendix 3.7 for details). These social welfare losses were attributed to losses in consumer surplus, which is much higher than the gains captured by producers as a result of the 15% tariff. The loss of consumer surplus is Rp 8,805.53 billion, while the producer surplus gain is estimated around Rp 7,818.27 billion. If a 15% tariff is imposed, the government would receive Rp 877.74 billion per annum.

The loss of consumer surplus is attributed to increased domestic price and reduced demand as a result of the tariff. Meanwhile, the increased price of rice would encourage producers to produce more rice and hence increase the rice surplus. For a 15% tariff, the quantity of rice imported would decline to 2,749 thousand tons, or 1,451 thousand tons below the base year level import (4.2 million tons). In contrast, domestic supply of paddy would be expected to increase by 1,195 thousand tons to around 47.60 million tons, or 2.58% more than the base level (46.40 million tons).

Interestingly, imposing a tariff would in fact make the economy as a whole better off if the tariff transmission elasticity were smaller (inelastic). The smaller this elasticity the greater would be the gain enjoyed by producers. For the tariff transmission elasticity 0.5, for instance, the net social welfare gain would be around Rp 330.59 billion. The combined surplus gains received by producers and government (Rp 5,190.09 and Rp 1,032.14 billion, respectively) would offset the consumer surplus loss (Rp 5,891.65 billion).

Table 3.4 Social welfare effect of Uruguay Round trade liberalization (7% increase in the world price of rice).

Item	
World price 1996 (US$/ton)	332
Increase world price (%)	7.0
Wholesale price at to (1996) (Rp/kg)	995
Producer price at to (Rp/kg)	330
Supply quantity at 1996 ('000 t)	51,102
Conversion factor of paddy to rice	0.62
Import quantity at 1996 ('000 t)	2040
Demand quantity at to ('000 t)	33,723
Demand elasticity	-0.1914
Supply elasticity	0.2245
Price transmission of PFOB to PWS	0.9465
Price transmission elasticity of PWS to PF	1.0198
Effects of increased world price:	
Change in wholesale price (%)	6.63
Wholesale price at 1997 (Rp/kg)	1,060.92
Effect on producer price (%)	6.76
Producer price at 1997 (Rp/kg)	352.30
Effect on demand quantity (%)	-1.27
Change in demand quantity ('000 t)	-427.65
Demand quantity at 1997('000 t)	33,295.59
Effect on supply (%)	1.52
Change in supply quantity ('000 t)	30.94
Supply of paddy at 1997 ('000 t)	51,132.94
Supply of rice at 1997 ('000 t)	31,702.43
Import quantity at 1997 ('000 t)	1,593.16
Effect on Import quantity ('000 t)	-446.84
Effect on consumer surplus (Rp million)	-2,209,065.41
Effect on producer surplus (Rp million)	1,139,769.35
Effect on net surplus (Rp million)	-1,069,296.06

Source: Calculated (see Appendix 3.6 for details).

Table 3.5 Social welfare effect of imposing import tariff for rice (15%).

Item			
Initial tariff rate (%)	0		
New tariff rate (%)	15		
Wholesale price at to (Rp/kg)	2,400		
Producer price at to (Rp/kg)	1,450		
Supply quantity at to ('000 t)	46,400		
Conversion paddy to rice	0.62		
Import quantity at to ('000 t)	4,200		
Demand quantity at to ('000 t)	32,968		
Demand elasticity	-0.1914		
Supply elasticity	0.2245		
Price transmission elasticity of PWS to PF	1.0198		
Effects of tariff change:			
Tariff transmission elasticity	0.50	0.75	1.00
Effect on wholesale price (%)	7.50	11.25	15.00
Change in wholesale price (Rp/kg)	180.00	270.00	360.00
Wholesale price at t1 (Rp/kg)	2,580.00	2,670.00	2,760.00
Effect on producer price (%)	7.65	11.47	15.30
Change in producer price (Rp/kg)	110.90	166.35	221.81
Producer price at t1 (Rp/kg)	1,560.90	1,616.35	1,671.81
Effect on demand (%)	-1.44	-2.15	-2.87
Change in demand quantity ('000 t)	-473.26	-709.88	-946.51
Demand quantity at t1 ('000 t)	32,494.74	32,258.12	32,021.49
	0.00	0.00	0.00
Effect on supply (%)	1.72	2.58	3.43
Change in supply quantity ('000 t)	796.73	1,195.09	1,593.46
Supply quantity at t1 ('000 t)	47,196.73	47,595.09	47,993.46
Supply of rice at t1 ('000 t)	29,261.97	29,508.96	29,755.94
Import quantity at t1 ('000 t)	3,232.77	2,749.16	2265.54
Effect on import quantity ('000 t)	-967.23	-1,450.84	-1934.46
Effect on consumer surplus (Rp million)	-5,891,646.99	-8,805,525.73	-11698107.97
Effect on producer surplus (Rp million)	5,190,090.71	7,818,271.01	10468541.26
Effect on government revenue (Rp million)	1,032,143.41	877,737.62	723331.82
Effect on net surplus (Rp million)	330,587.13	-109,517.11	-506234.89

Source: Calculated (see Appendix 3.7 for details).

3.2 Soybean

3.2.1 Area, production and yield

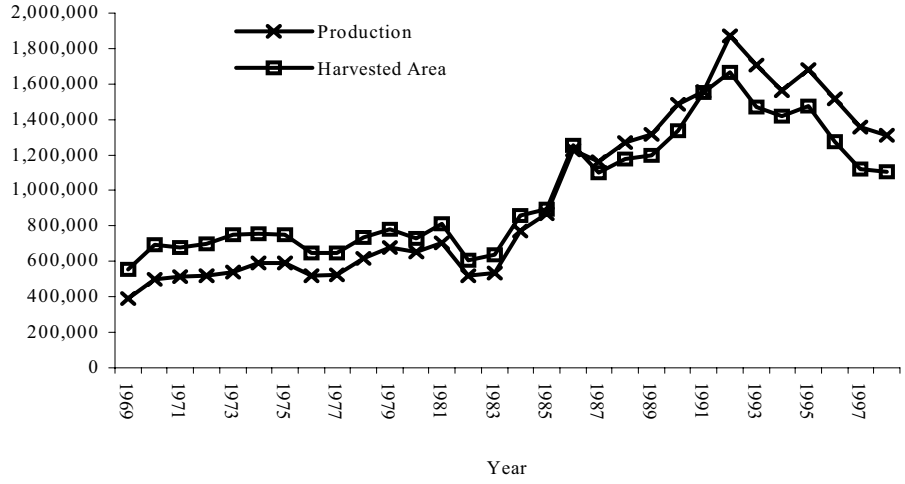
Table 3.6 shows the area, yield, and production of soybeans in Indonesia during the 1969-1998 period. Growth in soybean production has lagged well behind the growth in rice and maize production. However, since 1986 there has been a rapid increase in soybean area and production due to government policy initiatives. Overall, the average production growth rate during the 1969-1998 period was 5.3% per annum.

It can be seen from Table 3.6 and Figure 3.5 that the production of soybean was erratic compared to that of rice and maize. According to the shape of the production curve, the production period may be divided into four segments, namely, 1969-1979, 1980-1982, 1983-1992 and 1993-1998. The average production growth rate during these respective periods was

6.2%, -9.05%, 14.6% and –5.5% per annum. The highest production growth was achieved in the 1983-1992 period. However, it was followed by negative growth in the following period, indicating that Indonesia could not sustain soybean production growth.

The sources of production growth were area harvested and yield growth. According to the shape of the area harvested curve, the average annual growth rate was 4.0% in 1969-1979, 11.5% in 1983-1992 and –6.4% in the 1993-1998 period. The pattern of the growth rate of area harvested was similar to that of production. This declining growth rate in the last period indicates the reduced availability of land resources. Overall, the average growth rate of area harvested in the period of 1969-1998 was 3.3% per annum.

Figure 3.5 Production and harvested area of soybean, 1969-1998.



Source: Table 3.6.

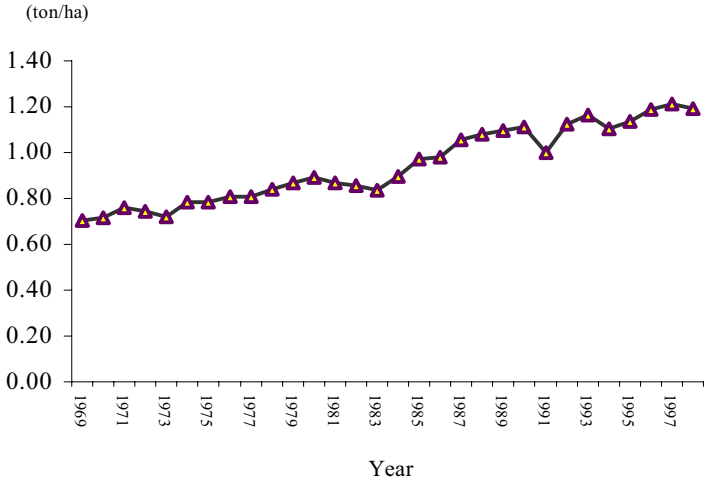
Taking the growth rate of yield as a residual, the yield growth rates in the respective periods of 1969-1980, 1981-1982, 1983-1991 and 1992-1998 were 1.85%, -1.89%, 2.71% and 2.61% per annum (Figure 3.6 and Table 3.6). It is obvious that the yield growth rate declined in the second period, but it was followed by increased yield growth rate in the following periods. The overall yield growth rate in the period of 1969-1998 was 1.97%. By comparing this overall yield growth rate to area harvested growth rate, the production growth of soybean mostly relied upon area harvested expansion. The contribution of yield in the production growth was small, suggesting the need for technology improvement in soybean farming.

Source: Table 3.6.

Table 3.6 Area harvested, production and yield of soybeans, 1969-1998.

Year	Harv. Area (ha)	Production (ton)	Yield (ton/ha)	Growth (%) Area	Production	Yield
1969	553,783	388,907	0.702			
1970	694,732	497,883	0.717	25.5	28.0	2.0
1971	679,625	515,644	0.759	-2.2	3.6	5.9
1972	697,500	518,229	0.743	2.6	0.5	-2.1
1973	750,506	541,040	0.721	7.6	4.4	-3.0
1974	753,499	589,239	0.782	0.4	8.9	8.5
1975	751,689	589,831	0.785	-0.2	0.1	0.3
1976	646,280	521,777	0.807	-14.0	-11.5	2.9
1977	646,278	522,821	0.809	0.0	0.2	0.2
1978	732,941	616,599	0.841	13.4	17.9	4.0
1979	784,018	679,825	0.867	7.0	10.3	3.1
1980	731,995	652,762	0.892	-6.6	-4.0	2.8
1981	810,095	703,811	0.869	10.7	7.8	-2.6
1982	607,710	521,394	0.858	-25.0	-25.9	-1.2
1983	639,776	536,103	0.838	5.3	2.8	-2.3
1984	858,854	769,384	0.896	34.2	43.5	6.9
1985	896,220	869,718	0.970	4.4	13.0	8.3
1986	1,253,767	1,226,727	0.978	39.9	41.0	0.8
1987	1,100,565	1,160,963	1.055	-12.2	-5.4	7.8
1988	1,177,360	1,270,417	1.079	7.0	9.4	2.3
1989	1,197,996	1,315,113	1.098	1.8	3.5	1.7
1990	1,338,100	1,487,433	1.112	11.7	13.1	1.3
1991	1,552,979	1,555,453	1.002	16.1	4.6	-9.9
1992	1,664,182	1,869,713	1.124	7.2	20.2	12.2
1993	1,470,206	1,708,528	1.162	-11.7	-8.6	3.4
1994	1,416,918	1,564,847	1.104	-3.6	-8.4	-5.0
1995	1,477,599	1,680,007	1.137	4.3	7.4	3.0
1996	1,275,812	1,517,181	1.189	-13.7	-9.7	4.6
1997	1,119,079	1,356,891	1.213	-12.3	-10.6	2.0
1998	1,102,962	1,313,253	1.191	-1.4	-3.2	-1.8

Figure 3.6 Yield of soybean, 1969-1998.



Source: Indonesia Statistical Yearbook (CBS, various issues).
Source: Table 3.6.

Even though its share is declining, Java remains the dominant soybean producing region. Up to 1997, Java accounted for more than 60% of area harvested, and around 65% of total production in Indonesia. Among provinces in Java, East Java is dominant accounting for more than 32% of area harvested, and 34% of total production in 1997. East Java has also the highest yields, at an average of 1.2 ton/ha in the 1985-1997 period and 1.3 ton/ha in the 1990-1996 period. Central Java is the other main region for soybean production, accounting for 14% of area harvested and 15% of production in 1997. Production growth in Central Java was about 3% per year, somewhat higher than the national average. Most soybean in Java is produced in irrigated areas, where soybean is planted after the first or second rice crop depending on availability of irrigation water.

Although Java remains the dominant soybean producing region, in the last fifteen years, soybean area in Java was nearly constant, while for the outer islands, the area increased by nearly 6.8% annually during 1980-1998. The share of the outer islands in soybean production increased from 14% in 1970 to 32% in 1985 and 38% in 1998. Major soybean producing regions in the outer islands are Aceh, Lampung, and Nusa Tenggara Timur (NTT). In contrast to soybean production in Java, most soybean in the outer islands is grown on dry land and rainfed areas.

The production of soybean during the period of 1987-1996 increased by 51.7 thousand tons or 3.63% per annum (Table 3.6). The sources of the production growth have been increased area harvested by 33.0 thousand hectares or 2.56% and improved yield by 1.07% per annum. In 1996, national soybean production was 1.51 million tons. The rapid area expansion and yield improvement emanated from the implementation of a special program (*Upaya Khusus, UPSUS*). A mutually beneficial business partnership between large companies and farmers made a notable contribution to this soybean production growth.

Overall, soybean yield growth in 1970-1998 was only at the rate of 1.9% per annum. The highest rate of growth of yield was achieved during the period of 1983-1992, at 3.0% per annum. However, the yield gap between farm level and research station was still very wide. This is because the degree of intensification of soybean cropping is relatively low, as reflected by low rates of fertilizer application and the use of improved varieties.

The government has attempted to promote soybean production through a number of programs, including breeding and release of improved varieties, production and distribution of seeds, subsidized liming, and provision of extension services through soybean intensification programs. More than 10 improved varieties of soybean have been released since 1970. Although these varieties have somewhat improved potential yields, these potential gains have not yet been captured by farmers.

3.2.2 Exports and imports

Despite a heavy restriction on imports, the import volume of soybean and soybean meal is continuously increasing. This is because the increases in domestic production could not meet the accelerating demands for soybean and soybean meals as a result of the fast growing feed and livestock industries. During the last two decades, as shown in Table 3.7 and Figure 3.7, import of soybean grain (yellow and black) increased substantially, from around 130 thousand tons in 1978 to 746 thousand tons in 1996 (BULOG, 1997). The yellow soybean is mainly imported to meet the domestic requirement of tofu and *tempe* (fermented soybean cake) processors. Meanwhile, import of soybean meal as a protein source for poultry feed has increased from 283 thousand tons in 1986 to 460 thousand tons in 1994 (Pomeroy 1995). Demand for feed is mainly coming from the poultry industry, followed by fish cultivation and cattle feedlots.

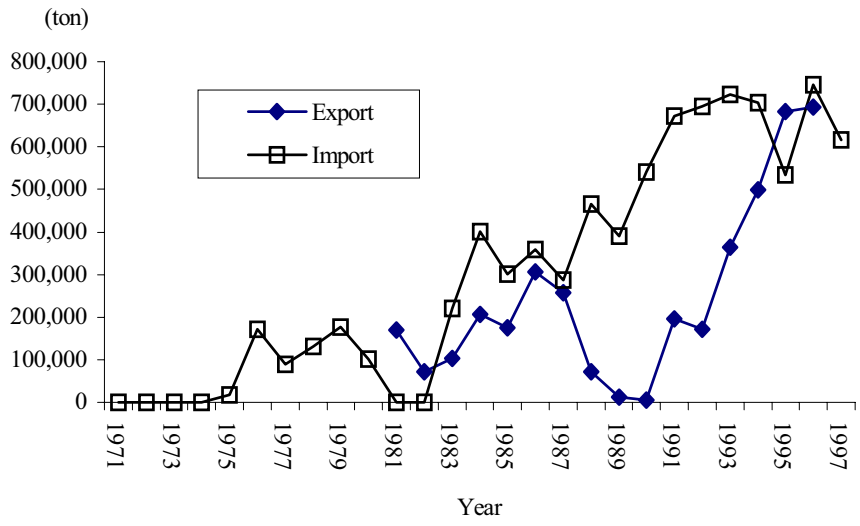
According to Simatupang et al. (1995), Indonesia is projected to import soybean to the amount of 1.3 million tons in 2000 and 1.9 million in 2010. They stated that trade liberalization along with phasing out the fertilizer subsidy would decrease production of soybeans and maize,

but increase rice production. Compared to other crops, an adverse effect of trade liberalization would likely be more serious on soybean production, indicated by a negative production growth rate of -1.7% per annum. This negative growth rate combined with positive demand growth contribute to a significant increase in soybean imports in the near future.

Table 3.7 Export and import volume of soybeans, 1975-1996.

Year	Export	Import	Year	Export	Import
1975	0	17,802	1986	306,716	359,041
1976	0	171,746	1987	257,050	286,702
1977	0	89,101	1988	72,323	465,837
1978	0	130,499	1989	11,437	390,304
1979	0	176,620	1990	5,534	541,056
1980	0	100,878	1991	195,609	671,377
1981	169,776	284	1992	171,579	694,125
1982	71,769	696	1993	364,077	723,330
1983	103,569	220,873	1994	499,221	702,916
1984	206,077	400,678	1995	681,875	533,675
1985	175,223	301,952	1996	692,471	746,330

Figure 3.7 Export and import volume of soybean, 1971-1997.



Source: Trade Statistics (CBS, various issues).
Source: Table 3.7.

3.2.3 Production, marketing and trade-related policies

3.2.3.1 Production policies

Since reaching self-sufficiency in rice in the mid 1980s, Indonesian food policy makers have turned their attention to the development of secondary food crops. Soybean has received special attention because of its importance as a main source of protein consumption particularly for low-income households. Indonesia has been a net importer of soybean. To reduce the

dependency of supply from the international market, the Indonesian government proclaimed a policy objective of self-sufficiency in soybean in 1986 for the first time.

A series of intensification programs has been implemented by the government to increase soybean production. These programs are basically similar with those adopted for promoting rice production. Upaya khusus (UPSUS), known as a special program to spur soybean production, stressed yield improvement and area expansion of soybeans. UPSUS for soybean is a special operation as the government sets the target of area expansion, and plays direct roles in program implementation and supervision, particularly on improved seed distribution and credit facilitation. This program, along with high price support and trade policies, has dramatically increased the planted area of soybeans (Table 3.6). The area harvested of soybeans increased from 896 thousand ha in 1985 to 1.5 million ha in 1995 with an average growth rate of 6.0% per year. As mentioned before, soybean yields have been increasing but remain low by world standards. The sources of total production growth slightly differed between Java and off-Java. The main source of production growth in the outer Islands was area expansion, while that in Java was due to yield improvement.

3.2.3.2 Trade-related policies

To pursue the self-sufficiency objective, the domestic price of soybean has been insulated from the international market by means of import controls. BULOG imports soybean and sells it to private traders or KOPTI at a higher price. Since 1988, soybean imports have been mainly in terms of grain since the domestic soybean meal industry began operating. It is estimated that the capacity of the soybean meal industry is 350 thousand tons, and to protect this infant industry soybean meal imported by private companies carries an import tariff of 35% over the CIF price. In June 1991, the tariff rate was reduced to 5%, but less than two months later the old tariff rate was reinstated. However, in September 1995, government liberalized import of soybean meal in order to support poultry feed industries. The evolution of tariff restrictions on soybean imports is presented in Appendix 3.8.

Soybean grain imported by BULOG is channeled to local food processors through its regional branch offices (DOLOG) and cooperatives of tofu and tempe processors (KOPTI). Most imported soybean is distributed to those main processors of soybean grain and only a small part of soybean is channeled to the free market. The objective of this involvement in domestic marketing is to secure a reliable supply for those home industries, because tofu and tempe represent a main protein source of household consumption, particularly for low income households. However, for domestically produced soybean, no such intervention is in effect. In order to encourage increased local soybean production, KOPTI is obligated to absorb at least 40% of total domestically produced soybean. However, in practice, this consumption target is unachievable, except in certain short-term periods when the supply of imported soybean from DOLOG was inadequate to match consumption needs. In West Java and Lampung, for example, purchasing of local soybean by KOPTI was only 20% of total soybean distributed (Irawan and Purwoto 1989). The main reason is that imported soybean is less expensive than that produced domestically, while in terms of soybean quality the opposite situation holds, particularly for tempe processing purposes.

In addition to soybean trade control, government also used to guarantee a floor price for farmers. The floor price, however, is not very effective since the actual price at the farm level is always higher by roughly 60%. Consequently, government procurement of domestic soybean is not necessary, since private traders themselves efficiently perform this activity. The wedge of soybean price between peak and off-season is relatively narrow (Hayami et al. 1987). Due to supply shortage, the quantity supplied in the peak season has always been absorbed without much pressure on price and on the contrary. During the off season, the soybean price cannot increase beyond a certain level because of the availability of soybean imports.

The protection rate scheme for soybean provided a nominal protection rate averaging 40% during 1972 - 1990. In the last decade there is no tendency of nominal protection decrease as in the case of rice. In 1980 - 1985 and 1986 - 1990 nominal protection rates of soybean on average were 47% and 43%, respectively. However, due to BULOG intervention on domestic supply by importing soybean, domestic price fluctuation was lower than that of the international market. During 1972 - 1990, the coefficient of variation of the annual wholesale price was 8.9% and for the border price it was 34.4% (Sudaryanto et al. 1992). In real terms, the domestic soybean price also declined at a lower rate, - 0.8% per year, compared to - 5.3% per year for the world market. This suggests that the trade policy on soybean has been successful not only in keeping a higher domestic price but also in maintaining its stability.

Based on Presidential Decree No 50/1981, BULOG was appointed by the government to stabilize and ensure soybean meal availability to meet an increasing demand for the feed industry. In 1982, as stated in the Trade Minister's Decree No 90, BULOG was designated to be the sole importer of soybean meal. This is aimed at (i) stabilizing the domestic price of soybean meal, which was formerly imported by private importers, and (ii) ensuring an adequate supply of soybean meal for the feed industry. BULOG directly supplied the needs of large and medium scale feed manufacturers, through the association of Importers of Feed Ingredients (ASBIMTI). Furthermore, ASBIMTI was responsible for supplying the needs of small scale feed manufacturers. Overall, BULOG was responsible for stabilizing the price of soybean meal in order to keep the price of feed at reasonable and stable levels. This will in turn protect the small-scale farmers from losses due to unstable and high prices of feed.

In June 1991, the government launched a deregulation package to remove the BULOG monopoly on soybean meal importation. The role of BULOG as a sole importer was replaced by general importers. In addition, the import tariff on soybean meal was reduced from 10 to 5%, but a 30% surcharge was implemented. In 1993, this surcharge was finally removed and in return the government implemented a local content requirement in which feed manufacturers were obliged to purchase 40% of their needs from domestic sources. This policy was aimed to stimulate and protect domestic meal processors. The June 1994 deregulation package reduced the local content requirement to 30%, and the import tariffs were abolished. This local content ratio was further reduced to 20%. In April 1996, all trade regulations on soybean meal were completely removed.

3.2.3.3 Pricing policy

Unlike rice, BULOG intervention in the domestic soybean market was relatively slight and indirect. During 1980-1992, government implemented a floor price on soybean. This policy instrument was considered ineffective, and was therefore no longer used, since the farm-gate prices of soybean were always well above the announced floor price. At present, controls over imports (and exports) and distribution are the principal means by which the government influences the soybean market. BULOG is the sole importer of soybeans but, in practice, it issues importing and processing contracts (for meal crushing) to the private sector.

As the sole importer, BULOG and its appointed trading companies have a monopoly on the importation and distribution of soybeans. As a result, the domestic price of soybean (and soybean meal) has always been well above the import parity price. This situation provides substantial economic incentives for soybean producers, BULOG and its trading partners, at the expense of consumers at large. In 1995, for example, the domestic price of soybean was 94% higher than its import parity price. This taxes thousands of small-scale tofu and tempe producers and significantly increases costs to poultry and other livestock farmers. In short, eliminating the import restriction would benefit the economy as a whole, particularly small tofu and tempe producers, the food and feed industries and consumers in general.

3.2.4 Effects of trade liberalization

3.2.4.1 Effects on domestic prices

Direct effects of trade liberalization can be seen from price development. The domestic price of a commodity is a function of, among others, the level of world prices and exchange rates. The notion of liberalized trade means that the domestic market is linked to a large extent to the world market. Any world price fluctuation will certainly result in fluctuation of the domestic price. Similarly, any shock on the domestic currency against the currency of the main trading partners will also impact on domestic market prices. This situation is now occurring in Indonesia. As shown in Figure 3.8, the domestic retail price of soybeans has been more unstable and increasing, since the drastic market reforms were undertaken by the government in response to the economic crisis. The increased price of soybeans in the last two years was mainly caused by the rupiah depreciation.

Figure 3.8 Retail, wholesale, and producer prices of soybean, 1980-1998.

Source: Marketing Vademecum (various issues).

3.2.4.2 Effects on social welfare

Effects of the Deregulation Package of May 1995 on soybean trade are examined in the following section. As shown in Appendix 3.8, the government removed the import tariff of soybeans that was from 5% to 0%. To calculate the impacts of this deregulation on consumer, producer and government surpluses, some base level data (1996) are needed namely price, quantity of import and domestic production.

The wholesale and producer prices of soybean grain in 1995 were Rp 1,320 and Rp 1,020 per kg, respectively, while the quantity of soybean imported was 533,675 tons. The estimated price elasticity of demand for soybean is –0.4282 (see Equation 5, and Appendix 3.9 for details). The estimated demand elasticity is lower than the previous estimate of –0.69 (PSE 1997). In contrast, as shown in Equation 3.6, the estimated supply elasticity of 0.5843 (see

Appendix 3.10) is higher than the value 0.23 from Rosegrant et al. (1987). Total domestic soybean production in 1995 was 1,680 thousand tons.

LQDS = 20.280122 – 0.428176LPWSS + 0.647101LYCR (Equation 5)
(6.76) (1.90) (4.16)
Adj.R2 = 0.8931; DW = 1.428; n = 11 year (1986-1996)

where:
LQDS = Log quantity demanded for soybean
LPWSS = Log wholesale price of soybean
LYCR = Log national real income per capita
Figures in parentheses are t-ratios.

LQSS = 3.393790 + 0.584272LLPFS (Equation 6)
(3.32) (3.80)
Adj.R2 = 0.5739; DW = 1.724; n = 11 year (1986-1996)

where:
LQSS = Log quantity supplied of soybean
LLPFS = Log 1-year lagged farmgate price of soybean
Figures in parentheses are t-ratios.

The transmission elasticity of the world price to the wholesale price is 0.7152 (Equation 7 and Appendix 3.11), while that from the wholesale to producer price was 0.8774 (Equation 8 and Appendix 3.12). Using a tariff transmission elasticity of 0.75, the decrease in the domestic wholesale price would increase the demand for soybean by 35,500 tons or 1.61% higher than the base year level. In contrast, the supply of soybean would decline by 1.6% (32,300 tons), from 1,680 thousand tons to 1,648 thousand tons in response to the drop in producer price of soybeans. The import quantity would increase by around 67,800 tons, from 533,600 tons to 601,400 tons. Detailed results of the calculation of producer-consumer surplus are presented in Appendix 3.13.

LPWSS = -2.583382 + 0.715169LPCIFS (Equation 7)
(1.52) (5.46)
Adj. R2 = 0.7234; DW = 1.427; n = 11 year (1986-1996)

where:
LPWSS = Log wholesale price of soybean
LPCIFS = Log world price of soybean in domestic currency
Figures in parentheses are t-ratios.

LPFS = 0.793014 + 0.877443LPWSS (Equation 5)
(1.53) (11.34)
Adj.R2 = 0.9206; DW = 2.386; n = 11 year (1986-1996)

where:
LPFS = Log farmgate price of soybean
LPWSS = Log wholesale price of soybean
Figures in parentheses are t-ratios.

As shown in Table 3.8, the net welfare gains resulting from tariff removal on soybean import are estimated around Rp 32.3 billion. These social welfare gains were attributed to the gain that would be enjoyed by consumers, which is much higher than the loss borne by producers as a result of tariff removal. The consumer surplus gain would be about Rp 110.5 billion, while the loss of producer surplus is estimated around Rp 55.8 billion. Due to the tariff removal, the government would give up income of around Rp 22.3 billion per year.

Table 3.8 Social welfare effects of tariff reduction on soybeans.

Item			
World price 1996 (US$/ton)	350		
Exchange rate 1996 (Rp/US$)	2,385		
World price 1996 (Rp/kg)	834.75		
Initial tariff rate (%)	5		
New tariff rate (%)	0		
Wholesale price at to (Rp/kg)	1,320		
Producer price at to (Rp/kg)	1,020		
Supply quantity at to ('000 t)	1,680		
Import quantity at to ('000 t)	533.6		
Demand quantity at to ('000 t)	2,213.6		
Demand elasticity	-0.4282		
Supply elasticity	0.5843		
Price transmission elasticity of PWS to PF	0.8774		
Effects of tariff change:			
Tariff transmission elasticity	0.50	0.75	1.00
Effect on wholesale price (%)	-2.50	-3.75	-5.00
Change in wholesale price (Rp/kg)	-33.00	-49.50	-66.00
Wholesale price at t1 (Rp/kg)	1,287.00	1,270.50	1,254.00
Effect on producer price (%)	-2.19	-3.29	-4.39
Change in producer price (Rp/kg)	-22.37	-33.56	-44.75
Producer price at t1 (Rp/kg)	997.63	986.44	975.25
Effect on demand (%)	1.07	1.61	2.14
Change in demand quantity ('000 t)	23.70	35.54	47.39
Demand quantity at t1 ('000 t)	2,237.30	2,249.14	2,260.99
Effect on supply (%)	-1.28	-1.92	-2.56
Change in supply quantity ('000 t)	-21.53	-32.30	-43.06
Supply quantity at t1 ('000 t)	1,658.47	1,647.70	1,636.94
Import quantity at t1 ('000 t)	578.83	601.44	624.05
Effect on import quantity ('000 t)	45.23	67.84	90.45
Effect on consumer surplus (Rp million)	73,439.77	110,452.89	147,661.49
Effect on producer surplus (Rp million)	-37,348.77	-55,842.49	-74,215.77
Effect on government revenue (Rp million)	-22,271.13	-22,271.13	-22,271.13
Effect on net surplus (Rp million)	13,819.87	32,339.26	51,174.59

Source: Calculated (see Appendix 3.18 for details).

The second scenario to be assessed is the potential effect of Uruguay Round trade liberalization. According to FAO (1995), the implementation of Uruguay Round trade liberalization would increase the world market price of fats and vegetable oils by 7.0%. In this analysis, it is assumed that the world market price of soybeans would increase by 7%, considering that a large quantity of soybeans is used to produce vegetable oils.

Table 3.9 shows that the 7.0% increase in world price of soybean would increase the wholesale and producer prices by 5.01% and 4.39%, respectively. The increase in the domestic wholesale price would in turn reduce the demand for soybean by 2.14% (47,450 tons). Meanwhile, the production of soybean would increase by 2.57% (13,700 tons), from 1,680 thousand tons to 1,693 thousand tons in response to the increase in the producer price of soybean. The import quantity would decline by 61,150 tons, from 533,600 tons to 472,450 tons. As shown in Table 3.9 (see Appendix 3.14 for details), the net welfare loss resulting from implementation of the Uruguay Round trade liberalization would be around Rp 69.14 billion. This social welfare loss was attributed to loss of consumer surplus, which was much higher that the gains captured by producers as a result of the increased soybean price. The loss of consumer

surplus was Rp 2,209.07 billion, while the producer surplus gain was estimated at around Rp 1,139.77 billion.

Again, as mentioned before, the results here should be interpreted cautiously. As the analysis is partial and static, the results do not take into account the general equilibrium effect of resource movement between sectors, which is creating other economic opportunities and dampening the overall adverse effects. Developing countries such as Indonesia may in fact be able to gain from agricultural liberalization, if they reform their own policies simultaneously (accelerate technical change and improve efficiency) and also act to redistribute income domestically between consumers and producers. Moreover, reforms should ensure less fluctuation of prices and therefore more stability in world markets for agricultural products.

Table 3.9 Social welfare effects of Uruguay Round liberalization (7% increase in the world price of soybeans).

Item	
World price 1996 (US$/ton)	350
Increase world price (%)	7.0
Wholesale price at to (1996) (Rp/kg)	1,320
Producer price at to (Rp/kg)	1,020
Supply quantity at 1996 ('000 t)	1,680
Import quantity at 1996 ('000 t)	533.6
Demand quantity at to ('000 t)	2214
Demand elasticity	-0.4282
Supply elasticity	0.5843
Price transmission of PFOB to PWS	0.7152
Price transmission elasticity of PWS to PF	0.8774
Effects of Increased World Price :	
Change in wholesale price (%)	5.01
Wholesale price at 1997 (Rp/kg)	1,386.08
Effect on producer price (%)	4.39
Producer price at 1997 (Rp/kg)	1,064.80
Effect on demand quantity (%)	-2.14
Change in demand quantity ('000 t)	-47.45
Demand quantity at 1997 ('000 t)	2,166.15
Effect on supply (%)	2.57
Change in supply quantity ('000 t)	13.70
Supply quantity at 1997 ('000 t)	1,693.70
Import quantity at 1997 ('000 t)	472.45
Effect on Import quantity ('000 t)	-61.15
Effect on consumer surplus (Rp million)	-144,716.62
Effect on producer surplus (Rp million)	75,578.67
Effect on net surplus (Rp million)	-69,137.96

Source: Calculated (see Appendix 3.14 for details).

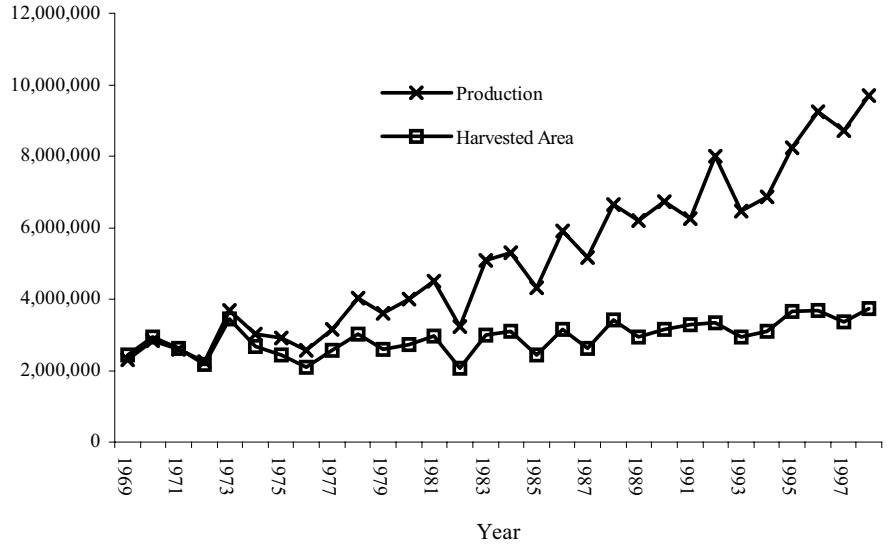
3.3 Maize

3.3.1 Area, production and yield

The long-run growth of maize production during the 1969-1998 period was sufficiently high, namely, 7.27% per annum. Looking closely at the shape of the production curve in Figure 3.10, however, it can be seen that the production period may be divided into three segments, namely, 1969-1977, 1978-1990 and 1991-1998. Using the data in Table 3.9, the production growth rate during these respective periods was estimated at 9.50%, 6.94% and 4.1% per

annum. These changes suggest a declining ability of the country to accelerate or maintain the high maize production growth over time, although the overall production growth rate in the 1969-1998 period remains sufficiently high. In 1998, the total production amounted to about 1.3 million tons, which was far above the 1969 position of 0.4 million tons.

Figure 3.9 Production and harvested area of maize, 1969-1998.



Source: Table 3.10.
Source: Table 3.10.

Figure 3.10 Yield of maize, 1969-1998.

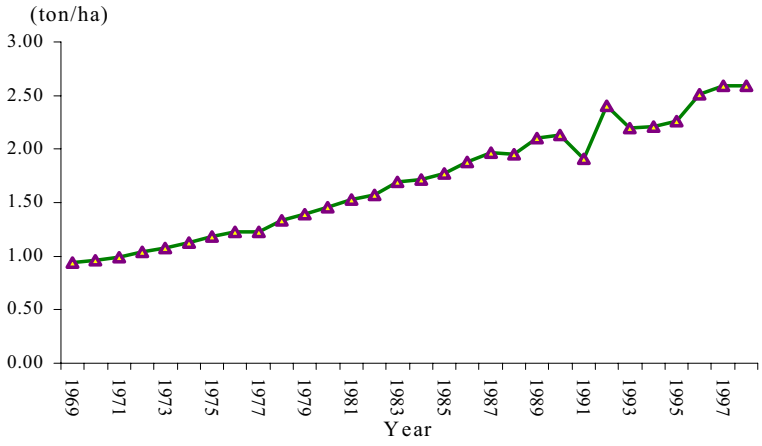


Table 3.10 Area harvested, production and yield of maize, 1969–1998.

Year	Harv. Area (ha)	Production (ton)	Yield (ton/ha)	Growth (%) Area	Product.	Yield
1969	2,435,823	2,292,876	0.941			
1970	2,938,611	2,825,215	0.961	20.6	23.2	2.1
1971	2,626,595	2,606,494	0.992	-10.6	-7.7	3.2
1972	2,160,053	2,254,382	1.044	-17.8	-13.5	5.2
1973	3,433,167	3,689,802	1.075	58.9	63.7	3.0
1974	2,666,868	3,010,781	1.129	-22.3	-18.4	5.0
1975	2,444,866	2,902,887	1.187	-8.3	-3.6	5.2
1976	2,095,128	2,572,139	1.228	-14.3	-11.4	3.4
1977	2,566,196	3,142,654	1.225	22.5	22.2	-0.2
1978	3,024,806	4,029,201	1.332	17.9	28.2	8.8
1979	2,593,496	3,605,525	1.390	-14.3	-10.5	4.4
1980	2,734,750	3,993,771	1.460	5.4	10.8	5.0
1981	2,955,006	4,509,302	1.526	8.1	12.9	4.5
1982	2,061,073	3,234,825	1.569	-30.3	-28.3	2.9
1983	3,002,092	5,086,875	1.694	45.7	57.3	8.0
1984	3,086,246	5,287,825	1.713	2.8	4.0	1.1
1985	2,439,966	4,329,503	1.774	-20.9	-18.1	3.6
1986	3,142,759	5,920,374	1.884	28.8	36.7	6.2
1987	2,626,033	5,155,680	1.963	-16.4	-12.9	4.2
1988	3,405,751	6,651,917	1.953	29.7	29.0	-0.5
1989	2,944,479	6,192,512	2.103	-13.5	-6.9	7.7
1990	3,158,092	6,734,028	2.132	7.3	8.7	1.4
1991	3,271,850	6,255,906	1.912	3.6	-7.1	-10.3
1992	3,327,162	7,995,459	2.403	1.7	27.8	25.7
1993	2,939,534	6,459,737	2.198	-11.7	-19.2	-8.6
1994	3,109,398	6,868,885	2.209	5.8	6.3	0.5
1995	3,651,838	8,245,902	2.258	17.4	20.0	2.2
1996	3,679,695	9,233,250	2.509	0.8	12.0	11.1
1997	3,355,224	8,703,602	2.594	-8.8	-5.7	3.4
1998	3,747,044	9,695,745	2.588	11.7	11.4	-0.2

Source: Indonesia Statistical Yearbook (CBS, various issues).

The sources of production growth are harvested area and yield growth. According to the shape of the harvested area curve in Figure 3.9, the growth of harvested area may be divided also into three segments, as in the production case. The harvested area growth rate during the respective periods was estimated at 5.19%, 3.56% and 2.53% per annum. The growth rate was declining over the three periods. This indicates that more land is available for maize farming, but with a declining growth rate. The overall growth rate in the period of 1969-1998, however, remains satisfactory at 3.43% per annum. In 1998, the total harvested area amounted to about 1.1 million hectares, double the 1969 position of 0.55 million hectares.

The growth rates of yield in the periods of 1969-1977, 1978-1990 and 1991-1998 were estimated at 4.31%, 3.38 and 1.61 per annum (Figure 3.10 and Table 3.10). It is obvious that yield growth rate was continuously declining over these three periods, implying that production technology was improving but with a slower rate and a reduced service capacity of land for maize production. In effect, yield has been leveling-off in the last period. The overall yield growth rate in the period of 1969-1998, however, remains satisfactory at 3.85% per annum. In 1998, the yield level was about 1.2 tons per hectare, which is above the 1969 level of 0.7 tons.

The share of area expansion and yield improvement to the production growth was estimated at 47.18% and 52.82%. It is obvious that maize production increase has relied upon both yield improvement and area expansion. The slightly higher share of yield improvement to the production growth could be expected to improve the efficiency of maize production in the future.

The yield improvement may be attributed to the introduction of improved varieties and increased fertilizer use. During 1969-1996, 38 new improved varieties were released farmers by

the Ministry of Agriculture. Some of them were generated by government research institutes and the others by state and private companies. Before 1970, production technology was rudimentary, and yield levels remained almost unchanged at around one ton per hectare. Since the late 1970s, there have been domestically bred varieties or maize produced by the State Company of PT Sang Hyang Seri, namely, *Arjuna* and *Harapan-6*. These varieties, which are responsive to fertilizer use and at least partially resistant to downy mildew, have boosted yield potential of maize.

Further increases in yield potential may be attributed to the introduction of C-1 hybrid seeds in 1983 produced by PT Cargil and other more recent hybrids (Rosegrant et al. 1987). The more recent high-yielding varieties are CPI-1 and CPI-2 produced by PT Charoen Pokphan Indonesia, *Arjuna Bisi* produced by PT Bright Indonesia Seed Industry, and Pioneer produced by PT Pioneer (Hadi et al. 1992). Yield potential of these varieties ranges from 3 to 9 tons per hectare with a shorter crop cycle of 90-115 days. There are also non-hybrid varieties with a high yield potential called *Bisma* that have been widely used by farmers.

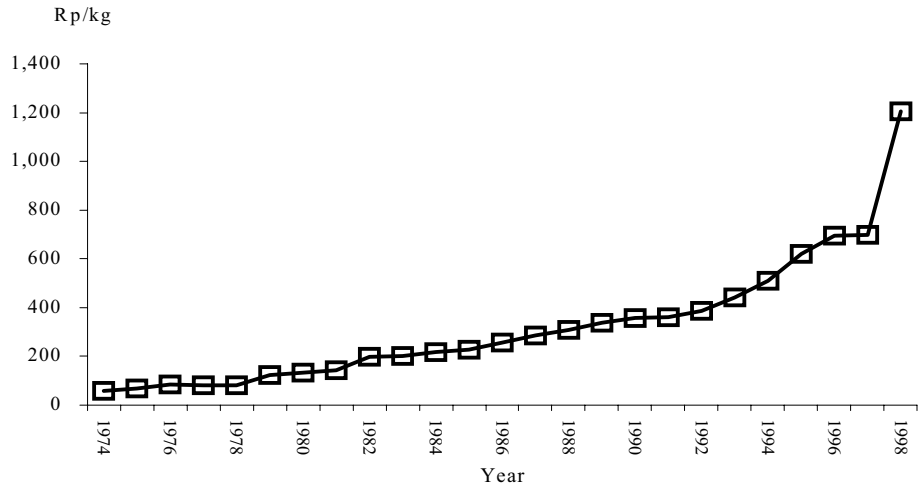
Fertilizer use in maize farming has increased dramatically after introduction of the fertilizer-responsive varieties in addition to the provision of subsidized price of fertilizers as an important component of intensification programs. The area planted under the Mass Guidance Programs (*Program Bimbingan Masal*), for instance, expanded rapidly during the 1985-1990 period. In the 1990s, the intensified area grew by 14% per annum. These programs were highly concentrated in East Java and Central Java, respectively accounting for 60% and 30% of the national figure. The prominent problems in promoting farmers to grow improved seeds have been lack of financial resources to purchase the more expensive hybrid seeds and more fertilizer. Since the total production costs of maize farming using hybrid seeds are much higher than those using traditional varieties, credit provision to farmers may be of crucial importance for enhancing maize production growth.

Even though the yield level was remarkably improved in the last 20 years, there remains a very wide gap between yield at the farm level and at research stations. Yield potential for open-pollinated high yielding variety was 2.5-3 tons per hectare, while average yields at the farm level were 2 tons per hectare. The yield potential of hybrid seeds may be as high as 5-7 tons per hectare. It is apparent that there are opportunities to increase yield through expansion of intensified areas and adoption of both open-pollinated and hybrid improved seeds, greater use of fertilizer, and improvement of cropping practices in the future.

The price of maize at the consumer level may also contribute to the growth of area harvested and yield. As shown in Figure 3.11, the retail price tended to increase although with some fluctuations. In the period of 1981-1997, for instance, the retail price increased from Rp 38 to Rp 319 per kg. A rapid price increase took place during 1993-1997. In 1998, the price of maize, like other agricultural commodities, may be far above the 1997 price due to a large rupiah depreciation. This retail price increase is expected to drive up the farm-gate price that eventually encourages farmers to cultivate more land for maize using better technologies (price-induced technology).

In terms of spatial distribution, maize production has been highly concentrated in East Java and Central Java, which together consistently accounted for about 65% of harvested area and almost 68% of production. Yield and production growth rates in East Java were slightly above the national levels. However, the harvested area in these provinces has been declining in recent years, which may be attributed mainly to replacement by rice and sugarcane. In the last ten years, South Sulawesi was the third most important province, accounting for 10% of the national figure, while Lampung, East Nusatenggara and North Sumatra have been other important maize producing provinces.

Figure 3.11 Retail price of maize, 1974-1998.



Source: National Logistic Board, Jakarta (various issues).

3.3.2 Exports and imports

In the period of 1969-1997, maize export took place every year (Table 3.11. and Figure 3.12). At the early stage of the period (1969-1971), the export quantity was sizeable ranging from 156,264 to 285,833 tons. In the following years, however, it tended to decrease with substantial fluctuation. Export quantities beyond 100,000 tons only took place in particular years such as 1973, 1974, 1984, 1989, 1990 and 1992, ranging from 136,523 to 285,833 tons. In the remaining years, it dropped to the lower points, ranging from 541 to 79,647 tons. In more recent years (1993-1997), it amounted to only 14,399 to 52,088 tons. In 1998, export was expected to increase, because of a large increase in domestic production (discussed above) due to implementation of a new program, the Self Reliance Movement of rice, maize and soybean, and a sharp drop in the domestic demand stemming particularly from the collapse of most poultry farms as feed users. The major country destination of maize exports was Japan.

Import of maize has taken place since 1973, the first year of the Second Five-Year Development Plan. Like export, import also took place every year with smaller fluctuations during 1973-1997. There were large import quantities in 1994 and 1997 accounting for about 1.1 million tons, respectively. Import quantities exceeding 100,000 tons occurred in 1987, 1991, 1993, 1995 and 1996, ranging from 515 to 969,145 tons. It is apparent that the import quantity tended to increase over the 1973-1997 period. In more recent years (1994-1996), the import quantity has been very high ranging from 0.6 million tons to 1.1 million tons. These figures are far beyond those in the preceding years of 1973-1993.

Large imports in the more recent years were aimed at supplying more raw material to the feed industry. In 1998, import may be expected to decline, stemming primarily from (i) increased domestic production (discussed above); (ii) high import price due to substantial rupiah depreciation; and (iii) squeezed domestic demand because of the collapse of most poultry

farms as feed users*. The major source countries of maize imports have been Argentina, USA, South Africa and Viet Nam.

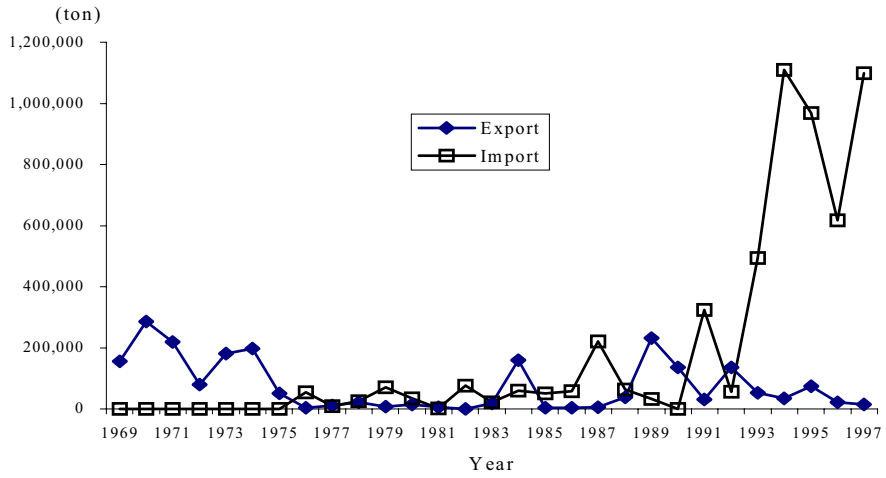
Table 3.11 Export and import volume of maize, 1969-1997.

Year	Export (ton)	Import (ton)	Year	Export (ton)	Import (ton)
1969	156,264		1984	159,833	59,251
1970	285,833		1985	3,489	49,863
1971	218,904		1986	4,433	57,369
1972	79,647		1987	4,680	220,998
1973	181,280	103	1988	37,404	63,454
1974	196,855	30	1989	232,093	33,340
1975	50,553	23	1990	136,641	515
1976	3,514	54,308	1991	30,742	323,176
1977	10,450	9,505	1992	136,523	55,498
1978	21,076	26,199	1993	52,088	494,446
1979	6,830	70,025	1994	34,091	1,109,253
1980	14,890	33,772	1995	74,880	969,145
1981	4,786	1,857	1996	21,819	616,888
1982	541	76,466	1997	14,399	1,098,013
1983	17,936	22,246			

Source: Trade Statistics (CBS, various issues).

* As the demand for chicken meat declines, the production of chicken meat will be discouraged. In effect, the demand for feed will also decline which eventually reduces the demand for maize as the main raw material.

Figure 3.12 Export and import volume of maize, 1969-1997.



Source: Table 3.11.

It is obvious that imports were larger than exports in most years. Only in particular years did the reverse situation prevail, namely 1973, 1974, 1984, 1989, 1990 and 1992. It is also seen that over the whole period of 1969-1997, export and import always took place in the same year. The decision regarding the quantity of export and import is basically dependent upon the balance between the domestic supply and demand for maize in the domestic market and, perhaps, world price (in rupiah currency). Export (or import) becomes the option whenever supply is larger (or smaller) then demand. This was termed as maize "self-sufficiency on trend".

The world price during 1987-1996 apparently also affected export and import quantities. Export considerably increased and import dropped when the world price substantially increased. The reverse situation prevailed when the world price dropped. In 1995-1996, however, despite the rocketing world price, imports remained larger than exports, probably because of substantial excess domestic demand. Over the whole period of 1969-1997, total export was much smaller than total import, at 2.2 million tons and 5.4 million tons, respectively. This trade deficit accounting for 3.2 million tons suggests that Indonesia is a net importer of maize. The total maize trade of 7.6 million tons (export + import) over the long period shows that Indonesia is a major trader of maize in the world markets.

3.3.3 Production, marketing and trade-related policy

3.3.3.1 Production policy

To foster domestic production, the government set out the following policies and programs. First, a floor price policy was aimed at shielding producers from price drops. It was initially stipulated in 1977 and implemented by 1 February 1978.

Essentially, the floor price was specified on the basis of production costs and the prevailing market price in the previous year and the expected producer's margin. Hence, the floor price was adjusted every year according to changes in the two variables.

In reality, the floor price was inflated by 10.9% per year. This rate of floor price increase was larger than that of rice (10.4%) and soybean (6.4%). In 1989, in particular, the floor price was increased by 212.5% from the 1978 position. In 1986, there was a slight change in the policy stipulated in November and December and implemented since 1 January 1987. All these suggest that the government paid more serious attention to maize.

To make the policy effective, the government through the National Logistic Board (*Badan Urusan Logistik,* BULOG) carried out market operations by procuring maize produce from farms at the peak harvest season (will be discussed in the following section). It is likely, however, that the price policy may be viewed as an ineffective path because the specified floor prices were always below the prevailing farm-gate market prices. In effect, the price policy was phased out in January 1992.

The second was an input subsidy policy, aimed at promoting farmers to use improved technologies such as fertilizers to meet the higher input requirements of the fertilizer-responsive high-yielding varieties of maize. However, the fertilizer subsidy basically applied not only to maize, but also to all agricultural commodities. Unfortunately, the limited budget availability forced the government to gradually reduce the subsidy. In 1998, only urea fertilizer was still subsidized, but eventually it was entirely removed by early 1999 after reconciliation of the serious polemics between those supporting and those rejecting subsidy. In fact, the subsidy had reduced the fertilizer price, but fertilizer availability to the food sub sector at the village level was highly uncertain with very high prices. The final conclusions have been that domestic fertilizer prices should correspond to world fertilizer prices (no subsidy), while farmers are provided with lower interest rate (higher subsidy on interest rate) farm credit, namely, 10.5% per annum down from the previous rate of 14%.

The government programs to encourage farmers to use improved production technologies were (i) Common Intensification Program (*Intensifikasi Umum*); (ii) Special Intensification Program (*Intensifikasi Khusus*); (iii) Extra Special Intensification Program (S*upra Intensifikasi Khusus*); and (iv) Self Reliance Movement (*Gerakan Mandiri*) covering the three basic food crops rice, soybean and maize.

In the first program, farmers were provided with extension services only, while input requirements had to be satisfied by themselves. In the second program, farmers were provided with a subsidized credit package consisting of material inputs (seeds, fertilizers and pesticides), labor costs and extension services. In the third program, a similar credit package was provided to farmers, but collaboration between farmer groups was required.

The last program is a local centrally integrated movement for increasing production of rice, soybean and maize. The objectives of this program are as follows: (i) to improve quality of farm intensification by applying recommended locally-specific technology packages; (ii) to improve yield so as to increase national production; (iii) to improve farmers' income; (iv) to save foreign exchange; (v) to socialize business partnerships between farmers and companies; (vi) to supply more raw material to feed and food industries; and (vii) to improve national food security.

To implement this program, the Farm Credit Scheme (*Kredit Usaha Tani*) was changed as follows: (i) the outstanding 1985-1995 credit was written off; and (ii) new credit is characterized by the exclusion of particular requirements such as sufficient collateral and a recommendation from the local cooperative office. Commodity coverage is extended not only to rice and selected secondary crops but also some horticultural crops, and NGOs are involved in providing credit services. The targeted achievement of this newest program is 4,354 thousand hectares of planted area, 4,223 thousand hectares of harvested area, 1.84 tons of yield and 12,012 thousand tons of production by year 2001.

3.3.3.2 Marketing policy

The core objectives of marketing policies were to guarantee that the farm-gate price not fall below the floor price and to meet the demand for maize by the feed industry either through intervening in domestic marketing or importing maize. In domestic marketing, the government through BULOG and Village Cooperative Units (VCU) procured maize from farmers. In this sense, KUD collected maize from farmers and then sold it to BULOG. In the early years of the policy implementation, the government procurement may be considered sizeable. Before 1988, inter island as well as inter provincial marketing was also entirely controlled by BULOG so as to meet the demand-supply balances. More recently, however, government procurement accounted for only about 1% of the national maize production.

Since 1988, BULOG quit from maize marketing intervention for the following reasons: (i) such intervention generated substantial financial burdens to the government budget; (ii) increased competition with private traders could provide higher prices to the farmers; and (iii) excess domestic demand prevailed in most years. In consequence, maize marketing is left to private companies or traders, whereby maize prices are likely determined by market forces.

In 1998, domestic production of maize increased, stemming from the Self Reliance Program (discussed earlier). In contrast, the demand for this commodity by the feed industry seemed to sharply decline as a consequence of the economic crisis that caused most poultry farms to collapse. Thus, the increased domestic production in the year might not be entirely absorbed by the feed industries. The high price (in rupiah terms) in 1998 as a result of the depreciated rupiah could be expected to encourage export that would, in effect, increase farm-gate price. Apparently, however, the farm-gate price dropped, making farmers suffer from substantial financial losses and leaving them unable to repay their farm credit.

3.3.3.3 Trade policy

During the 1991-1997 period, Indonesia imported and exported maize grain, based on the balance between domestic production and use. The most prominent import policy was the imposition of tariffs, principally aimed at protecting farmers from severe effects of price drops. Tariff rates were specified in policy packages (*Paket Kebijakan*). The name of the policy package was often related to the month when the package was declared. For instance, *PAKDES* refers to *Paket Kebijakan Desember* (December Policy Package), *PAKTO* refers to *Paket Kebijakan Oktober* (October Policy Package), and so forth.

The tariff rates for the respective maize products during 1989-1995 are shown in Appendix 3.15. It is clear that the tariff was not applicable to maize seeds, especially parent seeds for breeding purposes. The prime reason for this was the need to support the research center or breeding companies to generate new adapted improved seeds. From breeding activities, breeding companies are expected to produce quality extension seeds that would be available to farmers and other users.

Non-seed products may be classified into: (i) primary products such as maize grain and sweet corn; (ii) processed products such as flours, broken corn and meals, maize starch, oil and its fractions, and corn flakes; and (iii) by-products such as maize bran. Of these products, maize grain constituted the largest portion in maize import. In 1989, the tariff rates varied form 5 to 60%, with tariff rates of corn flakes the highest, while tariff rates for flours, broken corn/meals and maize starch for backing were the lowest. In 1989, only tariff rates on maize grain and corn flakes declined, from 20 to 15% and from 60 to 40%, respectively. In the following years of 1990-1993, tariff rates on all products remained unchanged, varying from 5 to 40%. In 1994, three products experienced falling tariff rates, namely, maize starch for batter from 10 to 5%, corn flakes from 40 to 35% and other products from 10 to 5%.

In 1995, more products experienced falling tariff rates, namely, maize grain from 15 to 10%, crude oil of maize from 20 to 0%, sweet corn from 30 to 25%, corn flakes old from 35 to 30%, maize bran from 10 to 5%, and other products from 5 to 0%. All these latest tariff rates

remained unchanged until December 1995. At the end of the period, the tariff rates varied from 0 to 30%. According to GATT, 1995 was regarded as the base year of GATT ratification. These tariff rates are expected to gradually decline during the period of 1995-2003 for the AFTA region, where the maximum tariff rate will eventually become 5%, which applies to all agricultural (primary or processed) commodities.

3.3.4 Effects of trade liberalization

Effect of tariff cuts

As mentioned earlier, the main imported maize product is maize grain. In 1996, this product was imposed a 5% tariff. To liberalize the maize trade, this tariff rate is assumed to be removed. Hence, the effect of this tariff removal is assessed. For this, a number of regression analyses were carried out to estimate the transmission elasticity of tariff to the wholesale price, the transmission elasticity of wholesale price to producer price, the demand elasticity with respect to wholesale price and the supply elasticity with respect to producer price.

Of these regression results, only the estimate of tariff transmission is not statistically significantly different from zero and has a negative sign. This means that the tariff change has no effect on the wholesale price. Theoretically, however, the tariff change should have a positive effect on wholesale price. Therefore, this analysis tends to disregard the statistical results and assumes the following four alternatives of tariff transmission as those applied in the rice case, namely: (i) 25% of the tariff change is transmitted to the wholesale price - tariff transmission elasticity (ET) equals 0.25; (ii) 50% of the tariff change is transmitted to the wholesale price - ET equals 0.50; (iii) 75% of the tariff change is transmitted to the wholesale price - ET equals 0.75; and (iv) the entire tariff change is transmitted to the wholesale price - ET equals 1. Effects of a 5% tariff removal for the respective tariff transmission elasticity assumptions were estimated.

A 5% tariff removal would decrease the wholesale price by 1.25%, 2.50%, 3.75% and 5% for the respective tariff transmission elasticity assumptions of 0.25, 0.50, 0.75 and 1.00. Effects of these respective changes would be decreases in the wholesale price by Rp 6.14, Rp 12.28, Rp 18.41 and Rp 24.55 per kg. Clearly, given the tariff removal policy, the higher the tariff transmission elasticity the greater the reduction in the wholesale price.

The regression results shown in Equation 9 (see Appendix 3.16 for details) reveal that the transmission elasticity of wholesale price to producer price is 0.956663. This implies that a 1% decrease in the wholesale price would result in a 0.956663% decrease in the producer price. For the respective tariff transmission elasticity assumptions, a 5% tariff removal would decrease the producer price by Rp 4.92, Rp 9.85, Rp 14.77 and Rp 19.70 per kg (Table 3.12). It is seen that given the tariff removal policy, the higher the tariff transmission elasticity the greater the reduction in the producer price.

Table 3.12 Social welfare effects of tariff removal on maize.

Item				
Policy Scenario:	Tariff Cuts			
World Price 1996 (US$/ton)	174.9			
World price 1996 (Rp/kg)	417.1			
Initial tariff rate (%)	5.00			
New tariff rate (%)	0			
Initial tariff (Rp/kg)	20.86			
Wholesale price at to (Rp/kg)	491.0			
Producer price at to (Rp/kg)	411.8			
Supply quantity at to ('000 t)	9,307.4			
Import quantity at to ('000 t)	616.9			
Demand quantity at to ('000 t)	9,924.3			
Demand elasticity	-0.813449			
Supply elasticity	0.476158			
Price transmission elasticity of PWS to PF	0.956663			
Effects of tariff removal:				
Tariff transmission elasticity	0.25	0.50	0.75	1.00
Effect on wholesale price (%)	-1.25	-2.50	-3.75	-5.00
Change in wholesale price (Rp/kg)	-6.14	-12.28	-18.41	-24.55
Wholesale price at t1 (Rp/kg)	484.9	478.7	472.6	466.5
Effect on producer price (%)	-1.1958	-2.3917	-3.5875	-4.7833
Change in producer price (Rp/kg)	-4.92	-9.85	-14.77	-19.70
Producer price at t1 (Rp/kg)	406.9	402.0	397.0	392.1
Effect on demand (%)	1.0168	2.0336	3.0504	4.0672
Change in demand quantity ('000 t)	100.9	201.8	302.7	403.6
Demand quantity at t1 ('000 t)	10,025.2	10,126.1	10,227.0	10,327.9
Effect on supply (%)	-0.5694	-1.1388	-1.7082	-2.2776
Change in supply quantity ('000 t)	-53.0	-106.0	-159.0	-212.0
Supply quantity at t1 ('000 t)	9,254.4	9,201.4	9,148.4	9,095.4
Import quantity at t1 ('000 t)	770.8	924.7	1,078.6	1,232.5
Effect on import quantity ('000 t)	153.9	307.8	461.7	615.6
Effect on consumer surplus (Rp million)	61,220.1	123,059.5	185,518.2	248,596.3
Effect on producer surplus (Rp million)	-45,703.1	-91,145.2	-136,326.3	-181,246.5
Effect on government revenue (Rp million)	-12,866.6	-12,866.6	-12,866.6	-12,866.6
Effect on net surplus (Rp million)	2,650.4	19,047.7	36,325.3	54,483.3

Source: Calculated (See Appendix 3.17 for details).

LPFM = 0.145949 + 0.956663LPWSM (Equation 9)
(0.61) (22.10)
Adj. R2 = 0.9779; DW = 2.211; n=11 year (1986-1996)

where:

LPFM = Log farmgate price of maize
LPWSM = Log wholesale price of maize
Figures in parentheses are t-ratios.

As shown in Equation 10 (Appendix 3.18), the estimated price elasticity of demand was -0.813449. This means that a 1% decrease in the wholesale price would increase the quantity demanded by 0.813449%. For the respective tariff transmission elasticity assumptions, a 5% tariff removal would increase the quantity demanded by 100,900 tons, 201,800 tons, 302,700 tons and 403,600 tons (Table 3.12). This implies that given the tariff removal policy, increased tariff transmission elasticity would increase the quantity demanded.

LQDM = 25.491531 + 0.813449LRPWSM + 0.881441LYCR (Equation 10)
(6.08) (2.36) (4.24)
Adj. R2 = 0.826; DW = 1.207; n = 11 year (1986-1996)

where:
LQDM = Log quantity demanded for maize (national)
LRPWSM = Log real price of wholesale price of maize
LYCR = Log national real income per capita
Figures in parentheses are t-ratios.

The estimated price elasticity of supply as shown in Equation 11 (Appendix 3.19) was 0.476158, meaning that a 1% decrease in the producer price would reduce the quantity supplied by 0.476158%. For the respective tariff transmission elasticity assumptions, the given 5% tariff removal policy would eventually reduce the quantity supplied by 53,000 tons, 106,000 tons, 159,000 tons and 212,000 tons. Increased tariff transmission elasticity would increase quantity supplied.

LQSM = 6.258061 +0.476158LLPFM (Equation 11)
(13.72) (5.64)
Adj. R2 = 0.7546; DW = 2.668; n = 11 year (1986-1996)

where:
LQSM = Log quantity supplied of maize (national)
LLPFM = Log 1-year lagged farmgate price of maize
Figures in parentheses are t-ratios.

For the respective tariff transmission elasticity assumptions, a 5% tariff removal would increase quantity imported by 153,900 tons, 307,800 tons, 461,700 tons and 615,600 tons (Table 3.12). Increased tariff transmission means increased quantity imported.

A 5% tariff removal eventually affects the consumer surplus, producer surplus, government revenue and net surplus. As shown in Table 3.12, for the respective tariff transmission elasticity assumptions, the 5% tariff removal would eventually (i) increase the consumer surplus by Rp 61.2 billion, Rp 123.1 billion, Rp 185.5 billion and Rp 248.6 billion; (ii) decrease the producer surplus by Rp 45.7 billion, Rp 91.1 billion, Rp 136.3 billion and Rp 181.2 billion; (iii) decrease government revenue by Rp 12.9 billion; and (iv) increase the net surplus by Rp 2.6 billion, Rp 19.0 billion, Rp 36.3 billion and Rp 54.5 billion.

It may be concluded that the 5% tariff removal policy scenario would increase social welfare in the maize commodity. The social welfare would increase more substantially as tariff changes are more perfectly transmitted to the wholesale price. It is likely, however, that transmission elasticity of the tariff on the wholesale price would be 0.75. In this sense, the increased net surplus would be Rp 36.3 billion. Therefore, the policy to remove the 5% tariff is justifiable on the grounds of improvements in social welfare or efficiency of scarce resource allocation.

Effects of world price increase

Due to trade liberalization, the world price of maize might be expected to increase by 4% per annum. Effects of this change need to be assessed. Using the similar estimated parameter of world price transmission to wholesale price as shown in Equation 12 (Appendix 3.20), and other estimated parameters of wholesale price transmission to producer price, demand elasticity and supply elasticity mentioned earlier, and other given variables at the base year such as world price, exchange rate, producer price, wholesale price, quantity demanded and quantity supplied, the results are shown in Table 3.13.

Table 3.13 Social welfare effects of world price increase on maize.

Item		
Policy Scenario:		
World price 1996 (US$/ton)	Data	174.9
World price change	Data	4.00
World price 1997 (US$/ton)	Calculated	181.9
World price 1996 (Rp/kg)	Calculated	417.1
World price 1997 (Rp/kg)	Calculated	433.8
Wholesale price at to (Rp/kg)	Data	491.0
Producer price at to (Rp/kg)	Data	411.8
Supply quantity at to ('000 t)	Data	9,307.4
Import quantity at to ('000 t)	Data	616.9
Demand quantity at to ('000 t)	Calculated	9,924.3
Demand elasticity	Regression	-0.813449
Supply elasticity	Regression	0.4762
Price transmission elasticity of PCIF to PWS	Regression	0.9122
Price transmission elasticity of PWS to PF	Regression	0.9567
Effects of increased world price:		
Effect on wholesale price (%)	%dPW x Ew	0.0365
Change in wholesale price (Rp/kg)	%dPWS x PWSo	17.92
Wholesale price at t1 (Rp/kg)	PWSo + dPWS	508.9
Effect on producer price (%)	%dPWS x Ep	0.0349
Change in producer price (Rp/kg)	%dPF x Pfo	14.37
Producer price at t1 (Rp/kg)	PFo + dPF	426.2
Effect on demand (%)	%dPWS x Ed	-0.0297
Change in demand quantity ('000 t)	%dQd x Qdo	-2.95
Demand quantity at t1 ('000 t)	Qdo + dQd	9,921.4
Effect on supply (%)	dPF x Es	0.0166
Change in supply quantity ('000 t)	%dQs x Qso	1.55
Supply quantity at t1 ('000 t)	Qso + dQs	9,308.9
Import quantity at t1 ('000 t)	Qd1 – Qs1	612.4
Effect on import quantity ('000 t)	Qm1 – Qmo	-4.49
Effect on consumer surplus (Rp million)	dPWS x (Qd1 - dQd/2)	-177,773.5
Effect on producer surplus (Rp million)	dPF x (Qs1 + dQs/2)	133,801.2
Effect on net surplus (Rp million)	dCS + dPS + dGR	-43,972.3

Source: Calculated (See Appendix 3.21 for details).

LPWSM = -6.50978 + 0.985488LPCIFM (Equation 12)
(4.28) (7.91)

Adj. R2 = 0.8486; DW = 2.624; n = 11 year (1986-1996)

where:

LPWSM = Log wholesale price of maize

LPCIFM = Log world price of maize in domestic currency
Figures in parentheses are t-ratios.

From Equation 12 a 1% increase in the world price would increase the wholesale price by 0.985488%. This indicates that the world price change was almost entirely transmitted to the wholesale price. A 4% increase in the world price would cause a 3.65% increase in the wholesale price. As shown in Table 3.13, this change equals Rp 17.92 per kg. The other result would be an increase in the producer price by 3.49% or Rp 14.37. The subsequent effects would be a decrease in the quantity demanded by 2.97% or 2,950 tons and a lower increase in the quantity supplied by 1.66% or 1,550 tons. The final results would be a decrease in quantity imported by 4,490 tons and consumer surplus by 177.8 billion rupiah, an increase in producer surplus by 133.8 billion rupiah, thus reducing the net surplus by 44.0 billion rupiah. In sum, the increase in the world price of maize would squeeze the social welfare.

3.4 Cassava

3.4.1 Area, production and yield

The production of cassava fluctuated slightly during the period of 1969-1998. According to the shape of the production curve (Figure 3.13), the production period may be divided into four segments, namely, 1969-1972, 1973-1982, 1983-1989 and 1990-1998. From the data in Table 3.14, the average production growth rate during these respective periods was estimated at -1.62%, 1.23%, 4.34% and 4.74% per annum. The growth rate was negative in the first period, but continuously increased in the following three periods. The highest production growth rate was achieved in the last period, suggesting that Indonesia not just sustained but accelerated production growth. However, the overall average production growth rate during the whole period of 1969-1998 was low at 1.32% per annum.

The sources of production growth were harvested area and yield growth. According to the shape of the harvested area curve (Figure 3.13), the period may be divided into two segments, namely, 1969-1984 and 1985-1998. Table 3.13 shows that the harvested area growth rate during the respective periods was –0.43% and 0.17% per annum. The overall harvested area growth rate in the whole period of 1969-1998 was –0.51% per annum. It may be concluded that cassava harvested area over the 30 years was almost unchanged.

The yield growth rate in the period of 1969-1998 was very slow, namely 1.82% per annum (Figure 3.14). There have been about 476 cassava cultivars, some of which are planted by farmers, namely, *Adira-1*, *Adira-2*, *K. Merah*, *Gading*, *Manalagi* and *Ambon* (CRIFC 1989, cited by Pakpahan et al. 1992). However, not all fresh products of these cultivars are palatable, which depends on the HCN content. It is obvious that the government has almost never launched a development program for cassava. Since yield levels are very low, introduction of improved varieties of 20-30 tons yield would be a favorable option in the future development.

By comparing the overall growth rate of yield with that of harvested area in the same period of 1969-1998, it is clear that production growth of cassava was heavily dependent upon yield improvement, despite the slow improvement in yield level discussed above. This slow yield improvement stemmed from (i) unavailability of improved cassava varieties, (ii) the use of traditional production technology (limited fertilizer use) and the fact that (iii) most land allocated to cassava is dry land with very marginal fertility.

Some important characteristics of cassava may be spelled out as follows (Pakpahan et al. 1992). First, it is cultivable in a wide range of soil and climatic conditions and quality of management practices in addition to its resistance to pests and diseases. This flexible nature of production facilitates production increases in the absence of technological advances. Increased market demand can be easily satisfied by producing more. Second, it can be used as raw material for producing various product alternatives. The broad spectrum of product alternatives

means that cassava is a prospective to develop. Third, the product is bulky and perishable, especially the fresh cassava root. This characteristic has adverse effects on the development of this commodity, since transportation and handling costs are high. Last, its yield is very high and heavy because of high moisture content.

Figure 3.13 Production and harvested area of cassava, 1969-1998.

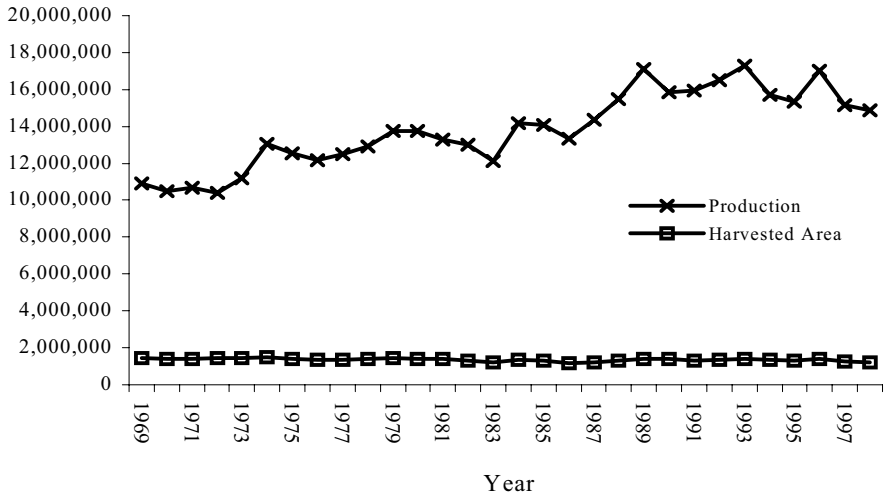
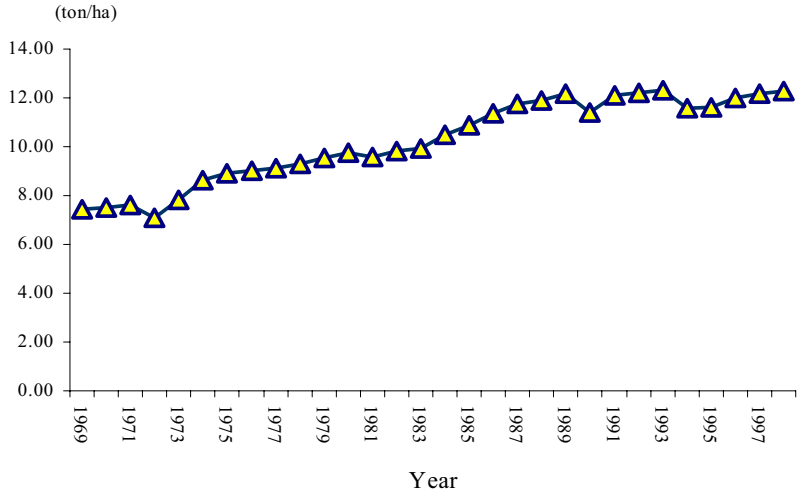


Figure 3.14 Yield of cassava, 1969-1998.



Source: Table 3.14.

Table 3.14 Harvested area, production and yield of cassava, 1969-1998.

Year	Harv. Area (ha)	Production* (ton)	Yield* (ton/ha)	Growth (%) Area	Product.	Yield
1969	1,467,146	10,916,529	7.441			
1970	1,398,070	10,478,308	7.495	-4.7	-4.0	0.7
1971	1,406,093	10,689,691	7.602	0.6	2.0	1.4
1972	1,468,412	10,384,952	7.072	4.4	-2.9	-7.0
1973	1,428,813	11,185,592	7.829	-2.7	7.7	10.7
1974	1,509,440	13,030,674	8.633	5.6	16.5	10.3
1975	1,410,025	12,545,544	8.897	-6.6	-3.7	3.1
1976	1,351,289	12,190,728	9.022	-4.2	-2.8	1.4
1977	1,367,535	12,487,664	9.132	1.2	2.4	1.2
1978	1,386,246	12,902,011	9.307	1.4	3.3	1.9
1979	1,441,748	13,750,767	9.538	4.0	6.6	2.5
1980	1,413,328	13,773,778	9.746	-2.0	0.2	2.2
1981	1,390,461	13,300,911	9.566	-1.6	-3.4	-1.8
1982	1,322,305	12,987,891	9.822	-4.9	-2.4	2.7
1983	1,219,066	12,102,733	9.928	-7.8	-6.8	1.1
1984	1,350,448	14,167,090	10.491	10.8	17.1	5.7
1985	1,291,835	14,057,027	10.881	-4.3	-0.8	3.7
1986	1,169,886	13,312,119	11.379	-9.4	-5.3	4.6
1987	1,222,151	14,356,336	11.747	4.5	7.8	3.2
1988	1,302,581	15,471,111	11.877	6.6	7.8	1.1
1989	1,407,880	17,117,249	12.158	8.1	10.6	2.4
1990	1,386,482	15,829,635	11.417	-1.5	-7.5	-6.1
1991	1,319,093	15,954,467	12.095	-4.9	0.8	5.9
1992	1,351,324	16,515,855	12.222	2.4	3.5	1.0
1993	1,401,640	17,285,385	12.332	3.7	4.7	0.9
1994	1,356,580	15,729,232	11.595	-3.2	-9.0	-6.0
1995	1,319,627	15,321,062	11.610	-2.7	-2.6	0.1
1996	1,415,101	17,002,455	12.015	7.2	11.0	3.5
1997	1,243,366	15,134,021	12.172	-12.1	-11.0	1.3
1998	1,211,871	14,888,793	12.286	-2.5	-1.6	0.9

Source: Indonesia Statistical Yearbook (CBS, various issues).
Note: * Fresh root.

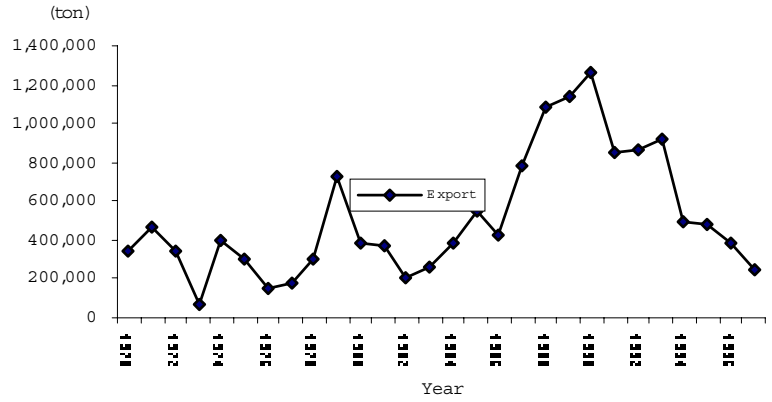
The spatial distribution of cassava production in the period of 1969-1998 showed that since the early years, Java has consistently been the main producing region. In 1969, the production share of Java was 75.59% of the national total. East Java, Central Java and West Java, in particular, contributed respectively 30.87%, 22.01% and 20.09% or 72.97% in total. The remaining of 27.03% was shared by East Nusa Tenggara (3.96%), South Sulawesi (3.13%), Lampung (2.71%), Yogyakarta (2.36%) and others (14.87%). By the end of the period (1998), the production share of these provinces had changed. The production shares of East Java, Central Java and West Java, respectively, declined to 20.77%, 21.25% and 11.54%, while East Nusa Tenggara, South Sulawesi, Lampung and Yogyakarta, respectively, increased to 5.07%, 3.23 %, 15.41% and 3.12%. The total share of the three main producing provinces on Java accounted for 53.56%, implying that the role of these provinces has decreased. The four other provinces, on the other hand, became increasingly important, even though their total production share is still relatively low. It is noted that Lampung became the third most important province, replacing West Java's position since 1992.

The decreased production share of Java may be attributed mainly to rapid land conversion to non-agricultural use as a consequence of expansion of factory sites, roads, settlements and other uses, which mainly use marginal dry-lands. The increased production of cassava in other provinces, particularly those off Java, on the contrary, may be attributed to more available dry-land for cultivation. In Lampung, in particular, the wide area of imperata land has fostered the production of cassava in this province. Expansion of transmigration projects has made another contribution to cassava production.

3.4.2 Exports and imports

During 1969-1997, export quantities were substantial, while imports were nil, also Indonesia is a net exporter of cassava. However, the export quantities fluctuated throughout the period. As summarized in Figure 3.15, during 1970-1972 the export quantity was quite large ranging from 344,513 tons to 459,834 tons, but this was followed by a sharp drop to only 75,380 tons in 1973. In the subsequent period of 1974-1987, the export quantity went up and down intermittently and eventually reached 0.78 million tons at the end of the period. In the following three years (1988-1990), it jumped up to around 1.09-1.27 million tons. This was the best performance of Indonesia's cassava export during the 1969-1998 period. In the remaining years (1991-1997), exports tended to decline eventually reaching 243,469 tons only. The declining export quantity in the 1991-1997 period may be attributed to a slight decline in production and an increase in domestic use.

Figure 3.15 Export volume of cassava, 1970-1997.



Source: Table 3.14.

The main cassava export product has been cassava chips (dried-sliced manioc). Although with smaller export quantities, pellet and tapioca may be regarded as other important products. The major country destinations were as Republic of Korea, China, Germany, Italy, Sweden and other West Europe for cassava chips; Germany and Netherlands for cassava pellets; Japan for tapioca; and Malaysia and China for other cassava product (Hadi 1998).

Table 3.15 Export and import volume of cassava chips, 1970-1997.

Year	Cassava (chip)		Year	Cassava (chip)	
	Export	Import		Export	Import
1970	334,227	0	1984	93,552	0
1971	458,963	0	1985	244,529	0
1972	343,402	0	1986	204,968	0
1973	74,830	0	1987	451,434	0
1974	393,517	0	1988	583,913	0
1975	302,461	0	1989	833,851	0
1976	148,582	0	1990	697,329	0
1977	183,202	0	1991	492,508	0
1978	307,792	0	1992	368,869	0
1979	709,644	0	1993	516,585	0
1980	386,053	0	1994	280,349	0
1981	71,909	0	1995	426,894	0
1982	43,025	0	1996	290,039	0
1983	58,485	0	1997	184,154	0

Source: FAO Trade Year Book (various issues).

3.4.3 Production, marketing and trade-related policies

There have been no prominent government policies related to cassava production, except the use of land for cassava cultivation. Land with a steep slope is not suggested for cassava farming because serious land erosion, degradation and siltation could emerge. However, this policy has not been put as an official regulation with specified punishments for offenders.

The more distinct policies (regulations) are related to cassava marketing and trade. In domestic marketing, business associations such as ASPEMTI and ATTI are expected to take part in dealing with improvement of the inefficient cassava marketing system. Mutual agreements between these associations and the government resulted in the enactment of the following regulations (Pakpahan et al. 1992). First, ASPEMTI ensures the procurement of *gaplek* (dried and sliced manioc) at the minimum price of 70% of the current FOB price at the exporter level. Second, ATTI buys cassava from farmers at a price of 13.6% of the current tapioca price. In addition, there were other regulations to encourage cassava exports to European markets as expressed in the decree of former Minister of Trade No.224/K/VII/89 dated August 29, 1989. There were quick and positive responses of businessmen, reflected in a remarkable increase in the number of cassava exporters that seemed to resemble a kind of conglomeration so as to capture the larger export market from export quota.

In the trade case, there have been two distinct government policies, namely, export quota and import tariff. The export quota applied only for export to the European markets. This policy was aimed at preventing the world market from cassava over supply that could squeeze world prices. During 1982-1988, for instance, the annual quota applied to Indonesia increased from 500,000 tons in 1982 to 750,000 tons in 1983-1984 and eventually to 825,000 tons in 1985-1988 (CBS cited by Pakpahan et al. 1992). It seems that this latest quota has remained unchanged in the following years and has never been satisfied up until 1987. Thailand, on the other hand, was able to make up 50% of Indonesia's quota. This enabled Indonesia to import Thai cassava and re-export it to meet the quota. During 1988-1993, Indonesia's export exceeded the quota, after which export was always far below the quota.

The import tariff was imposed on various cassava products through Policy Packages as for the previous commodities. The tariff rates were dependent upon the specific cassava product. As shown in Appendix 3.22, the highest tariff rate was imposed on primary products such as dried-sliced cassava (*gaplek*), pellets and others, namely 30%, while the lowest rate was imposed on manioc starch, at 5%. Figures for flours/meal and manioc were, respectively, 20% and 10%.

It should also be noted that all the tariff rates remained unchanged over a long period. All the policy packages did not change the tariff rates up until 1994. In that year, only pellets and other primary products experienced declining tariff rates, from 30 to 25% in 1994 and then again to 20% in 1995. The tariff rates of the remaining products, on the other hand, declined in 1995, from 30 to 25% for dried-sliced manioc, from 20 to 15% for flour/meal products, and from 10 to 5% for manioc. The tariff rates of manioc starch remained unchanged over the whole period.

3.4.4 Effects of trade liberalization

As indicated earlier, Indonesia only exports cassava products, of which dried and sliced manioc have been the major ones. Despite the declining tariffs on particular products, import has occurred. In this sense, analysis of the impacts of tariff reduction is not relevant. Therefore, analysis of the impact of trade liberalization will be more meaningful by assessing the impact of increased world price of cassava on domestic cassava. The likely reason for this analysis is that trade liberalization would expand the world trade volume, because import by less competitive developed as well as developing countries would increase and that, in turn, would drive up the world price. It is assumed that the world price would increase somewhat more rapidly than in the grain case (4% per annum), namely 6% per annum. In the following analysis, therefore, impacts of a 6% increase in the world price are assessed.

To facilitate the assessment of the effects of the world price increase on the social welfare, a number of regression analyses were carried out to estimate: (i) the price transmission elasticity of the world price to wholesale price; (ii) the price transmission elasticity of wholesale price to producer price; (iii) the demand elasticity; and (iv) the supply elasticity.

The estimated transmission elasticity of world price (in domestic currency) to wholesale price, as shown in Equation 13 (Appendix 3.22) was sufficiently low at 0.47311. A 1% increase in world price (Jakarta FOB) only increased the wholesale price 0.47311%. A 6% increase in the world price would increase the wholesale price by 3.62% only, by Rp 10.49 per kg (Table 3.16). Apparently, there is a market force that prevents perfect price transmission from world to domestic markets.

LPWSC = - 0.671968 + 0.473110LPFOBC (Equation 13)
(0.49) (4.16)
Adj. R2 = 0.597; DW = 1.680; n = 11 year (1986-1996).

where:

LPWSC = Log wholesale price of cassava (cried and sliced manioc) in Jakarta, Surabaya and Bandar Lampung
LPFOBC = Log Jakarta FOB price of cassava (dried and sliced manioc)
Figures in parentheses are t-ratios.

The estimated price transmission elasticity of the wholesale price to producer price was 1.195 as indicated in Equation 14 (Appendix 3.24), meaning that a 1% increase in the wholesale price would increase the producer price by 1.195%. A 6% increase in the world price would eventually increase the producer price by 5.40%, by Rp 10.35 per kg (Table 3.16).

LPFC = -1.118488 + 1.195390LPWSC (Equation 14)
(096) (5.20)
Adj. R2 = 0.7027; DW = 2.042; n = 11 year (1986-1996)

where:

LPFC = Log farmgate price of cassava (dried and sliced manioc) in East Java, Central Java and Lampung provinces.
LPWSC = Log wholesale price of cassava (dried and sliced manioc) in Jakarta, Surabaya, Semarang and Bandar Lampung
Figures in parentheses are t-ratios.

The estimated demand elasticity with respect to wholesale price, as shown in Equation 15 was –0.014849. Meanwhile, the estimated supply elasticity with respect to producer price shown in Equation 16 was 0.129971. These two estimates indicate that domestic demand for and supply of cassava were almost perfectly inelastic. A 6% increase in world price would eventually decrease the quantity demanded by 0.07% or 11,150 tons. In contrast, the similar percentage increase in world price would eventually increase the quantity supplied by 0.70% or 119,420 tons. These changes would generate a potential increase for export by around 130,570 tons.

A similar change in the world price, as shown in Table 3.14, would reduce the consumer surplus by Rp 174.214 billion and increase the producer surplus by Rp 176.570 billion. The net surplus would increase by approximately Rp 2.356 billion. In conclusion, increased world price of cassava would eventually slightly improve the social welfare.

LQDC = 16.251817 – 0.014849LPPWSC + 0.080400LYCR (Equation 15)
(12.06) (0.13) (1.11)
Adj.R2 = 0.15; DW= 1.497; n= 11 year (1986-1996)

where:

LQDC = Log-quantity demanded for cassava
LQPWSC = Log-wholesale price of cassava
CYCR = Log-real national income per capita

Table 3.16 Social welfare effect of increased world price on cassava.

Commodity:	Cassava		
Policy Scenario	World Price Increase		
World price 1996 (US$/ton)	Pwo	Data	123.3
World market price Change	%PW	Given	6.00
World price 1997 (US$/ton)	PW1	Calculated	130.7
Exchange rate 1996 (Rp/US$)	ER	Data	2385
World price 1996 (Rp/kg)	PFOBo	Calculated	294.1
World price 1997 (Rp/kg)	PFOB1	Calculated	311.7
Wholesale price at 1996 (Rp/kg)	PWSo	Data	232.0
Producer price at to (Rp/kg)	PF0	Data	191.5
Supply quantity at 1996 ('000 t)	Qso	Data	17,002.5
Export quantity at 1996 ('000 t)	Qxo	Data	386.1
Demand quantity at to ('000 t)	Qdo	Calculated	16,616.4
Demand elasticity	Ed	Regression	-0.01485
Supply elasticity	Es	Regression	0.12997
Price transmission of PFOB to PWS	Ew	Regression	0.75345
Price transmission elasticity of PWS to PF	Ep	Regression	1.19539
Effects of increased world price:			
Change in wholesale price (%)	%dPWS	%dPW x Ew	4.521
Change in wholesale price (Rp/kg)	dPWS	%dPWS x PWSo/100	10.49
Wholesale price at 1997 (Rp/kg)	PWS1	PWSo + dPWS	242.49
Effect on producer price (%)	%dPF	%dPWS x Ep	5.404
Change in producer price (Rp/kg)	dPF	%dPF x PF0/100	10.35
Producer price at 1997 (Rp/kg)	PF1	PF0 + dPF	201.85
Effect on demand quantity (%)	%dQd	%dPWS x Ed	-0.07
Change in demand quantity ('000 t)	dQd	%dQd x Qdo/100	-11.15
Demand quantity at 1997 ('000 t)	Qd1	Qdo + dQd	16,605.25
Effect on supply (%)	%dQs	dPF x Es	0.70
Change in supply quantity ('000 t)	dQs	%dQs x Qso/100	119.42
Supply quantity at 1997 ('000 t)	Qs1	Qso + dQs	17,121.92
Export quantity at 1997 ('000 t)	Qx1	Qs1 - Qd1	516.67
Effect on export quantity ('000 t)	dQx	Qx1 - Qxo	130.57
Effect on consumer surplus (Rp million)	dCS	dPWS x (Qd1 - dQd/2)	-174,214.01
Effect on producer surplus (Rp million)	dPS	dPF x (Qs1 + dQs/2)	176,570.29
Effect on net surplus (Rp million)	dNS	dCS + dPS + dGR	2,356.28

Source: Calculated (see Appendix 3.23 for details).

LQSC = 9.025273 + 0.129971LLPFC (Equation 16)
(24.12) (1.71)
Adj.R2 = 0.162; DW= 0.955; n= 11 year (1986-1996)

where:

LQSC = Log-quantity supplied for cassava
LLPFC = Log-1-year lagged farmgate price of cassava
Figures in patterns are t-ratios.

3.5 Potato

3.5.1 Area, production and yield

Production of potato in Indonesia has grown steadily during the last two decades. Total production increased from 230 thousand tons in 1980 to 1.1 million tons in 1996, at an average rate of 10.3% per annum over the period (Table 3.17 and Figure 3.16). Although long-term

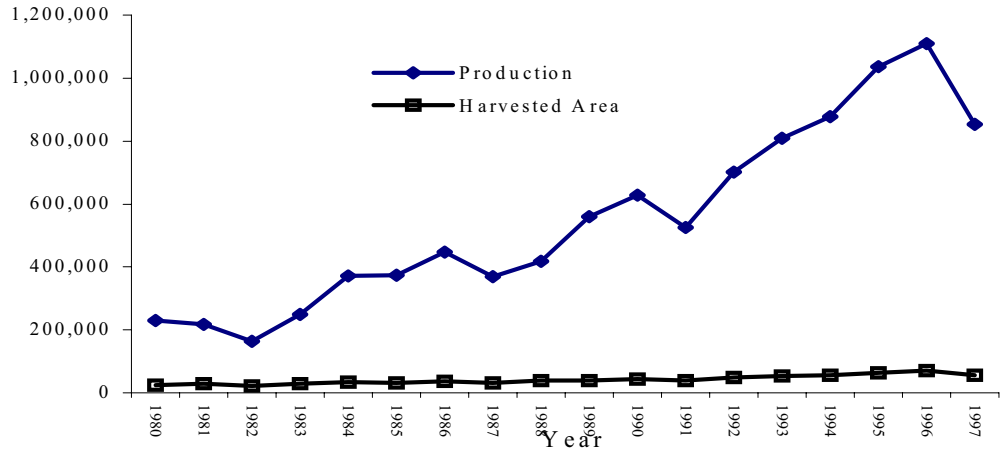
production and consumption indicated positive trends, fluctuation has been experienced over the last ten years. The increase in production is mainly attributable to a steady increase in yield from 9.4 tons per ha in 1980 to 15-16 tons per ha in 1996-1997 (Figure 3.17). Yield of potato has fluctuated somewhat for a number of reasons, and there are indications that yield of potato in major highland production areas has been declining. Factors leading to reduced yields in highland areas are, among others, the use of degenerated and infested seed, occurrence of pest and disease complexes, and decreasing soil fertility. Erosion has been frequently noticed in most highland areas.

Table 3.17 Harvested area, production and yield of potatoes, 1969-1998.

Year	Harv. Area (ha)	Production (ton)	Yield (ton/ha)	Growth (%) Harv. Area	Production	Yield
1980	24,423	230,377	9.433			
1981	30,314	216,713	7.149	24.1	-5.9	-24.2
1982	20,996	164,801	7.849	-30.7	-24.0	9.8
1983	30,305	249,986	8.249	44.3	51.7	5.1
1984	33,030	371,546	11.249	9.0	48.6	36.4
1985	32,350	372,825	11.525	-2.1	0.3	2.5
1986	37,165	446,295	12.008	14.9	19.7	4.2
1987	32,019	368,961	11.523	-13.8	-17.3	-4.0
1988	38,983	418,154	10.727	21.7	13.3	-6.9
1989	39,228	559,396	14.260	0.6	33.8	32.9
1990	44,930	628,727	13.993	14.5	12.4	-1.9
1991	38,281	525,929	13.739	-14.8	-16.4	-1.8
1992	48,852	702,584	14.382	27.6	33.6	4.7
1993	54,123	809,457	14.956	10.8	15.2	4.0
1994	56,057	877,146	15.647	3.6	8.4	4.6
1995	62,388	1,035,259	16.594	11.3	18.0	6.0
1996	69,946	1,109,560	15.863	12.1	7.2	-4.4
1997	56,141	853,878	15.210	-19.7	-23.0	-4.1

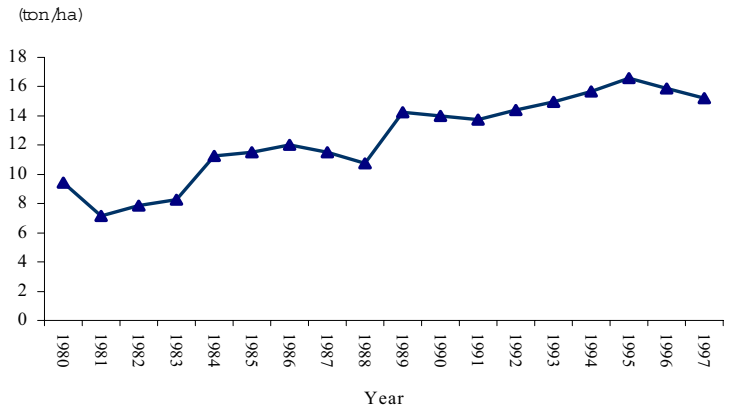
Source: Indonesia Statistical Yearbook (CBS, various issues).

Figure 3.16 Production and harvested area of potato, 1980-1997.



Source: Table 3.17.

Figure 3.17 Yield of potato, 1980-1997.



Source: Table 3.17.

Java and Sumatra have been the major producing regions accounting for 70% and 20% of total production. The major highland potato producing province has been West Java. In 1995, West Java accounted for 30% of total harvested area and 25% of production. The share of West Java has been declining due to increasing shares of other provinces. The share of Central Java in production increased over 1980-1996 because of rapidly expanding production of the Dieng Plateau. Another significant increase in production share has occurred for North Sumatra. The production share of East Java has been slowly increasing.

Potato has been cultivated commercially in Indonesia since before the 1970s, initially in a few selected areas in West and East Java. It spread over time to other highland areas and to medium altitude areas. At present, potato is grown mainly in highland areas and in few medium altitude areas. A widely used variety is Granola. The average yield of potato remains low compared to its potential. The actual yield of highland potato ranged from 12 to 16 tons but fluctuated year by year. Meanwhile, the yield of medium altitude potato was much lower, ranging from 3 to 5 tons. The highest and most stable yields occurred in West Java and North Sumatra. Yields of highland potato in North Sumatra ranged from 12 to 18 tons with an average of 14 tons over the period of 1985-95. The yield of West Java fluctuated during the period; the highest was 16 tons in 1987, while the lowest, 11 tons, was obtained in 1993.

The highland potato production system is both labor and capital intensive. It is characterized by heavy application of fertilizers (500-1000 kg of TSP and urea, 20-35 ton of manure) and pesticides (50-70 kg per hectare). The system is labor intensive and requires 400-450 man-days per hectare of cultivation. The use of seed ranges from 600 to 1000 kg per hectare. Highland potato is usually cultivated as a monocrop, but sometimes in rotation with cabbage as is found in Pangalengan, Dieng Plateau, and Malang. Potato is also cultivated in a more diverse highland production system, where other vegetable crops such as tomato, cabbage, and onions are of equal importance.

Potato is grown throughout the year. The crop growth period is very short, approximately 60-70 days, which opens a window of opportunity for farmers to use the crop in existing palawija and vegetable-based cropping systems. Farmers usually plant potato in October/November and harvest in December/January. In December/January 1983 there was a harvest failure due to drought and consequently the potato price was very high at that particular time. This high price stimulated farmers to expand their area of production in the following

year. The direct consequence was that the price of potato dropped in 1985 to only a half of the price level in 1993.

For the last two decades, Granola has been a dominant variety used by farmers. Farmers can easily get the seeds (Fo) of this variety from local stores. Up to present, seeds of potato are imported mainly from Germany and Holland. These seeds are frequently used for 5-6 planting times. Right after harvest, farmers save some of the product and conduct a selection to obtain the seeds to be used in the following planting season. The seeds are more expensive, almost double, the cost of regular potato. In 1995/96, the price of seed of Granola variety ranged from Rp 3,500 to Rp 4,000 per kg. Until the sixth planting, farmers calculate that the cost for seed ranges from Rp 5 to 8 per kg of harvested potato (Adiyoga et al. 1996).

Another variety which is mainly grown to supply PT Indofood is Atlantic. This variety is imported from Australia or USA and distributed solely by PT Indofood. The demand for this processing potato is quite high. However, farmers' experience shows that growing this variety is not as profitable as growing Granola, since its yield drastically drops after the 3rd planting (Adiyoga et al. 1996). They calculated that after the 3rd planting, the seed cost ranges between Rp 100 and Rp 125 per kg. Thus, although the selling price of Atlantic is much higher than Granola, farmers prefer to grow the latter variety.

Some large farmers diversify their business not only as potato producers for consumption, but also as seed growers. There are at least five seed growers in Pangalengan, West Java, who sell their products to other potato producing regions in Java, Sumatra and South Sulawesi. About 60% of potato seed needed in Java is supplied by Pangalengan. The unit price of seed locally produced ranges between Rp 1,200 and Rp 2,000 per kg.

3.5.2 Exports and imports

Indonesia is a net exporter of potatoes. During the 1980-1997 period, export of potato increased from 365 tons to 36,758 tons, at an average rate of 31% per annum (Table 3.18 and Figure 3.18). The principal destination countries of potato export are Malaysia and Singapore.

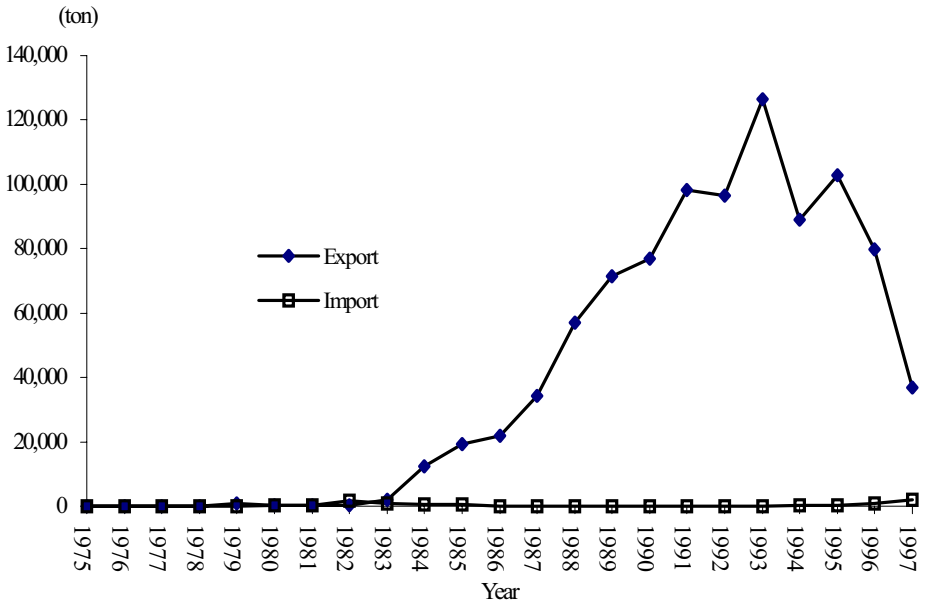
Potato is imported in the form of seeds, fresh or chilled and frozen. During the 1988-1997 period, import of potato increased from 18.9 tons to 2,035 tons, at an average annual rate of 68%. The principal countries of origin of imported potato are Australia, USA and Netherlands for potato seeds; Australia and Netherlands for fresh/chilled potato; and USA for frozen potato.

Table 3.18 Export and import volume of potato, 1980-1997 (tons).

Year	Export	Import	Year	Export	Import
1980	365.0	226.0	1989	71,350.0	25.0
1981	285.2	416.7	1990	76,774.7	5.0
1982	150.3	1,600.5	1991	98,176.9	69.3
1983	1,892.5	856.5	1992	96,469.9	113.6
1984	12,295.2	624.8	1993	126,584.2	38.6
1985	19,288.3	603.0	1994	88,924.7	332.1
1986	21,872.2	65.7	1995	102,940.5	308.0
1987	34,297.2	2.1	1996	79,681.4	894.4
1988	57,044.8	18.9	1997	36,758.2	2,035.4

Source: Trade Statistics (CBS, various issues).

Figure 3.18 Export and import volume of potato, 1980-1997.



Source: Table 3.18.

3.5.3 Production, marketing, and trade-related policies

Unlike other food commodities, government policies on production, marketing and trade have been very limited. On the production side, as potato is not considered a main staple, there have been limited production programs on potato undertaken by both national and provincial governments. Since 1995, the government has launched a production credit scheme for potato. The implementing bank, Bank Rakyat Indonesia (BRI), which is responsible for distributing the credit through Rural Cooperatives (KUD). Farmer group membership is required to obtain the credit. The amount of credit when initially launched in 1995 was Rp 2.5 million per ha. Evidence indicates that only large and well-educated farmers had much access to this credit. Some farmers were concerned that the amount of credit was too small, only about one-third of the real production cost.

Seed is known as one of the main cost components in growing potatoes, and the quality of seed will directly affect the yield. In order to obtain good quality seed at reasonable prices, the provincial government of West Java supported by a JICA grant has established a potato seed project, which involves a number of related agencies: (i) the Research Institute for Vegetables, Lembang, (ii) the Seed Control and Certification Service, (iii) the Office of Agricultural Service of West Java Province, and (iv) a food and beverage company owned by the provincial government. The Research Institute of Vegetables, Lembang, is responsible for producing and sending potato plantlets Go (pathogen-free material) to the Pangalengan Center Seed Farm, which will multiply them and produce G1 and G2. The G2 is then distributed to PD. Mamin, which is responsible for producing G3. Through the Center of Rural Cooperative Unit, the G3 is sold to certified growers who produce G4. Finally, this G4 is bought back by Center of Rural Cooperative Unit and then distributed to farmers.

Government intervention in potato trade is also limited to tariff regulation on some potato products. As shown in Appendix 3.27, import tariffs for potato-related products are 5-

30%. No import tariff was implemented for seeds. This is in line with the government intention of encouraging domestic potato production. It can also be seen that the government has been implementing relatively low tariff rates for raw materials and high tariffs for processed products. Since the deregulation package of May 1995, the rate has been reduced to 5-20%, with the highest rates for processed products.

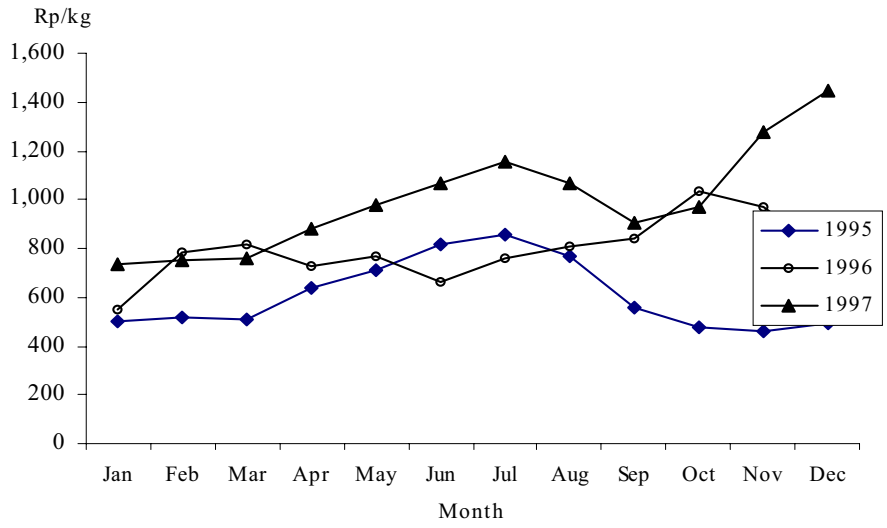
3.5.4 Effects of trade liberalization

Except for tariff regulations, potato trade and marketing have long been liberalized. Moreover, potato-related products, which have been tariffied are of little importance, since they are not widely used in production and are relatively small in import volume. In addition, domestically-produced potatoes are not perfect substitutes for the imported ones. Therefore, any policy for liberalizing the potato trade will be expected to have limited effect not only on potato industries but also little on the economy. The following presents an analysis on the effects of trade liberalization (not necessarily on potato trade) on export, import, domestic prices and social welfare.

Price is a good indicator to see whether the market is performing well or not. The domestic price of a commodity is a function of the level of world prices and exchange rates. In the situation where trade is liberalized, any shock in the world price will be transmitted to the domestic market. Similarly, any shock on the domestic currency against the currencies of the main trading partners will also affect domestic market prices. This situation has been more or less occurring in the potato market in Indonesia. As shown in Figure 3.19, the domestic retail price of potato has been unstable. Price is determined by the market, with almost no intervention from the government.

Effects of the Deregulation Package of June 1996 on potato trade are examined here. As shown in Appendix 3.27, the government has reduced import tariff of potatoes from 22% to 17%. To calculate the impact of this deregulation on consumers, some base level data (1996) are needed, namely prices, quantity of import, and domestic production.

Figure 3.19 Monthly retail price of potato in Jakarta, 1995-1997.



Source: BULOG (various issues)

Wholesale and producer prices of potato in 1996 were Rp 868 and Rp 762 per kg, respectively, while the quantity of potato import was 2.1 thousand tons. Equation 15 shows that

the estimated price elasticity of demand for potato is -0.1142 (Appendix 3.28). Meanwhile, as shown in Equation 16, the estimated supply elasticity is 0.8652 (Appendix 3.29). Total domestic potato production in 1996 was 1,035 thousand tons. The estimated price transmission elasticity from wholesale to producer was 1.0208 (Equation 17 and Appendix 3.30).

LQDP = 14.623621 – 0.114171LPWSS + 0.498203LYCR (Equation 15)
(1.85) (0.18) (0.94)
Adj.R2 = 0.5433; DW = 1.436; n = 11 year (1986-1996)

where:
LQDP = Log quantity demanded for potatoes
LPWSP = Log wholesale price of potatoes
LYCR = Log national real Income per capita
Figures in parentheses are t-ratios.

LQSP = 1.375915 + 0.865267LLPFP (Equation 16)
(1.41) (5.21)

Adj.R2 = 0.7231; DW = 2.060; n = 11 year (1986-1996)

where:
LQSP = Log quantity supplied of potatoes
LLPFP = Log 1-year lagged farmgate price of potatoes
Figures in parentheses are t-ratios.

LPFP = -0.267279 + 1.020793LPWSP (Equation 17)
(1.62) (37.67)
Adj.R2 = 0.9923; DW = 2.608; n = 11 year (1986-1996)

where:
LPFP = Log farmgate price of potatoes
LPWSP = Log wholesale price of potatoes
Figures in parentheses are t-ratios.

Using the tariff transmission elasticity of 0.75, the decrease in the domestic wholesale price would increase the demand for potato by 4,400 tons or 0.43% higher than the base year level (Table 3.19). In contrast, the supply of potato would decline by –3.31% (-34,300 tons), from 1,035 thousand tons to 1,001 thousand tons in response to the drop in producer price of potato. The import quantity would increase by around 38,700 tons, from 2,100 tons to 40,800 tons. As a result, the net welfare gains from tariff removal would be around Rp 9.7 billion. This is attributable to consumer surplus gain amounting to Rp 33.8 billion net to the producer and the government surplus losses of Rp 29.7 billion and Rp 2.9 billion, respectively. More details on the data and calculations of the social welfare effect of potato trade liberalization are presented in Appendix 3.31.

Table 3.19 Social welfare effects of tariff reduction on potatoes, 1996.

Item			
Initial tariff rate (%)	22		
New tariff rate (%)	17		
Tariff change	-5		
Wholesale price at to (Rp/kg)	868		
Producer price at to (Rp/kg)	762		
Supply quantity at to ('000 t)	1,035.26		
Import quantity at to ('000 t)	2.10		
Demand quantity at to ('000 t)	1,037.36		
Demand elasticity	-0.1142		
Supply elasticity	0.8652		
Price transmission elasticity of PWS to PF	1.0208		
Effects of tariff change:			
Tariff transmission elasticity	0.50	0.75	1.00
Effect on wholesale price (%)	-2.50	-3.75	-5.00
Wholesale price at t1 (Rp/kg)	846.30	835.45	824.60
Effect on producer price (%)	-2.55	-3.83	-5.10
Producer price at t1 (Rp/kg)	742.55	732.83	723.11
Effect on demand (%)	0.29	0.43	0.57
Change in demand quantity ('000 t)	2.96	4.44	5.92
Demand quantity at t1 ('000 t)	1,040.32	1,041.80	1,043.28
Effect on supply (%)	-2.21	-3.31	-4.42
Change in supply quantity ('000 t)	-22.86	-34.29	-45.72
Supply quantity at t1 ('000 t)	1,012.40	1,000.97	989.54
Import quantity at t1 ('000 t)	27.92	40.83	53.74
Effect on import quantity ('000 t)	25.82	38.73	51.64
Effect on consumer surplus (Rp million)	22,542.82	33,838.34	45,149.92
Effect on producer surplus (Rp million)	-19,909.64	-29,697.77	-39,374.77
Effect on government revenue (Rp million)	1,926.15	2,912.83	3,899.51
Effect on net surplus (Rp million)	4,559.34	7,053.40	9,674.66

Source: Calculated (see Appendix 3.31 for details).

4. Farm Level Effects of Trade Liberalization

In Chapter 3, the effects of trade liberalization on production (supply), demand, import, and export of each commodity in question were analyzed. In addition, standard partial welfare analyses were also used to measure the net social welfare effect for any policy change or price shock, that is a net surplus received or loss borne by consumers, producers and the government as a result of trade liberalization. In this chapter analyses are directed to measurement of the effect of such policy changes and price shocks at the farm.

The effect of trade liberalization on farm income is transmitted through a price linkage equation. A reduction of tariff on soybean imports will cause domestic prices of soybean, both at the wholesale and farm level, to decline. The magnitude of this decline in domestic price depends on the magnitude of tariff and price transmission elasticity parameters. These elasticity parameters are, to a considerable extent, affected by marketing system and marketing efficiency. Any change or shock would be fully transmitted if the market were efficient. Once the change and the new price are identified, the farm level effects such as those on yields, inputs, and farm income can be measured.

4.1 Rice

4.1.1 Marketing system and marketing efficiency

As previously mentioned, rice was the first commodity for which the government heavily intervened in the market. Government market intervention is implemented across the country. BULOG is the sole importer and it is responsible for stabilizing the price of rice through market operations. BULOG has been very successful in insulating the domestic market from world market fluctuations. Direct government control in the rice market, through pricing policy (floor and selling price) and its market operation, has made the rice market in Indonesia uniform. Rice marketing in West Java and in Indonesia, in general, is almost entirely in the hands of private traders.

The core objectives of marketing policies in rice are to guarantee proper implementation of rice price policies. In the domestic market, the government through the national logistic agency (*Badan Urusan Logistik*, BULOG), local logistic depot (DOLOG), and village cooperatives called *Koperasi Unit Desa* (KUD) undertake rice procurement. In this sense, KUD buys rice from farmers and then sells it to BULOG. Despite government intervention, wholesalers and private traders in all marketing levels and regions play very important roles. Village traders and rural assembly traders basically play a more important role than KUD. In their procurement operation, KUDs frequently work in collaboration with private traders.

Even though there are some variations in rice marketing channels in West Java, the marketing channels are relatively simple and short, consisting of (i) rural traders including KUDs, (ii) regional and inter-regional traders, (iii) wholesalers, (iv) local logistic depot (DOLOG), and (v) retailers (Figure 4.1). Rural traders assemble a relatively large volume of rice and sell it to central markets. They may either reside at or travel to farms to purchase, transfer, and later sell the produce. Regional traders usually reside outside the production areas, and visit the production area to purchase rice from rural assembly traders and ship it to wholesale and retail markets. The wholesalers are merchants in large cities, who receive rice from rural traders or other traders. They have permanent stalls in urban markets and sell mainly to retailers or secondary wholesalers. Most of the rice they handle is sold on a wholesale basis, but some of them can at the same time act as assemblers or retailers.

The selling price at various marketing channels as depicted in Table 4.1 reveals that in the major marketing channel (private), farmers in West Java received almost 70% of the Jakarta wholesale price. This sufficiently high percentage of producer price stems from government policy specifying the floor price. According to Presidential Instruction Decree No.1/1996, the floor price of husked rice was Rp 450 per kg, which is equivalent to Rp 692 per kg of milled rice. It is noted from Table 4.1 that the selling price ratio of rural assembler to wholesale price was much higher than that to DOLOG/BULOG. This is a reason of why rural traders sell only a very small portion to the national logistic board relative to wholesalers. In fact, the flow of rice from rural assemblers to DOLOG/BULOG took place only during the peak harvest season, when the market price at the producer level is relatively low compared to that in off-season.

Table 4.1 Price of rice at various marketing channels, West Java.

Channels	Price (Rp/kg)	% of PWS[1])
Private :		
- Wholesaler	995	100
- Rural Assembler	850	85.43
- Farmer [2,3]	692	69.58
Public 1: [2]		
- DOLOG/BULOG	na	na
- Rural Assembler	730	73.37
- Farmer[3]	692	69.58
Public 2: [2]		
- DOLOG/BULOG	na	na
- KUD	738	74.17
- Farmer[3]	692	69.58

1) PWS = Wholesale price of rice.
2) Based on President Instruction Decree No. 1/1996.
3) Calculated as: price of husked rice of Rp 450 divided by 0.65.
Na: no available data on selling price of BULOG.

As previously mentioned, the implementation of market operations has successfully stabilized the domestic retail price of rice. This also indicates that BULOG has generally been successful in insulating domestic prices from short-run fluctuations in world market prices. However, empirical evidence indicates that the government frequently has less capacity to undertake domestic procurement to guarantee the announced floor price received by farmers. This is particularly true during the peak harvest season, when farmers frequently receive a farm-gate price of rice well below the announced floor price. Despite this, in general, it is clear that government market operations have played an important role in stabilizing rice prices in Indonesia.

4.1.2 Farm production and profitability

The 1996 structure of production cost and revenue of rice farming in West Java is presented in Table 4.2. The total variable cost was Rp 836,421 per hectare. It is known from the cost structure that rice farming is labor intensive, with a total labor use of 130-140 man-days per season. Of the total variable cost, the labor cost was Rp 472,500, which accounted for more than 56.5%, while the other dominant input was fertilizer, accounting for 17.2%.

The net revenue was Rp 892,119 per ha per season over the total variable cost. This accounted for 51.61% of the gross revenue of Rp 1,728,540. This net revenue was equivalent to 2,703 kg of paddy. In general, as compared to other food crops, rice is a more profitable commodity to produce.

Figure 4.1 Major value chains of rice, West Java.

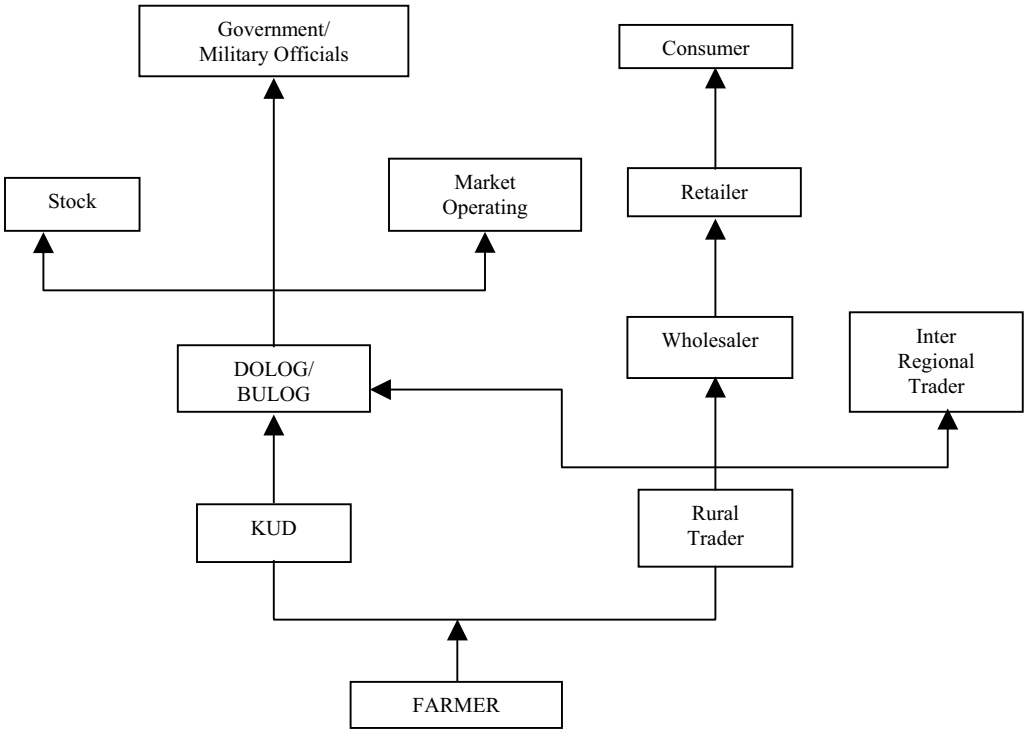


Table 4.2 Cost structure and revenue of rice farming (per hectare), West Java, 1996.

Item	Quantity	Price (Rp)	Value (Rp)	Share (%)	
				Gross-R	Tot-Cost
Gross Revenue	5,238	330	1,728,540	100.00	
Seed	41	696	28,397	1.64	3.40
Fertilizer:					
Urea	214	355	75,970	4.40	9.08
Za	15	375	5,625	0.33	0.67
TSP	98	535	52,430	3.03	6.27
Others	20	481	9,614	0.56	1.15
Pest-Insecticides	8	4,550	35,945	2.08	4.30
Labor	135	3,500	472,500	27.34	56.49
Other Costs					
Rent of Equip/animal			58,319	3.37	6.97
Irrigation fees			13,177	0.76	1.58
Transport cost			18,993	1.10	2.27
Others			16,250	0.94	1.94
Variable Cost			787,220	45.54	94.12
Cost of Capital			49,201	2.85	5.88
Total variable cost			836,421	48.39	100.00
Net Revenue					
Nominal (Rp)			892,119	51.61	
Real (kg paddy)			2,703		

Source: Calculated.

4.1.3 Effects of trade liberalization

The first scenario is the effect of implicit tariff reduction on rice import by 16.46%. This tariff reduction on import would cause domestic prices to decrease. Assuming tariff

transmission elasticity of 0.75, the 16.46% decrease in tariff would be expected to reduce the wholesale price by 12.34%. With the estimated price transmission of the wholesale price (PWS) to producer price (PF) of 1.0198, the farm-gate price would decline by 12.59% (shown earlier). This means that the farm-gate price of paddy (PF) in 1997 would be expected to decline from Rp 330 to Rp 288.5 per kg. The effects of this price decline are presented in Table 4.3 and in Appendix 4.1.

Table 4.3 Effect of implicit tariff reduction by 16.5% on farm income of rice, West Java, 1996.

Item	Base-1996	Tariff Cuts	Change (%)
Gross Revenue	1,728,540	1,487,424	-13.9
Seed	28,397	28,397	0.0
Fertilizer:			
Urea	75,970	71,619	-5.7
Za	5,625	5,303	-5.7
TSP	52,430	49,427	-5.7
Others	9,614	9,063	-5.7
Pest-Insecticides	35,945	35,671	-0.8
Labor	472,500	436,418	-7.6
Other Costs			
Rent of Equip/animal	58,319	58,319	0.0
Irrigation fees	13,177	13,177	0.0
Transport cost	18,993	18,993	0.0
Others	16,250	16,250	0.0
Variable Cost	787,220	742,637	-5.7
Cost of Capital	49,201	46,415	-5.7
Total variable cost	836,421	789,052	-5.7
Net Revenue			
Nominal Value (Rp)	892,119	698,373	-21.7
Real (kg paddy)	2,703	2,425	-10.3

Source: Calculated (see Appendix 4.1 for details).

Due to own and cross-price effects, the 12.59% decline in farm-gate price would discourage the use of inputs such as fertilizer, pesticides and labor respectively by 5.7%, 0.8% and 7.6%, which would subsequently reduce yield by 1.4%. In effect, gross revenue and total variable cost would decrease by 13.9% and by 5.7%. The final result would be a decline in net revenue of 21.7%, from Rp 892,119 to Rp 698,373. In real terms (in terms of paddy), the net revenue would decline by 10.3%, from 2,703 kg to 2,425 kg per ha per season.

The second scenario to be assessed is the potential effect of a world market price increase as a result of Uruguay Round trade liberalization. According to FAO (1995), the implementation of Uruguay Round trade liberalization could be expected to increase the world market price of rice by 7%. With the elasticity of price transmission of the world price (PW) to wholesale price (PWS) of 0.9465, and wholesale price (PWS) to producer price (PF) of 1.0198, the 7% increase in world price would result in 6.63% and 6.76 increase in PWS and PF, respectively (shown earlier). This means that the farm gate price of paddy (PF) in 1997 would increase from Rp 330 to Rp 352 per kg. The effects of this price increase on farm income are presented in Table 4.4 (see Appendix 4.2).

Due to own and cross-price effects, the 6.76% increase in farm-gate price would encourage farmers to use more inputs. Fertilizer use would increase by 3.0%, while pesticide and labor use would increase by 0.4% and 4.0%, respectively, with a subsequently increase in yield by 0.73%. Gross revenue and total variable cost would increase by 7.4% and 3.0%. The net revenue would increase by 11.7%, from Rp 892,119 to Rp 996,063, and the net revenue in real terms (in terms of paddy) would increase by 4.7%, from 2,703 kg to 2,830 kg per ha per season.

Table 4.4 Potential effect of Uruguay Round trade liberalization (7% increase in world price of rice) on farm income of rice, West Java, 1996.

Item	Base-1996	WP Increase (7%)	Change
Gross Revenue	1,728,540	1,857,297	7.4
Seed	28,397	28,397	0.0
Fertilizer:			
Urea	75,970	78,249	3.0
Za	5,625	5,794	3.0
TSP	52,430	54,003	3.0
Others	9,614	9,902	3.0
Pest-Insecticides	35,945	36,089	0.4
Labor	472,500	491,400	4.0
Other Costs			
Rent of Equip/animal	58,319	58,319	0.0
Irrigation fees	13,177	13,177	0.0
Transport cost	18,993	18,993	0.0
Others	16,250	16,250	0.0
Variable Cost	787,220	810,573	3.0
Cost of Capital	49,201	50,661	3.0
Total variable cost	836,421	861,234	3.0
Net Revenue			
Nominal (Rp)	892,119	996,063	11.7
Real (Kg Gabah)	2,703	2,830	4.7

Source: Calculated (see Appendix 4.2 for details).

4.2 Soybeans

4.2.1 Marketing system and marketing efficiency

To a considerable extent, marketing system and market efficiency affect the tariff and price transmission elasticity from the world price to wholesale and to producer prices. A higher efficiency in the marketing system would generate a higher rate of tariff and transmission. In this regard, observing the domestic marketing system in the major soybean producing regions would be of importance.

The marketing chain of soybean in the largest producing area of East Java is depicted in Figure 4.2. Soybean flows through various chains from producers before reaching end users like feed factories or *tahu* (tofu) and *tempe* (fermented soybean) processors. The main chain, however, was "farmer → village assembler → larger assembler → district trader → *tahu/tempe* processor". Most households in Indonesia consume soybean products in the form of *tahu/tempe*, hence, almost no consumer uses soybean grain for direct consumption. Almost entirely (90-100%) of a farmer's soybean produce is sold to the village assembler, while a small amount is retained for seed. A large part of soybean from district traders is used locally by small-scale *tahu/tempe* processors, leaving the rest for local feed factories, Surabaya wholesalers and district traders in Solo.

The marketing costs of soybean from producers to Surabaya wholesalers are shown in Table 4.5. Producers received 77.27% of the Surabaya wholesaler selling price, leaving an overall marketing margin (marketing cost and middlemen's profit) of 22.73%. This suggests that the marketing system of soybean in East Java is fairly efficient.

Figure 4.2 Value chains of soybean in East Java.

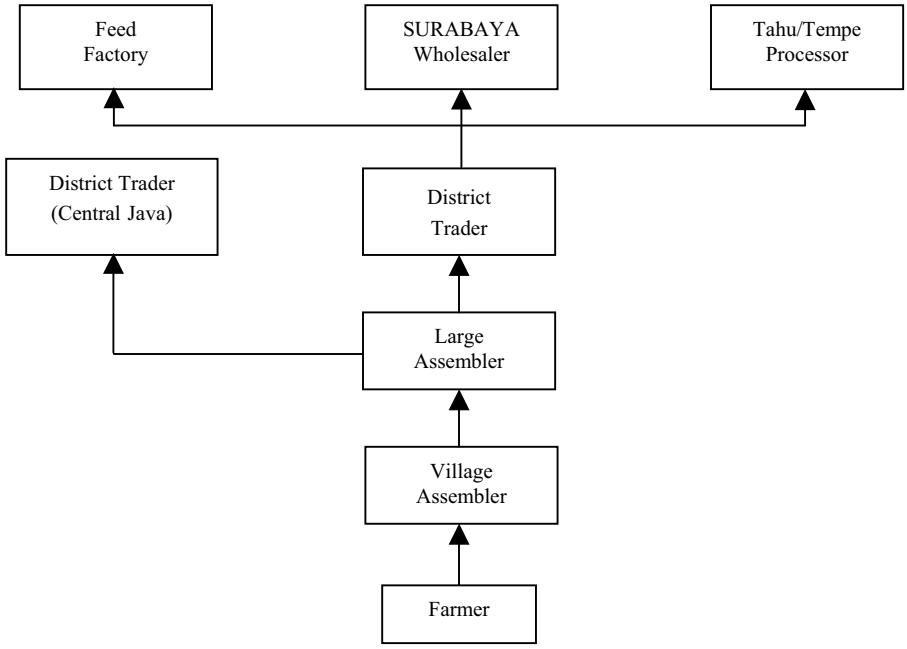


Table 4.5 Marketing margin of soybean grain in East Java.

Value Chain	Price (Rp/kg)	% of PWS
Surabaya Wholesaler	1,320	100.00
District Trader	1,200	90.91
Large Assembler	1,140	86.36
Village Assembler	1,080	81.82
Farmer	1,020	77.27

Source: Jierwiriyapant et al. (1992), recalculated and updated.
Note: PWS is wholesale price.

4.2.2 Farm production and profitability

Table 4.6. presents the structure of production cost and revenue of soybean farming in West Java in 1996. The total variable cost was Rp 320,771 per ha per season. From the cost structure, it is seen that soybean farming is less labor intensive compared to rice farming, with a total labor use of 34.2 man-days per ha per season. Of the total variable cost, the labor cost was Rp 119,563, which accounted for 37.27%, while the other dominant input was fertilizer, accounting for 15.14%.

The net revenue over total variable cost in 1996 was estimated around Rp 872,629 per ha per planting season. This net revenue accounted for 73.12% of gross revenue, suggesting that soybean farming was profitable. Compared to rice, however, soybean was less profitable. In real terms (physical output), the net revenue was equivalent to 856 kg.

Table 4.6 Cost structure and revenue of soybean farming (per hectare), East Java, 1996.

Item	Quantity	Price (Rp)	Value (Rp)	Share (%) Gross-R	Tot-Cost
Gross Revenue	1,170.0	1,020	1,193,400	100.00	
Seed	46.6	1,257	58,597	4.91	18.27
Fertilizer:					
Urea	82.3	339	27,923	2.34	8.70
TSP	41.7	470	19,602	1.64	6.11
Others	3.1	335	1,052	0.09	0.33
Pest-Insecticides	1.6	4,369	6,946	0.58	2.17
Labor	34.2	3,500	119,563	10.02	37.27
Other Costs					
Rent of Equip/animal			11,302	0.95	3.52
Irrigation fees			16,193	1.36	5.05
Transport cost			10,366	0.87	3.23
Others			30,358	2.54	9.46
Variable Cost			301,902	25.30	94.12
Cost of Capital			18,869	1.58	5.88
Total variable cost			320,771	26.88	100.00
Net Revenue					
Nominal (Rp)			872,629		
Real (kg of soybean)			856		

Source: Calculated.

4.2.3 Effects of trade liberalization

The policy scenario is removal of the 5% tariff. The effects of this tariff cut would cause the domestic prices to decrease. Assuming tariff transmission elasticity of 0.75, the 5% decrease in tariff would be expected to reduce the wholesale price by 3.75%. With the estimated price transmission of wholesale price (PWS) to producer price (PF) of 0.8774, the farm-gate price would decline by 3.29% (see Table 3.8). This means that the farm gate-price of soybean (PF) in 1996 would be expected to decline from Rp 1,020 to Rp 986 per kg. The effects of this price decline on farm cost and income are presented in Table 4.7 and in Appendix 4.3.

Due to own and cross-price effects, the 2.19% decline in farm-gate price would discourage the use of inputs such as fertilizer, pesticides and labor, respectively, by 1.5%, 0.2% and 0.2%, which would subsequently reduce yield by 9.56%. In effect, gross revenue and total variable cost would decrease by 3.5% and 0.3%, respectively. The final result would be a decline in net revenue by 4.6%, from Rp 872,629 to Rp 832,354. The net revenue in real terms (soybean grain) would decline by 1.3%, from 855 kg to 844 kg per ha per season.

The second scenario is the potential effect of the 7% increase in world market price of soybeans as a result of Uruguay Round trade liberalization. With the elasticity of price transmission of the world price (PW) to wholesale price (PWS) of 0.7152, and wholesale price (PWS) to producer price (PF) of 0.8774, the 7% increase in world price would result in 5.01% and 4.39% increases in PWS and PF, respectively. This means that the farm-gate price of soybean (PF) would increase from Rp1,020.0 to Rp 1,064.8 per kg. The effects of this price increase on farm income are presented in Table 4.8 (see Appendix 4.4).

The increase in farm-gate price (4.39%) would encourage farmers to use more inputs. Fertilizer use would increase by 2.0%, while pesticide and labor use would increase by 0.3%. As a result, yield of soybean is expected to increase slightly by 0.18%, from 1,170 kg/ha to 1,172 kg/ha. Gross revenue and total variable cost would increase by 4.6% and 0.4%. Eventually, the net revenue would increase by 6.1%, from Rp 872,629 to Rp 925,860. The net

revenue in real terms (in terms of soybean grain) would increase by 1.6%, from 856 kg to 870 kg per ha per season.

Table 4.7 Effect of tariff reduction on farm income of soybean, East Java, 1996.

Item	Base-1996	Tariff Cuts	Change (%)
Gross Revenue	1,193,400	1,152,081.8	-3.5
Seed	58,596.573	58,597	0.0
Fertilizer:			
Urea	27,923	27,504	-1.5
TSP	19,602	19,308	-1.5
Others	1,052	1,036	-1.5
Pest-Insecticides	6,946	6,932	-0.2
Labor	119,563	119,324	-0.2
Other Costs			
Rent of Equip/animal	11,302	11,302	0.0
Irrigation fees	16,193	16,193	0.0
Transport cost	10,366	10,366	0.0
Others	30,358	30,358	0.0
Variable Cost	301,902	300,920	-0.3
Cost of Capital	18,869	18,808	-0.3
Total variable cost	320,771	319,728	-0.3
Net Revenue			
Nominal (Rp)	872,629	832,354	-4.6
Real (kg of soybean)	855	844	-1.3

Source: Calculated (see Appendix 4.3 for details).

Table 4.8 Potential effects of Uruguay Round trade liberalization (world price increase) on farm income of soybean in East Java, 1996.

Item	Base-1996	Price Increase	Change (%)
Gross Revenue	1,193,400	1,248,005	4.6
Seed	58,596.573	58,597	0.0
Fertilizer:			
Urea	27,923	28,475	2.0
TSP	19,602	19,989	2.0
Others	1,052	1,073	2.0
Pest-Insecticides	6,946	6,965	0.3
Labor	119,563	119,878	0.3
Other Costs			
Rent of Equip/animal	11,302	11,302	0.0
Irrigation fees	16,193	16,193	0.0
Transport cost	10,366	10,366	0.0
Others	30,358	30,358	0.0
Variable Cost	301,902	303,195	0.4
Cost of Capital	18,869	18,950	0.4
Total variable cost	320,771	322,145	0.4
Net Revenue			
Nominal (Rp)	872,629	925,860	6.1
Real (kg of soybean)	856	870	1.6

Source: Calculated (see Appendix 4.4 for details).

4.3 Maize

4.3.1 Marketing system and marketing efficiency

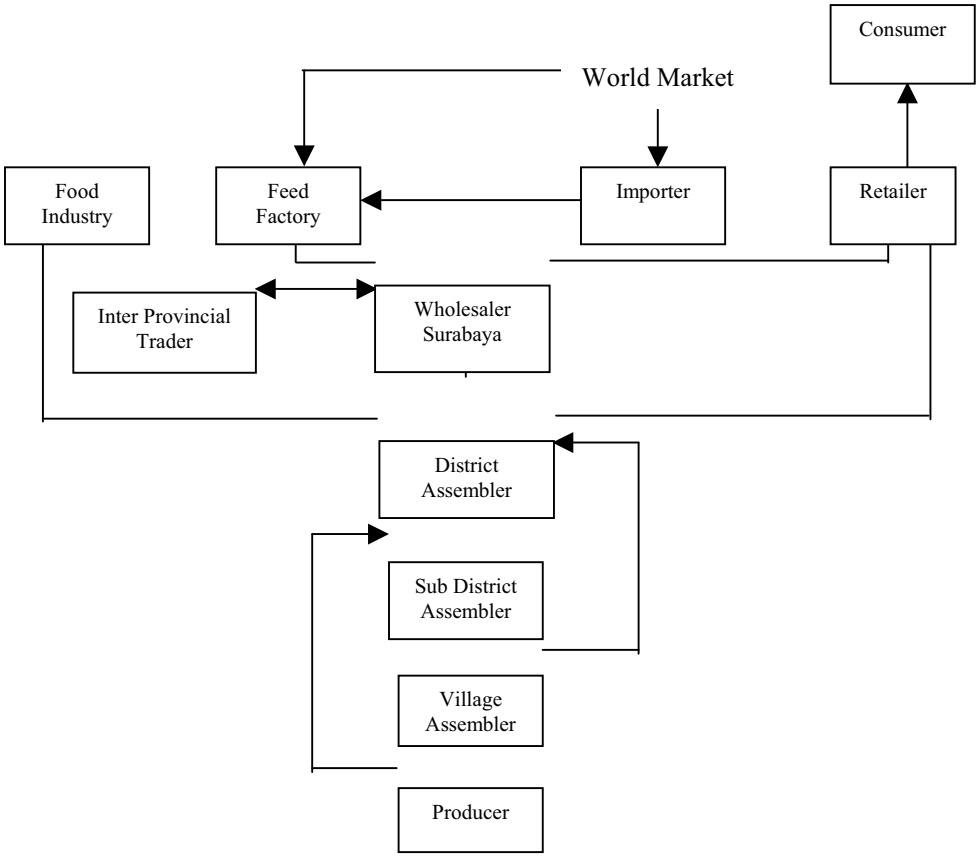
Liberalization of international trade in terms of reduced tariff that would increase wholesale price would eventually also increase producer price. The rate of transmission of world price to wholesale price and of wholesale price to producer price, to a considerable extent, would be affected by the marketing system of the commodity. Logically, a more

efficient marketing system will generate higher price transmission elasticities and lower marketing margins; hence, a higher producer price may be expected. In this sense, it is reasonable to look at the marketing system as well as marketing margin of maize.

The value chain of maize in the major producing region of East Java is shown in Figure 4.3. The major chain has been "farmer → village assembler → sub-district assembler → district assembler → wholesaler → feed factory or inter-provincial trader". To a smaller extent, farmers also sell maize produce directly to sub-district assemblers without passing through village assemblers. Sometimes, village assemblers also sell maize produce directly to district assemblers without passing through sub-district assemblers. Maize from district assemblers flows to wholesalers in the provincial city in Surabaya, who then sell the product to feed factories or to wholesalers in other provinces, either within or outside Java. Maize flow to other provinces usually takes place in the peak harvest season, when production is not entirely absorbed by the local market and feed factories (excess supply). During off harvest season, when production drops (supply shortage), maize from other provinces flows to wholesalers in Surabaya. Up until 1992, BULOG was responsible for importing maize to meet feed factory needs. In recent years, the import was entirely carried out by private importers or by feed factories.

In selling maize produce, most farmers adopt a *tebasan* system. In this system, farmers sell standing crops prior to harvest. Both farmer and buyer estimate the value of maize throughput on the basis of estimated throughput and the prevailing producer price. Harvest may be done by the buyer after both sides reach an agreement upon the value of throughput. After harvest, maize produce flows throughout the value chain.

Figure 4.3 Major value chains of maize, East Java.



The marketing margin from producer to wholesale price, as an important indicator of marketing efficiency, is shown in Table 4.9. It can be seen that in 1996, producers of maize received a price of Rp 411.8 per kg. This is 83.86% of the wholesale price of Rp 491 per kg, meaning that the marketing margin was 16.14% of the wholesale price. Obviously, such a price spread was small, implying that the marketing system of maize was sufficiently efficient.

Table 4.9 Marketing margin of maize, East Java.

Item	Rp/kg	Percent
Producer	411.8	83.86
Transport	3.6	0.73
Village Assembler's Profit	5.7	1.16
Marketing Margin (1)	9.3	1.89
Village Assembler	421.1	85.76
Processing	2.7	0.55
Transport	3.8	0.77
Bag	2.8	0.57
Sub district Assembler's Profit	6.4	1.31
Marketing Margin (2)	15.7	3.20
Sub district Assembler	436.8	88.95
Transport	14.6	2.98
District Assembler's Profit	12.4	2.53
Marketing Margin (3)	27.0	5.50
District Assembler	463.8	94.45
Transport	17.8	3.63
Wholesaler profit	9.4	1.91
Marketing Margin (4)	27.24	5.55
Wholesaler to Feed Factory	491.0	100.00

Source: Calculated.

4.3.2 Farm production and profitability

The structure of production cost and revenue of maize farming in East Java in 1996 is presented in Table 4.10. The total variable cost was Rp 243,372 per ha per season. From the cost structure, it is seen that maize farming is less labor intensive compared to rice or soybean farming, with a total labor use of 23.8 man-days. Of the total variable cost, the labor cost was Rp 83,174, accounting for 34.18%, while the other dominant input was fertilizer, accounting for 25.66%. The net revenue over total variable cost in 1996 was estimated at Rp 735,065 per ha per planting season. This net revenue accounted for 75.13% of gross revenue, implying that maize farm was profitable to farmers. Compared to rice and soybean, however, maize offered a lower profit rate. In real terms (physical output), the net revenue was equivalent to 1,785 kg.

4.3.3 Effects of trade liberalization

Effects of tariff cuts

To assess the impacts of trade liberalization at the producer level, a 5% tariff removal is assumed. As indicated earlier, this tariff change would reduce the producer price. However, the effect on the producer price varies according to the tariff transmission elasticity to the wholesale price. In the following analysis, effects at the farm level are estimated on the basis of a 0.75 tariff transmission elasticity. As shown earlier, a 5% tariff removal with this tariff transmission elasticity would reduce the wholesale price (PWS) by 3.75%. With the price transmission elasticity of wholesale price (PWS) to producer price (PF) of 0.956663, the producer price would decrease by 3.59%, from Rp 411.8 to Rp 397.0 per kg. Effects of this producer price change are presented in Table 4.11 (see Appendix 4.5).

Due to own and cross-price effects, the 3.59% decline in farm-gate price would discourage the use of inputs such as fertilizer and labor, respectively, 0.07-1.80% and 0.18%. In

effect, gross revenue and total variable cost would decrease by 3.77% and 0.46%, respectively. The eventual result would be a decline in net revenue by 4.86%, from Rp 735,065 to Rp 699,334. In real terms (in physical output), the net revenue would decline by 1.31%, from 1,785 kg to 1,762 kg per ha per season.

Table 4.10 Cost structure and revenue of maize farming, East Java, 1996.

Item	Quantity	Price (Rp)	Value (Rp)	Share (%) Gross-R	Tot-Cost
Gross Revenue	2,376.0	411.8	978,437	100.00	
Seed	34.0	1,009.6	34,327	3.51	14.10
Fertilizer:					
Urea	162.4	309.7	50,301	5.14	20.67
TSP	29.0	418.6	12,144	1.24	4.99
Others	1.1	424.3	454	0.05	0.19
Pest-Insecticides			469	0.05	0.19
Labor	23.8	3500	83,174	8.50	34.18
Other Costs:					0.00
Rent of Equipment			14,557	1.49	5.98
Irrigation fees			7,212	0.74	2.96
Transport cost			7,981	0.82	3.28
Others			18,437	1.88	7.58
Variable Cost			229,056	23.41	94.12
Cost of Capital			14,316	1.46	5.88
Total Variable Cost			243,372	24.87	100.00
Net Revenue:					
Nominal (Rp)			735,065	75.13	
Real (kg maize)			1,785		

Source: Calculated.

Table 4.11 Farm level effect of tariff reduction by 5% on net farm income of maize, East Java, 1996.

Item	Base-1996 (Rp)	Tariff Cuts (Rp)	Change(%)
Gross Revenue	978,437	941,577	-3.77
Seed	34,327	34,327	0.00
Fertilizer :			
Urea	50,301	49,397	-1.80
TSP	12,144	12,135	-0.07
Others	454	454	-0.07
Pest-Insecticides	469	469	0.00
Labor	83,174	83,025	-0.18
Other Costs:			
Rent of Equipment	14,557	14,557	0.00
Irrigation fees	7,212	7,212	0.00
Transport cost	7,981	7,981	0.00
Others	18,437	18,437	0.00
Variable Cost	229,056	227,994	-0.46
Cost of Capital	14,316	14,250	-0.46
Total Variable cost	243,372	242,243	-0.46
Net Revenue:			
Nominal (Rp)	735,065	699,334	-4.86
Real (kg maize)	1,785	1,762	-1.31

Source: Calculated (see Appendix 4.5 for details).

Effects of world price increase

As mentioned earlier, a 4% increase in world price of maize is assumed. Results of the assessment of this price change are shown in Table 4.12. In contrast to the previous maize case (tariff cuts), this scenario shows positive results. The world price that would improve producer

price would likely increase fertilizer and labor use implying additional fertilizer costs that ranged from 0.07 to 1.75% and an additional labor cost of 0.17%. In effect, gross revenue as well as total variable cost would increase by 3.67% and 0.45% respectively. Eventually, this would result in a 4.74% increase in net revenue, from Rp 735,065 to Rp 769,879 per hectare per season. In physical terms, the net revenue would increase by 1.20%, from 1,785 kg to 1,807 kg per hectare per season.

Table 4.12 Farm level effect of world price increase by 4% on net farm income of maize, East Java, 1996.

Item	Base-1996 (Rp)	World Price Increase (Rp)	Change (%)
Gross Revenue	978,437	1,014,347	3.67
Seed	34,327	34,327	0.00
Fertilizer:			
Urea	50,301	51,179	1.74
TSP	12,144	12,152	0.07
Others	454	454	0.07
Pest-Insecticides	469	469	0.00
Labor	83,174	83,319	0.17
Other Costs:			
Rent of Equipment	14,557	14,557	0.00
Irrigation fees	7,212	7,212	0.00
Transport cost	7,981	7,981	0.00
Others	18,437	18,437	0.00
Variable Cost	229,056	230,088	0.45
Cost of Capital	14,316	14,380	0.45
Total Variable cost	243,372	244,468	0.45
Net Revenue:			
Nominal (Rp)	735,065	769,879	4.74
Real (kg maize)	1,785	1,807	1.20

Source: Calculated (see Appendix 4.6 for details).

4.4 Cassava

4.4.1 Marketing system and marketing efficiency

In a trade liberalization situation, a change in the world price would be transmitted to the wholesale price and eventually to the producer price. In the domestic market, the transmission elasticity of wholesale price to producer price, however, would be significantly affected by the commodity marketing system. In a logical view, a more efficient marketing system will bring about lower marketing costs, and a higher producer price. Therefore, the following brief description of the marketing system, marketing margin and market efficiency of cassava are useful to understand the magnitude of price transmission.

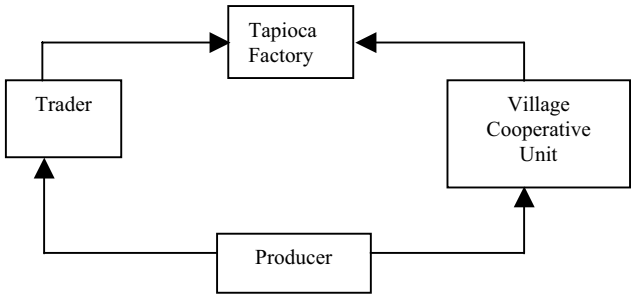
There are two cassava products of farmers, namely fresh cassava and dried-sliced manioc (*gaplek*). Most farmers, however, prefer to produce the first product, especially when the price of cassava drops. In the marketing system, the first product has a less complex value chain compared to the second.

In the fresh cassava case, it is seen from Figure 4.4 that there are two short major value chains, namely "farmer → trader → tapioca factory" and "farmer → village cooperative unit → tapioca factory". In the first chain, farmers generally do not sell cassava in the form of harvested produce, but as standing crop. In this sense, the trader, acting on behalf of a tapioca factory, estimates the value of cassava throughput based on the estimated throughput quantity and the per kg prevailing price. The crop may be harvested by the trader after both farmer and trader reach agreement upon the value of the cassava throughput. All costs incurred in the harvest and post-harvest activities are paid by the trader. This system is called the *tebasan*

system. Commonly 12-17% is deducted from the gross throughput value, depending on the starch content and impurities. Starch content is tested immediately after harvest. The trader ships the harvested fresh cassava to the tapioca factory and receives fees for his procurement services.

In the second chain, the Village Cooperative Unit (VCU) also adopts the *tebasan* system as in the first chain. In this regard, the cooperative does not act on behalf of a tapioca factory, but on its own as a fresh cassava supplier.

Figure 4.4 Major value chains of fresh cassava, East Java.



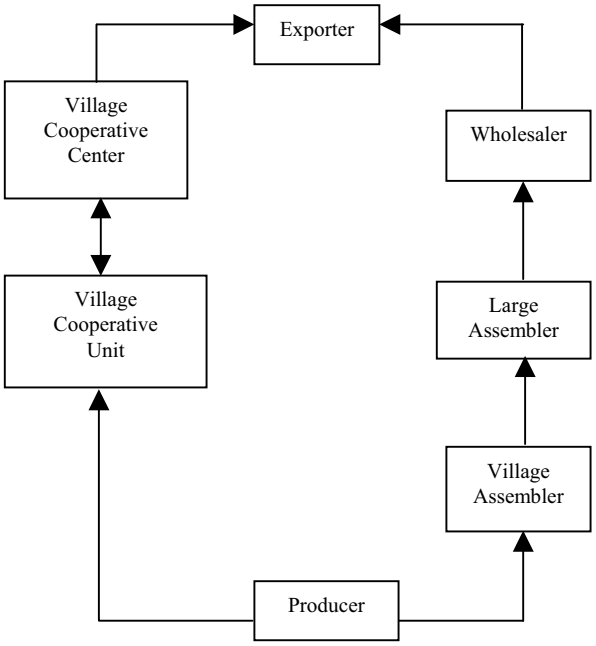
A serious problem arises in the peak season. Quite often many traders and cooperatives have to form a long queue at the factory gate during the season because total cassava throughput sold to the factory is very sizeable. Weighing and administrative activities need more time to serve all the factory suppliers. In effect, the long queuing time frequently causes the cassava quality to deteriorate, which in turn causes substantial financial losses to the suppliers.

In the dried-sliced manioc case, as shown in Figure 4.5, there are also two major value chains, namely, "farmer → village cooperative unit → village cooperative center → exporter" and "farmer → village assembler → large assembler → wholesaler → exporter". In both cases, farmers process fresh cassava into dried sliced manioc using a simple technology.

In the first chain, farmers sell dried sliced manioc of 20% moisture content to the village cooperative. The cooperative then reprocesses the manioc into chips of standard quality with a moisture content of 17%. The cassava chips are then sold to the Village Cooperative Center (VCC). The cassava chips then flow from VCC to exporter.

In the second chain, farmers sell dried-sliced manioc of 20% moisture content to village assemblers, who then sell this product to large assemblers. After re-drying the product so as to obtain cassava chips of standard quality with a 17% moisture content, the large assembler sells the standard-quality cassava chips to wholesalers. The wholesaler then sells the product to exporters.

Figure 4.5 Major value chains of dried-sliced manioc, East Java.



In 1996, producers of dried-sliced manioc (chips) received 65.11% of the FOB price or 82.5% of the wholesale price of the product (Table 4.13). The marketing margin was 34.89% of the FOB price or 17.5% of the wholesale price. The marketing margin from wholesaler to exporter was 21.11%. It is seen that the price spread was quite large, suggesting that the marketing system of dried-sliced manioc was inefficient. The major sources of inefficiency were losses due to quality defects in the early marketing chain and trader's profit, respectively accounting for 9.86% and 10.74% or 20.6% for both.

Table 4.13 Marketing margin of dried-sliced manioc, East Java.

	Cost Component	Price (Rp/kg)	Percentage of FOB
	Farmer selling price	191.48	65.11
1	Unloading	1.22	0.42
2.a.	Drying	4.87	1.65
b.	Loading	1.62	0.55
c.	Transportation	3.24	1.10
d.	Losses	12.15	4.13
e.	Trader's profit	17.42	5.92
f.	Marketing margin (1)	40.52	13.78
g.	Wholesaler selling price	232.00	78.89
h.	Processing into chip	2.65	0.90
3.a.	Loading and transportation	19.51	6.63
b.	Packaging	8.88	3.02
c.	Losses	16.85	5.73
d.	Trader's profit	14.18	4.82
e.	Marketing margin (2)	62.07	21.11
f.	FOB price	294.07	100.00

4.4.2 Farm production and profitability

The structure of production cost and revenue of cassava farming in East Java (1996) is presented in Table 4.14. The total variable cost was Rp 479,748 per ha per season. From the cost structure, it is clear that cassava farming is less labor intensive compared to rice, but more labor intensive compared to soybean and maize farming, with a total labor use of 53.9 man-days per ha per season. Of the total variable cost, the labor cost was Rp 188,631, which accounted for 39.32%, while the other dominant input was fertilizer, accounting for 10.80%. The net revenue over total variable cost in 1996 was estimated at Rp 1,952,302 per ha per planting season. This net revenue accounted for 80.27% of gross revenue, implying that cassava farming was highly profitable to farmers. Compared to rice, soybean, and maize, cassava was more profitable. In real terms (physical output), the net revenue was equivalent to 10,195 kg.

Table 4.14 Cost structure and revenue of cassava farming, East Java, 1996.

Items	Quantity	Price (Rp)	Value (Rp)	Share (%)	
				Gross-R	Tot-Cost
Gross Revenue	12,700	191.5	2,432,050	100.00	
Seed			58,740	2.42	12.24
Fertilizer:					
Urea	119.65	315.5	37,748	1.55	7.87
TSP	33.69	416.9	14,045	0.58	2.93
Others	0.05	380.0	19	0.00	0.00
Pest-Insecticides			1,002	0.04	0.21
Labor	53.9	3,500	188,631	7.76	39.32
Other Costs:					
Rent of Equipment			20,492	0.84	4.27
Irrigation fees			8,906	0.37	1.86
Transport cost			30,428	1.25	6.34
Others			43,987	1.81	9.17
Variable Cost			403,998	16.61	84.21
Cost of Capital			75,750	3.11	15.79
Total Variable cost			479,748	19.73	100.00
Net Revenue:					
Nominal (Rp)			1,952,302		
Real (kg cassava)			10,195		

Source: Calculated.

4.4.3 Effects of trade liberalization

Effects of a 6% increase in world price are assessed in this analysis. As mentioned earlier, with the price transmission elasticity of world price (PW) to wholesale price (PWS) of 0.47311, a 6% increase in world price would increase the wholesale price by 2.839%. The price transmission elasticity of wholesale price (PWS) to producer price (PF) of 1.19539 would increase the producer price by 6.59%, from Rp 191.5 to Rp 238.59 per kg. Effects of this producer price change are presented in Table 4.15.

Because of own price and cross-price effects, the producer price increase would increase the use of inputs, such as fertilizers and labor, the respective costs of which would increase by 0.07-1.70% and 0.18%. This would subsequently increase yield by 0.17%. In effect the gross revenue and total variable cost would increase by 3.57% and 0.24%, respectively. This increase in gross revenue stems mainly from the price increase by 3.34%. Net revenue would increase by 4.39%, from Rp 1,952,302 to Rp 2,037,968 per ha per season. In physical terms, the net revenue would increase by 0.96%, from 10,195 kg to 10,293 kg per hectare. Such a favorable effect to producers may be improved further through improvement of the marketing system, especially at the export level. As shown earlier, the transmission elasticity of wholesale price to producer price is greater than unity, but the transmission elasticity of world price to wholesale price is low (0.47311).

Table 4.15 Farm level effect of tariff reduction on net farm income of cassava, East Java, 1996.

Items	Base-1996 (Rp)	World Price Increase (Rp)	Change (%)
Gross Revenue	2,432,050	2,518,868	3.57
Seed	58,740	58,740	0.00
Fertilizer:			
Urea	37,748	38,389	1.70
TSP	14,045	14,055	0.07
Others	19	19	0.07
Pest-Insecticides	1,002	1,002	0.00
Labor	188,631	188,951	0.17
Other Costs:			
Rent of Equipment	20,492	20,492	0.00
Irrigation fees	8,906	8,906	0.00
Transport cost	30,428	30,428	0.00
Others	43,987	43,987	0.00
Variable Cost	403,998	404,968	0.24
Cost of Capital	75,750	75,932	0.24
Total Variable cost	479,748	480,900	0.24
Net Revenue:			
Nominal (Rp)	1,952,302	2,037,968	4.39
Real (kg cassava)	10,195	10,293	0.96

Source: Calculated (see Appendix 4.7 for details).

4.5 Potato

4.5.1 Marketing system and marketing efficiency

Potato marketing in West Java is mainly oriented towards providing fresh potatoes to consumers. Potato is considered a cash crop, and farmers commonly sell the bulk of their produce right after harvest. Potato marketing is almost entirely in the hands of private traders. Government intervention is very limited to tariff regulation on some potato products. An import tariff is not implemented for seeds. In general, potato marketing is very efficient and well integrated. This is because of relatively good marketing infrastructure and transportation facilities connecting the major producing and consuming areas.

Horton (1980), cited by Adiyoga et al. (1996), suggests that problems encountered in potato marketing in general come from (i) characteristics of potato producers, (ii) characteristics of the crop (bulkiness and perishabilty), (iii) the nature of supply and demand for potatoes (seasonality), and (iv) peculiarities of the marketing system such as poor information flow, inadequate physical facilities, and the prevalence of specialized traders with large operation and financial capacity. Price fluctuation that is reflected in price instability at the farm-gate may discourage technological change in potato production. On the other hand, price instability at the retail level may also discourage consumption of potato, in favor of other commodities.

The main outlet of potato production in Java is Jakarta. According to Adiyoga et al. (1996), 60-80% of the total supply of potato to Jakarta passes through Kramat Jati Central Market, and the other 20-40% is delivered directly to the retail market. Approximately 63% of potato entering the Kramat Jati central market in Jakarta comes from West Java, 30.7% from Central Java, and the rest (6.4%) from East Java. Among producing areas in West Java, Pangalengan is the major contributor to the Jakarta market (35%), followed by Garut (17.9%) and Ciwidey (10.3%).

Basically, farmers sell all of their harvest to the market. Medium and large producers are able to spread the risks by selling their harvest over a period of time. This is possible because they are able to rent or even own a warehouse. By applying this marketing strategy, they can reduce the loss from depressed price during the peak harvest season. This strategy has

established some of the large commercial growers as permanent and reliable potato suppliers. In contrast, small producers participate in the market only during the harvest season. Consequently, the small producers are more vulnerable to short term price fluctuation.

Before selling their produce, farmers sort and grade it. They may show the traders or prospective buyers a graded sample to solicit competitive bids or invite them to visit the farm. If the transaction takes place at the farm, the agreement between farmers and traders will determine who pays for sorting and grading. Grading is mainly based on size and weight, while taste and protein content are implemented only in the case of large transactions.

Even though there are several channels in potato marketing in Pangalengan, the marketing channels are relatively simple and short, consisting of (i) field petty assembly traders, (ii) contract traders, (iii) rural assembly traders, (iv) regional and inter-regional traders, (v) wholesalers, and (vi) retailers. Field assemblers are small-scale traders who daily visit farms and make bids. They buy and assemble relatively small volumes directly from farmers and sell them to rural traders. They may operate with their own funds or occasionally act as commission agents. As commission agents, they do not buy potatoes, but assemble and ship them to rural assembly traders for a commission or fee (Adiyoga et al. 1996).

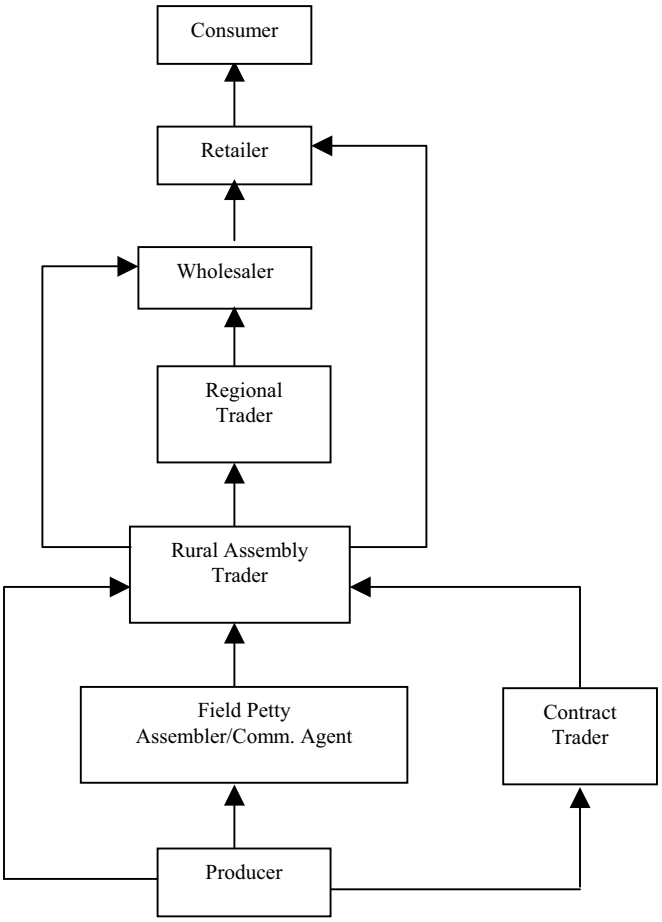
Contract traders buy potatoes from farmers on a contract basis that involves negotiation and transaction long before the harvest time. The contract traders estimate the total value of potato based on estimated quantity and expected price at harvest time. Once it is agreed, the contract traders take over the care of potatoes on the farms. Contract buyers may finance operations on their own, or be financed by rural assembly traders or wholesalers.

Rural assembly traders collect a relatively large volume of potatoes and ship them to central markets. They may either reside at or travel to farms to purchase, transfer, and later sell the produce. Besides assembling and shipping potatoes, this type of trader may also provide a cash advance or guarantee before harvest, recruit and pay qualified workers for sorting and grading, supply necessary marketing materials, and arrange potato transportation from the fields. Some rural assembly traders in Pangalengan are also involved in production as growers, or run the production with share-croppers (farmers).

The regional traders usually reside outside the production areas and visit Pangalengan to purchase potatoes from rural assembly traders and ship them to wholesale and retail markets. The wholesalers are merchants in Bandung or Jakarta who receive potato shipments from producers, rural assembly traders and other traders. They have permanent stalls in the urban markets and sell mainly to retail merchants or secondary wholesalers. Most of the potatoes they handle are sold on a wholesale basis, but some of them can at the same time act as assemblers or retailers. As the last chain of marketing, retailers sell potatoes in unaltered form directly to consumers. Potato marketing channels in Pangalengan (West Java) are depicted in Figure 4.6. The major channels are as follows: (i) producer-rural assembly trader-regional trader-wholesaler-retailer-consumer; (ii) producer-rural assembly trader- wholesaler-retailer-consumer; (iii) producer-field petty assembly trader or commission agents-rural assembly trader-wholesaler-retailer-consumer; and (iv) producer-contract trader-rural assembly trader-retailer-consumer.

The first and the second channels absorb approximately 80% of the total potato supply from Pangalengan, while the remaining 20% is marketed through the third and fourth channels (Adiyoga et al. 1996). There are many petty assembly traders, 7-10 contract traders, and 15-20 rural assembly traders participating in potato marketing in Pangalengan. Potatoes from Pangalengan are mainly shipped to Jakarta, as the main consumption center, and other big cities in West Java such as Bandung, Bogor, Cirebon, and Sukabumi. Peak sales of potato occur between January and March, and off-sales between July and October. Table 4.16 presents the structure of marketing margin of potato from Pangalengan to Jakarta, 1998.

Figure 4.6 Major value chains of potato, West Java.



4.5.2 Farm production and profitability

Potato farming is one of the most capital intensive farming businesses. The structure of production cost and farm profitability for potato in West Java in 1996 is presented in Table 4.7. The total production cost was Rp 5,088,814 per hectare per season. The prominent cost components were labor (33.4%), seed (33.2%), and cost of land (11.4%). Potato farmers use very large amounts of chemical fertilizers and manure. The chemical fertilizers used by farmers were urea, TSP, KCl, the prices of which were Rp 332, Rp 467 and Rp 351 per kg, respectively. The nominal net revenue, given the potato price of Rp 762, was Rp 10.4 million per hectare per season. This profit constituted about 67% of total gross revenue, suggesting that potato farming is highly profitable to the farmer.

Table 4.16 Marketing margin of potato from Pangalengan to Jakarta, December 1998.

Trader	Buying Price (Rp/kg)	Selling Price (Rp/kg)	Marketing Margin (%)
Village Assembler	2,700	2,900	75.0
Transport and handling	16		0.4
Profit	184		5.1
Regional trader in Bandung	2,900	3,100	80.6
Handling	25		0.7
Transport	50		1.4
Profit	125		3.5
Wholesaler in Kramat Jati, Jakarta	3,100	3,300	86.1
Handling	25		0.7
Sorting and Loss	66		1.8
Profit	109		3.0
Retailer	3,300	3,600	91.7
Cost of handling	75		2.1
Profit	175		4.9
Consumer	3,600		100

Source: Primary (survey) data.

Table 4.17 Cost structure and revenue of potato farming, West Java, 1996.

Item	Quantity	Price (Rp)	Value (Rp)	Share (%) GrossR	Share (%) Tot Cost
Gross Revenue	20,269	762	15,444,978	100.00	
Seed	1,125	1,500	1,687,500	10.93	33.16
Fertilizer:					
Urea/ZA	429	322	137,994	0.89	2.71
TSP	420	467	195,899	1.27	3.85
KCl	101	351	35,600	0.23	0.70
ZPT/PPC	200	82	16,500	0.11	0.32
Manure	7,660	24	187,000	1.21	3.67
Pest-Insecticides	11	18,340	201,739	1.31	3.96
Labor	404	4,200	1,697,640	10.99	33.36
Other Costs					
Land rent			580,000	3.76	11.40
Rent of Equip/animal			18,600	0.12	0.37
Transport cost			0	0.00	0.00
Others			31,000	0.20	0.61
Production Cost			4,789,472	31.01	94.12
Cost of Capital			299,342	1.94	5.88
Total production cost			5,088,814	32.95	100.00
Net Revenue					
Nominal (Rp)			10,356,164	67.05	
Real (kg of potato)			13,591		

Source: Calculated.

4.5.3 Effects of trade liberalization

A 5% tariff reduction, from 22% to 17%, would reduce the producer price. Assuming a tariff transmission elasticity to the wholesale price of 0.5, the wholesale price (PWS) would decrease by 2.5%. As indicated earlier, with the price transmission elasticity of wholesale price (PWS) to producer price (PF) of 0.8774, the producer price would decrease by 2.19%, from Rp 762 to Rp 745.2 per kg. Table 4.18 presents the effects of this producer price on farm income (see Appendix 4.7 for details).

Due to own and cross-price effects, the 2.19% decline in farm-gate price would discourage the use of inputs such as fertilizer and labor respectively by 1.5% and 0.2%, which would subsequently reduce yield by 3.26%. In effect, gross revenue and total variable cost would decrease by 5.4% and 0.2%, respectively. The eventual result would be a decline in net

revenue by 7.9%, from Rp 10,356,164 to Rp 9,533,752 per ha per season. In real terms (in physical output), the net revenue would decrease by 4.7%, from 13,591 kg to 12,953 kg.

Table 4.18 Farm level effect of tariff reduction on net farm income of potato, West Java, 1996.

Items	Base-1996	Tariff Cuts	Change(%)
Gross Revenue	15,444,978	14,612,576	-5.4
Seed	1,687,500	1,687,500	0.0
Fertilizer:			
Urea/ZA	137,994	135,875	-1.5
TSP	195,899	192,891	-1.5
KCl	35,600	35,053	-1.5
ZPT/PPC	16,500	16,247	-1.5
Manure	187,000	187,000	0.0
Pest-Insecticides	201,739	201,739	0.0
Labor	1,697,640	1,694,165	-0.2
Other Costs			
Land rent	580,000	580,000	0.0
Rent of Equip/animal	18,600	18,600	0.0
Transport cost	0	0.00	
Others	31,000	31,000.00	0.0
Production Cost	4,789,472	4,780,070	-0.2
Cost of Capital	299,342	298,754	-0.2
Total production cost	5,088,814	5,078,824	-0.2
Net Revenue			
Nominal (Rp)	10,356,164	9,533,752	-7.9
Real (kg of potato)	13,591	12,953	-4.7

Source: Calculated (see Appendix 4.18 for details).

5. Economic Crisis, Policy Reforms and Related Impacts

5.1 Introduction

Since mid 1997, Indonesia has been in a deep crisis. In just one year, 1997, its currency fell in value by 80%, inflation soared to over 50%, unemployment climbed rapidly, the stock exchange lost much of its value, and the economy swung from rapid growth to rapid contraction. Foreign creditors have withdrawn and investors have retreated. The crisis has been intensified by the worst drought in years and a decline in oil prices. Social unrest has erupted and shaken the political stability of the nation. In 1998, the economy is predicted to contract by 10-15%, inflation could exceed 80%, and the number of poor could double.

The World Bank projection (1998) shows the GDP falling by 10-15% in FY98/99 and remaining stagnant in FY99/2000. Domestic demand has plunged due to a sharp decline in investment. Even export growth appears to be slowing as trade finance becomes increasingly scarce. The balance of payments is projected to record a current account surplus for at least the next two years, about 1.8% of GDP for FY98/99 and 2.3% of GDP for FY99/2000. Exports are likely to grow relatively slowly owing to limited access to trade finance, the depletion of input stocks, lack of buyer confidence, and prolonged uncertainty and social unrest. In this respect, imports are expected to shrink substantially, suppressed by the severe contraction in domestic demand and a major increase in import costs.

In addition to external factors triggered by Thailand's crisis, the World Bank (1998) came to the conclusion that four key microeconomic factors sent Indonesia into the deep crisis. The first was the rapid build-up of private external debt in recent years. Such a large external debt at such short maturities made Indonesian corporations particularly vulnerable to changes in outside sentiments. Corporations could have protected themselves if they had hedged their foreign debts, but they chose not to do so to save costs and earn higher profits.

The second was that Indonesia's banking system went into the crisis with several well recognized flaws. Accounting and provisioning rules had not kept pace with the increased sophistication of the banking system and did not provide important early warning signals on the true financial health of the banks. The legal framework did not support contract enforcement when borrowers failed to repay. Not surprisingly, numerous banks were seriously undercapitalized, and some even insolvent before the crisis began.

The third factor was the question of governance, related to the issues of corruption, collusion and insider trading as a result of the weak legal system, the arbitrariness, and lack of transparency in decision making. In some sense, this crisis of confidence has been the most damaging of all Indonesia's crises, because it postponed the return of private financial flows and slowed the provision of interim official funding.

The fourth was the unfortunate political juncture at which the crisis hit the country. The deteriorating economic situation, increases in food and fuel prices, and calls for the President's resignation and political reforms, culminating in two days of mass violence and looting in cities throughout Indonesia. The political situation remains fluid and uncertain, its fragility vulnerable to a further worsening in economic conditions.

5.2 Crisis-induced policy reforms

Not long after the monetary crisis hit the economy, the government turned to the IMF and the World Bank to cope with the crisis and stabilize the economy. The IMF and World Bank mobilized commitments for a total stabilization package amounting to some US$ 43 billion. In exchange for these extraordinary loans, the donors insisted that Indonesia undertake macroeconomic and structural policy reforms to ensure that the economy would be managed in a more competitive and transparent way. The IMF came with conditional aid as stated in the GOI-IMF Letter of Intent signed by the two parties on 15 January 1998.

The IMF policy recommendations are basically aimed at responding to the four major policy challenges, namely: (i) restructuring the corporate debt overhang, (ii) reforming and strengthening the banking system, (iii) improving governance, and (iv) maintaining macroeconomic stability through the transition with appropriate fiscal, monetary, investment and trade policies. Each of these is necessary for restoring stability, regaining the confidence of foreign investors, trading partners and resuming growth. The scope and focus of policy reforms, however, differ slightly between one letter of intent to another.

One of the conditions that the IMF insisted on, as a part of structural transformation included in the 15 January 1998 letter of intent, was that BULOG's operation and monopoly be limited to rice and that subsidies on other food and essential goods be scaled-back sharply. Domestic agricultural trade was deregulated. Imports of garlic, wheat, and soybean were liberalized by allowing general importers to import those commodities. Foreign investment was encouraged, and by February 1998, formal and informal barriers to investment in the palm oil industry were removed.

Much more progressive reforms on trade and investment are found in the supplementary memorandum of the GOI-IMF Letter of Intent signed on April 9, 1998. Import tariffs for most of 500 agricultural items were agreed to be reduced to a maximum of 5%. The ban on crude palm oil (CPO) export was removed and replaced by an export tax of 40% and raised in July to 60%. Local content requirement on milk products and BPPC's monopoly on cloves were abolished. Some of the proposed reforms listed in the January letter of intent were restated including the removal of regulations limiting foreign investment on palm oil, wholesales and retails.

In addition to fiscal and monetary policy reforms and debt restructuring efforts, the GOI-IMF supplementary memorandum signed on June 25 1998 re-emphasized structural policy reforms. In this memorandum, the GOI was requested to keep its commitment in completing the previous structural reforms including the BULOG demonopolization in marketing and distribution, and the use of international standard auditing in the financial system of BULOG, the state electricity company (PLN), the state oil company (Pertamina), and the reforestation funds. Transparency in the process of privatization of the state owned companies (BUMN) was requested and the GOI together with the Asian Development Bank and the World Bank will prepare the Master Plan of the BUMN reforms by September 1998.

The June 1998 memorandum of economic and financial policies also covered the agreed plan to spend 7.5% of its GDP for social safety net programs extending to electricity, fuel, medicines, foodstuffs, and other needs. The two parties agreed on temporary subsidies for rice, sugar, soybeans, wheat, flour, corn, meat and fish, which account for a substantial portion of the expenditure of poor households. The government plans to import a million tons of sugar, 700 tons of soybeans, and 4.1 million tons of rice for the 1998/99 fiscal year. Bulog would need about $2.7 billion in soft credit from Bank Indonesia to import essential commodities, including 3.1 million tons of rice. Another Rp 5.4 trillion is needed to finance market operation programs aimed at stabilizing basic commodity prices. On the 2nd July 1998, the government deregulated its investment policy, embarking on a more open investment regime.

5.3 Agricultural sector adjustment policies

Indonesia has undertaken massive policy reforms in agriculture, including: (i) eliminating BULOG import monopoly over wheat, wheat flour, sugar, soybeans, garlic, and quite recently rice, (ii) reducing tariff rates on all food items to a maximum of 5% and abolishing local content regulations, (iii) removing restrictive trade and marketing arrangements for a number of commodities including the local content requirement, and (iv) deregulating trade in agricultural products across district and provincial boundaries including those for cloves, oranges, and livestock. It is expected that consistent implementation of these reforms will restore investor confidence and allow for more efficient and productive investment. Moreover, these reforms will benefit smallholder producers and thus reduce the incidence of poverty.

In the beginning of September 1998, the government lifted subsidies on wheat flour, sugar, and soybeans, and simultaneously liberalized their importation. General importers are completely free to import the commodities and will be exempt from import duties. The government has committed to improving the bidding mechanism by adding several requirements to ensure transparency and competitive bidding. At least 160 companies, both domestic and foreign, have shown an interest in joining the tender.

There are several other essential policy areas to be addressed to strengthen the poverty-reducing capacity of the agricultural and natural resource sectors.

- Ensuring adequate incentives to rice farmers: There are clear trade-offs between keeping rice prices low for consumers and providing adequate production incentives to farmers. In the medium term, it will be important to move rice prices towards the world market price on trend to ensure an appropriate supply response, to avoid smuggling overseas, and to provide appropriate earning opportunities to farmers.
- Reforming the role of government in the marketing and distribution of food commodities: This includes further deregulation of trade in food crops (except for rice), possibly replacing administrative mechanisms for food security and price stabilization with financial instruments.
- Improving trade and price policies affecting agricultural and rural sectors: Reducing non-tariff barriers to constrained agricultural markets, including export restrictions on agricultural commodities, will provide better earning opportunities to producers. Other policies are also essential to increase competitiveness, productivity and efficiency in agriculture such as liberalizing trade in fertilizer, agro chemicals, and seeds and privatizing state owned fertilizer and seed enterprises.
- Increasing the efficiency of irrigation management to improve efficiency and productivity in agriculture: This can be achieved by increasing efficiency of existing irrigation schemes and instituting effective irrigation options and maintenance programs.

A more agricultural specific policy reform which is in line with supplementary memorandum to the GOI-IMF Letter of Intent signed on 15 November 1998, added the so called "The Agricultural Sector Adjustment Loan (Agsal)", listing necessary policy reforms required by IMF as a condition for loan disbursement. There are three objectives of the reforms, namely: (i) maintain food security in a more efficient and effective manner, (ii) improve the efficiency of key farm level factor markets, and (iii) enhance the knowledge base to improve agricultural performance.

The first objective is based on the question of the ability of Indonesia to adequately feed its population. Since the crisis hit the Indonesian economy, food prices have risen dramatically and adequate quantities of food are out of reach of approximately the bottom quarter of the population. It is estimated that as many as 70 million persons have an income below the poverty line. The objective will be achieved by (i) relying on market mechanisms for foodstuffs, (ii)

protecting food insecure households through well-targeted food subsidy programs, and (iii) restructuring BULOG.

The second objective is based on the consideration that markets of the main farm inputs are heavily distorted. The crisis has revealed underlying structural flaws in the operation of agro-input markets. The fertilizer and seed markets, for example, are dominated by public sector companies which operate in non-competitive and inefficient ways. The lack of competition or a commercial orientation within the fertilizer and food seed industry raises the cost of providing essential agro-inputs and reduces the responsiveness of the agro-input producers to farmer demands. Technological innovation is stifled and growth is far less than what it could be. For fertilizer, the GOI has maintained heavy subsidies for urea, TSP, ZA and KCl. At the present level, close to two-thirds of the sale price of fertilizer is accounted for by direct budgetary subsidy. In addition, the domestic fertilizer factories are provided natural gas at subsidized prices. Based on the above consideration, the second objective is to be achieved by (i) improving the fertilizer market, (ii) improving the seed market, and (iii) reorienting cooperatives.

The third objective is based on the belief that competition in agricultural production and factor markets will spur an agricultural recovery if the public sector can provide an enabling environment for agricultural growth and development. Good quality economic infrastructure, solid investment in rural human resources, clear rights in rural property, an effective legal framework for rural business activity, an ample supply of suitable technology, well-functioning rural financial markets, and the information and awareness of technological and market opportunities are necessary to sustain the dynamism of rural prosperity and structural change. This objective is to be achieved by undertaking joint consultations and reviews of public programs and priorities in agriculture with the World Bank, interested government agencies (central and local), NGOs, and other technical experts on an annual basis to improve the efficiency of sectoral spending. Such review will examine, inter alia, agricultural research, extension, rural credit, village infrastructure, rural industrialization, rural education, and rural health care.

As mentioned in previous chapters, in December 1998 the government undertook progressive reforms on the domestic food market including the role of BULOG. In addition, fertilizer subsidies were lifted and fertilizer and rice prices were freed to be determined by market mechanisms. Along with the above measures, as a compensation, non-price production incentives are to be implemented in the forms of, among others: (i) adequate farm credit and simple procedures to ensure the implementation of packages of technology, (ii) adequate funds for national seed systems to operate, and (iii) adequate funds to undertake applied research and extension services.

It has been argued that government should increase the rice floor price by 40-50% in order to reduce the gap between prices received by farmers and the import parity price (Table 5.1). Higher farm prices would increase farmer incentives and help restore higher rates of production growth. In the long-run, higher prices of rice would reduce rice consumption, stimulate diversification of consumption by diverting household consumption away from rice, and in turn reduce rice self-sufficiency burdens. Whether higher rice prices increase rural welfare depends very much on the degree to which farm producers are net sellers or net buyers of rice, and the relevant demand and supply elasticities prevailing in the market.

Table 5.1 Domestic and world rice prices, 1997-1998.

Year	Domestic Price (Rp/kg)	World Price (US$/ton)	Exchange Rate (Rp/US$)	Import Parity Price (Rp/kg)	Ratio Dom/IPP
1997 Jan	965	310	2,387	893	1.08
Feb	972	337	2,403	978	0.99
Mar	1,014	328	2,418	958	1.06
Apr	1,016	290	2,443	855	1.19
May	1,021	280	2,458	830	1.23
June	1,033	290	2,450	858	1.20
Jul	1,046	300	2,528	915	1.14
Aug	1,062	290	2,935	1,028	1.03
Sep	1,088	270	3,350	1,092	0.99
Oct	1,123	250	3,700	1,117	1.01
Nov	1,207	250	3,740	1,129	1.07
Dec	1,215	232	5,700	1,597	0.76
1998 Jan	1,290	230	9,230	2,563	0.50
Feb	1,439	240	9,580	2,776	0.52
Mar	1,475	237	9,540	2,730	0.54
Apr	1,532	260	8,350	2,622	0.58
May	1,950	260	10,910	3,425	0.57
June	2,300	260	12,500	3,925	0.58
Jul	2,150	275	12,000	3,985	0.54
Aug	2,810	290	11,500	4,027	0.70

Source: Price data from Bulog monthly reports (various issues).
Exchange rate from Economic Indicators (BPS).
Note: World price of rice: Bangkok FOB of Thai 25% Broken.
Freight and insurance costs: 15% of the FOB price.
Cost of handling and transport to central market: 5% of CIF price.
Import parity price= ((1+1.15)*FOB Bangkok*Exchage rate) *1.05/1000.

The price of fertilizer has been highly subsized as an incentive to increase rice production. If rice were competitively priced, there would be little reason to subsidize fertilizer. The level of subsidy relative to world or import parity prices of fertilizer is described in Table 5.2. The rate of fertilizer subsidy increased in the last year mainly due to devaluation of the rupiah. A wide gap between the subsidized and world market prices has provided traders or speculators with high incentives to illegally re-export subsidized fertilizer to neighboring countries. Moreover, given that export crops become more profitable in the wake of devaluation, there has been strong indication that fertilizer is being used on estate crop production. This has caused domestic prices of fertilizers to soar to a level of well above the maximum retail (subsidized) prices set by the government.

In terms of urea and TSP (SP-36) fertilizers, for example, their market prices in August 1998 were reported to be Rp 1,100 and Rp 1,500 per kg, respectively, much higher than the subsidized prices. Similarly, the maximum retail price of KCl for rice production was set at Rp 850 per kg, while the market price in fact reached a level of Rp 3,000 per kg. This indicates that the implementation of fertilizer price subsidy was no longer effective. This was the main reason for the government to abolish price subsidy on fertilizer.

Whether it is timely to abolish subsidies, when the delivery system has collapsed is now a controversial policy issue. Many argue that before the subsidies were removed, the government should have secured an effective food delivery system in order to reach those who are food insecure. In terms of fertilizer subsidy removal, negative reaction spread out not long after the policy was announced, which was close to fertilizing time. At that time, farmers have no cash to purchase fertilizer which has already become much more expensive and, unfortunately, fertilizers accidentally disappeared from the markets. Speculators were blamed for hoarding the fertilizers. Many people suggested that subsidy elimination should instead be done gradually.

Table 5.2 Subsidized, retail and world market prices of fertilizer.

Year/Month	Subsidized Price (1)		Import Parity (2)		Ratio (1:2)	
	Urea	TSP	Urea	TSP	Urea	TSP
1997 Dec	400	525	630	1,180	0.63	0.45
1998 Jan	400	525	1,015	1,910	0.39	0.27
Feb	400	525	1,040	1,985	0.38	0.26
Mar	450	675	1,088	1,975	0.41	0.34
Apr	450	675	1,095	1,728	0.41	0.39
May	450	675	1,415	2,298	0.32	0.29
Jun	450	675	1,445	2,635	0.31	0.26
Jul	450	675	1,330	2,525	0.34	0.27
Aug	450	675	1,330	2,420	0.34	0.28

Source: Calculated from Fertilizer Week Magazine (various issues).

5.4 Impacts of the crisis and economic situation

The massive rupiah depreciation has serious implications on domestic demand, the banking system, corporate balancesheets, inflation, trade and the balance of payments, government finances, and eventually growth, incomes, employment, welfare, and poverty.

The most immediate effect of the exchange rate depreciation was a collapse in domestic demand: -2.5% in the last quarter of 1997, -7.9% and –17.6% in the first and second quarters of 1998 (World Bank 1998). The collapse of domestic demand overwhelmed producers of import substitutes who might otherwise have benefited from the exchange rate depreciation. Exporters of manufacturing products have been handicapped by a shortage in trade finance due to lack of confidence among the trading partners. The main gainers were exporters, especially those exporting agricultural and natural resource based products. As presented in Table 5.3, the values of agricultural exports during the first two quarters in 1998 were much higher than those of the previous year. However, this is not the case for mining where export values during the first two quarters were below those that of the previous year.

Table 5.3 Indonesia's export values (million US$) by industry (excluding petroleum and gas).

Year	Agriculture	Manufacturing	Mining	Others	Total
1995	2,888.3	29,328.2	2,690.9	46.0	34,953.4
1996	2,912.7	32,124.8	3,019.8	35.6	38,092.9
QRT 1	587.0	7,164.0	671.7	9.7	8,462.4
QRT 2	686.7	8,035.3	862.6	8.7	9,593.3
QRT 3	824.5	8,341.8	716.4	7.7	9,890.4
QRT 4	784.5	8,583.7	769.1	9.5	10,146.8
1997	3,132.6	34,985.2	3,107.1	596.1	41,821.0
QRT 1	600.8	7,779.4	718.5	52.5	9,151.2
QRT 2	720.2	8,501.3	878.0	261.5	10,361.0
QRT 3	931.4	9,340.0	782.4	258.1	11,311.9
QRT 4	880.2	9,364.5	728.2	24.0	10,996.9
1998					
QRT 1	807.3	8,814.3	613.0	7.4	10,242.0
QRT 2	907.5	8,751.4	606.8	6.2	10,271.9

Source: BPS, Economic Indicator (Nov. 1998 & August 1997).

The rupiah depreciation caused inflation to soar. By the end of June 1998, inflation over the past 12 months had reached 59%. The bulk of this increase was caused by a rise in the price of tradables, especially food and clothing. This has serious implications on the welfare of the poor. Agricultural supply shocks due to weather problems combined with the high inflation have sharply reduced consumer purchasing power and triggered an alarming rise in the number of food insecure families. A large number of families with incomes marginally above the

poverty line in 1996 have found that their incomes no longer keep pace with the rapidly rising prices of essential goods.

Tabor et al. (1998) estimated the poverty incidence and number of persons classified as severely food insecure in 1998. They argue that the absolute poverty incidence has increased because of: (i) the fall in real incomes, (ii) the rise in urban unemployment, which is estimated to be as high as 15 million persons, and (iii) the rise in food prices facing the poor at a rate faster than the rate of price inflation. Using the income distribution and poverty line measures prevailing in 1996, the 1998 estimates of the income fall, and higher real prices facing the poor and middle classes, they suggest that the crisis would cause an increase of 8 million urban poor and 23 million rural poor. They also suggest that there would be approximately 9.6 million urban and 24.3 million rural food-insecure individuals in mid-1998.

Up to now, the government is retaining its (more targetted) subsidy on rice, particularly to food insecure families, and it still seeking the most appropriate mechanism to deregulate trading in the staple and to make the price affordable. Market operations to help people severely affected by the crisis have been conducted in 23 out of the country's 27 provinces, with about 230,000 tons of rice being sold at much reduced price(40%). Such market operations are planned to last until March 1999.

The government budget is under tremendous strain, stemming from the impact of weaker economic activity, lower oil prices, and increased subsidies as a result of the rupiah depreciation and higher inflation. The 1998/99 budget has turned to a deficit of 8.5% of GDP. All these factors combined to lower GDP growth significantly. By the first half of 1998, GDP had contracted by 12.2% causing a number of lay-offs. Total unemployment climbed sharply to an estimated figure of 14 million or 15% of the workforce by the end of the year. Many claim that this is just the beginning. Economic conditions are likely to get worse before they get better.

5.5 Impacts of the crisis on food production and supply

Weather problems and the economic crisis have pushed Indonesia into a serious food crisis. The primary cause of food shortages and production drops is the long El-Nino drought followed by La-Nina. In terms of rice, the supply shocks occurred after several years of slow growth of rice production. The monetary crisis, which has disrupted agricultural input and output markets, seriously affected food supply.

Table 5.4 presents food crop production in the last three years. Rice production, in the form of dried paddy, dropped from 51 million tons in 1996 to 49 million tons in 1997 or at a rate of 4.1%. The 1998 rice production is estimated to drop further by 6-7% compared with that of last year. This estimate is based on the production figure over the first 8 months, which is much smaller (37 million tons) than that of the previous year (42 million tons). According to the second production forecast of the Central Bureau of Statistics, rice production in 1998 is forecast to drop further by 6.5%, to a total amount of 46.3 million tons. A similar situation has occurred in the production of other food crops. The case of soybean was the worst, since its production continuously dropped, from 1.7 million tons in 1995 to 1.5 million tons in 1996 and 1.4 in 1997. Due to weather problems of La-Nina, the 1998 production of soybeans is estimated to further decline as reflected by its total production in the first eight month of the year.

Table 5.4 Production of food crops, 1995-1998 ('000 tons).

Year /Period	Paddy	Maize	Soybean	Cassava
1995	49,744	8,246	1,680	15,441
Jan-Apr	23,524	4,811	539	2,443
May-Agt	16,476	1,946	689	6,228
Sep-Dec	9,744	1,489	452	6,770
1996	51,101	9,307	1,517	17,002
Jan-Apr	26,345	5,203	502	3,289
May-Agt	15,302	2,153	625	8,149
Sep-Dec	9,454	1,951	390	5,564
1997	49,377	8,771	1,357	15,134
Jan-Apr	26,742	5,312	469	2,680
May-Agt	14,694	2,404	550	7,770
Sep-Dec	7,941	1,055	338	4,684
1998				
Jan-Apr	21,621	5,593	380	1,952
May-Agt	15,625	2,059	510	6,119

Source: BPS. Economic Indicators (Nov. 1998).

The decline in the domestic food supply has been partially offset by an increase in food imports. Table 5.5 presents import figures of main food commodities during the 1994-1998 period. Imports of rice, soybean and sugar, in particular, have increased significantly to offset the low level of domestic production. The import of wheat has also increased to meet an increasing demand in relation to the food and social safety net program. The decline in rice production in 1997 has been offset by rice imports of 3.6 million tons plus 4.3 million tons of wheat import. As mentioned before, for the 1998/99 fiscal year, the government plans to import a million tons of sugar, 700 tons of soybeans, and 4.1 million tons of rice.

Table 5.5 Food imports, 1994-1998 ('000 tons).

Year	Rice	Maize	Soybean	Wheat	Sugar
1994	876	1,084	697	3,188	128
1995	3,014	894	473	3,614	687
1996	1,090	595	593	3,820	975
1997	3,582	619	779	3,958	1,336
Jan-Jun	320	na	na	2,087	993
1998*	3,100	500	700	4,250	1,716
Jan-Jun	3,414	na	298	2,130	954

Source: BULOG.
Note: * Forecast by Tabor et al. (1998).
Jan-Jun: Import procurement by BULOG.

5.6 Impact of the crisis on agricultural exports

Natural rubber, palm oil, coffee, tea, and cocoa are major sources of foreign exchange earnings for Indonesia. Theoretically, a large devaluation of the rupiah would make Indonesia's export commodities more competitive in the world market, and therefore increase exports. This, however, was not true due to a number of reasons. The potential boost in agricultural exports was offset by higher input prices or higher prices for imports which are either used directly by the sector (such as fertilizer and pesticides) or indirectly by other sectors which supply inputs to agriculture. The higher cost of capital choked off investment in the economy, including in the cash crop subsector.

Not only on food crops, a long drought as a result of El-Nino resulted in a sharp fall in the production of export crops including oil palm, cocoa, and coffee in the second half of 1997. Coffee production dropped by 30% in 1997, more than half of the nation's 2.7 million hectares

of oil palm were seriously damaged. As a result, exports of coffee fell by 16%, cocoa beans by 20% and tea fell by more than 36% (Bahri et al. 1998). Data on the value of Indonesia's major agricultural exports are described in Table 5.6

Table 5.6 Exports of agricultural products (million US$).

Year	Rubber	Coffee	Shrimps	Tea	Cocoa	Fish	Others	Total
1996	46.0	588.8	1,015.7	109.3	263.0	675.4	254.5	2,952.7
QRT 1	17.0	90.5	228.0	24.0	50.2	75.8	131.5	617.0
QRT 2	11.8	143.1	226.9	21.6	75.2	93.9	114.2	686.7
QRT 3	6.5	199.6	279.9	29.4	66.9	108.6	133.6	824.5
QRT 4	10.7	155.6	280.9	34.3	70.7	97.1	135.2	784.5
1997	31.8	503.5	1,007.9	84.6	295.1	381.4	828.3	3,132.6
QRT 1	6.7	91.7	232.7	31.9	45.5	60.6	131.7	600.8
QRT 2	9.4	156.8	220.1	31.0	59.8	99.3	143.8	720.2
QRT 3	6.8	165.2	291.1	15.6	95.0	98.5	259.2	931.4
QRT 4	8.9	89.8	264.0	6.1	94.8	123.0	293.6	880.2
1998								
QRT 1	4.4	100.0	230.2	31.1	45.4	97.7	298.5	807.3
QRT 2	5.1	113.2	307.7	28.8	102.0	98.5	252.2	907.5

Source: BPS, Economic Indicator (Nov. 1998 & August 1997).

6. Conclusion and Policy Recommendations

6.1 Effects of trade liberalization prior to the economic crisis

At the macro level, tariff reductions for import substitution would reduce wholesale price, producer price, supply quantity and producer surplus, but increase demand quantity, import and consumer surplus. The eventual effect would be an increase in net surplus, suggesting an improvement in social welfare. The extent of change, however, would be dependent very much on the transmission elasticity of tariff on wholesale price, the transmission elasticity of wholesale price on producer price, and the price elasticity of supply and demand. A higher tariff transmission elasticity would have a larger negative effect on wholesale and producer prices, and thus have a larger negative effect on producer surplus, a larger positive effect on consumer surplus and eventually a larger positive effect on social welfare.

The effect of multilateral (Uruguay Round) trade liberalization estimated from partial welfare analysis in this study should be interpreted cautiously, since the result ignores the general equilibrium effect of resource movement between sectors, which creates other economic opportunities and dampens the overall adverse effects. Previous studies indicate that commodity prices will be higher than they would have been without liberalization. This will simply mean that countries that are net exporters of these commodities will gain from liberalization, while countries that are net importers may lose. In this regard, in order to avoid the possible loss from trade liberalization due to these upward price changes, the developing countries should reform their own policies and also act to redistribute income domestically between consumers and producers.

At the farm level, tariff cuts would reduce the producer price. Due to own price and cross-price effects, a decline in producer price would reduce the use of inputs such as fertilizer and labor, which would subsequently reduce yield and net revenue. As reflected in price transmission elasticity, the magnitude of the effects at the farm level would be dependent on the marketing system of the respective commodities. It is likely that the more efficient the marketing system, the higher the elasticity of price transmission. In the case of rice and potato in West Java and soybean, maize and cassava in East Java, the marketing systems can be considered efficient with marketing margins of 14-15%. Further improvement in the marketing systems would therefore improve the producer price.

Rice

There is no single policy claimed to be the main contributor to Indonesia's success in the rice business. The success is instead attributed to combined efforts and policies over decades. Hence, a review on government policies is needed. In the case of rice, the main policies, which have contributed to the rapid growth in rice production and achievement of self-sufficiency, are the rice intensification programs, irrigation development, support for development and dissemination of modern varieties of rice, intervention in rice marketing and price support, and fertilizer subsidies.

The import figures indicate that trade liberalization of the Indonesian rice market started gradually in the late 1980s. Milled rice import quantity, though unstable, tended to increase by 165.3 thousand tons or 36.60% per annum. In 1996, the rice import was 2.04 million tons valued at US$ 676.6 million. This was a combined result of increased domestic supply shortage of rice due primarily to increased demand and domestic supply shock resulting from the drought. In subsequent years (1997-1998), higher import quantities might be expected as a

result of severe drought effects that could, in turn, drive up world rice prices. The total rice import was estimated to increase further in 1998 to around 4.2 million tons valued at US$ 1.08 billion. The major countries of origin of the rice import have been India, Thailand, Viet Nam and Pakistan.

The removal of the implicit import tariff for rice (reduction by 16.4%) would increase the demand for rice by 2.36% or 796,700 tons. Meanwhile, the supply of paddy would decline by 2.83%, from 51.1 million tons to 49.7 million tons in response to the drop in producer price of paddy. The import quantity would increase by around 1.7 million tons, from 2.04 to 3.7 million tons. As a result, the net welfare gains for the 16.4% cut of implicit tariff would be around RP 1,832.2 billion. The gain of consumer surplus would be Rp 4,910.5 billion, while the loss of producer surplus was estimated at around Rp 2,092.6 billion. At the farm level, the gross revenue and total variable cost of rice farming would decrease by 13.9% and by 5.7%, respectively, resulting in reduction of net revenue by 21.7% from Rp 892,119 to Rp 698,373.

The implementation of Uruguay Round trade liberalization is expected to lift the world market price of rice by 7&. The analysis shows that this price change would increase the wholesale and producer prices by 6.63% and 6.76%, respectively. The increase in the domestic wholesale price would reduce the demand for rice by 1.27% (427,650 tons), but increase production of paddy slightly by 1.52% (30,940 tons), or increase from 51.102 million tons to 51.133 million tons. The import quantity would decline by around 446,840 tons, from 2.040 to 1.593 million tons. The net welfare loss would be around Rp 1,069.30 billion. These social welfare losses were attributed to loss on consumer surplus, which was much higher (Rp 2,209.07 billion) than the gains captured by producers (Rp 1,139.77 billion). At the farm level, Uruguay Round trade liberalization would increase gross farm revenue and total variable cost by 7.4% and 3.0%. Eventually, the net revenue would increase by 11.7%, from Rp 892,119 to Rp 996,063.

The economic crisis has forced the government to abruptly deregulate its domestic rice market. The December 1998 deregulation liberalized the rice market including the removal of BULOG's monopoly on the importation of rice. There has been growing concern recently about the potential adverse effects of this situation. These concerns were mainly triggered by a decreasing trend of rice prices in the world market in the last four months. Some are afraid that, if no tariff were imposed, the Indonesian rice market would be flooded by imported rice, and this in turn would negatively affect domestic rice production and farm income. In order to reduce these potential adverse effects, the government has been considering implementation of an import tariff on rice. The analysis estimated that that the net welfare loss for imposing a 15% import tariff is around Rp 588.3 billion per year. This social welfare loss was attributed to loss on consumer surplus, which is much higher than the gain captured by producers as a result of the 15% tariff. The loss of consumer surplus is Rp 8,826 billion, while the producer and government surplus gains were estimated around Rp 7,221 billion and Rp 1,017 billion per annum, respectively.

Soybeans

Despite heavy restrictions on imports, the import volume of soybean and soybean meal is continuously increasing. This is because domestic production cannot meet the accelerating demands for soybean and soybean meals as a result of, particularly, the fast growing feed and livestock industries. During the last two decades, import of soybean grain (yellow and black) increased substantially, from around 130 thousand tons in 1978 to 746 thousand tons in 1996. Meanwhile, import soybean meal as a protein source for poultry feed increased from 283 thousand tons in 1986 to 460 thousand tons in 1994.

The decrease in domestic wholesale price following the tariff removal would increase the demand for soybean by 35,500 tons, 1.61% higher than the base year level. In contrast, the supply of soybean would decline by 1.6% (32,300 tons), from 1,680 thousand tons to 1,648

thousand tons in response to the drop in producer price of soybeans. Import quantity would increase by around 67,800 tons, from 533,600 tons to 601,400 tons. The net welfare gain resulting from tariff removal on the soybean import is estimated around Rp 32.3 billion. These social welfare gains were attributed to the gain that would be enjoyed by consumers, which is much higher than the losses borne by producers as a result of tariff removal. The consumer surplus gain would be about Rp 110.5 billion, while the loss of producer surplus is estimated around Rp 55.8 billion. Due to the tariff removal, the government would give up income of around Rp 22.3 billion per year. At the farm level, the removal of the tariff would reduce net revenue of soybean farming by 4.6%, from Rp 872,629 to Rp 832,354.

The 7% increase in world market price of soybean arising from the Uruguay Round trade agreement would increase the wholesale and producer prices by 5.01% and 4.39%, respectively. Increase in the domestic wholesale price would in turn reduce the demand for soybean by 2.14% (47,450 tons). Meanwhile, the production of soybean would increase by 2.57% (13,700 tons), from 1,680 thousand tons to 1,693 thousand tons in response to the increase in the producer price of soybean. The import quantity would decline by 61,150 tons, from 533,600 tons to 472,450 tons. The net welfare loss resulting from the implementation of the Uruguay Round trade liberalization would be around Rp 69.14 billion. At the farm level, gross revenue and total variable cost of soybean farming would increase by 4.6% and 0.4%. The net revenue would increase from Rp 872,629 to Rp 925,860, by 601%.

Maize

Indonesia used to be a net exporter of maize, but since the early 1990s it has became a net importer. At the early stage of the period (1969-1971), the export quantity was sizeable ranging from 156,264 to 285,833 tons. In the following years, however, it tended to decrease with substantial fluctuation. Import of maize has taken place since 1973, the first year of the Second Five-Year Development Plan. There were large imports in 1994 and 1997, ranging from 0.6 to 1.1 million tons, and it is projected to increase in the future.

In general, there has been less market and trade intervention on maize. The most prominent import policy was the imposition of tariffs, principally aimed at protecting farmers from severe effects of price drops. Since the early 1990s, Indonesia has practically liberalized its domestic market of maize.

The decrease in the domestic wholesale price following the tariff removal of 5% would increase the demand for maize by 302,700 tons or 1.8% higher than the base year level. In contrast, the supply of soybean would decline by 159,000 tons. The import quantity would increase by around 461,700 tons. The net welfare gains resulting from tariff removal on maize import are estimated around Rp 36.3 billion. These social welfare gains are attributed to the gain that would be enjoyed by consumers, which is much higher than the losses borne by producers as a result of tariff removal. The consumer surplus gain would be about Rp 185.5 billion, while the loss of producer surplus is estimated around Rp 136.3 billion. Due to tariff removal, the government would give up income of around Rp 12.9 billion per year. At the farm level, the tariff removal would likely reduce net revenue by 4.86% or Rp 35,731 per hectare per season.

The world price increase by 4%, on the other hand, would have severe effects on the maize economy. The quantity imported and consumer surplus would decrease by 4,490 tons and Rp 177.8 billion, respectively, while the producer surplus would increase by Rp 133.8 billion. The social welfare of the society, in effects, would get worse because of a decline in net surplus by Rp 44.0 billion. At the farm level, on the other hand, farmer's income would be better-off from additional net revenue of 4.74% or Rp 34,814 per hectare per season.

Cassava

Indonesia is a net exporter of cassava and its derived products. During 1969-1997, export quantities were substantial, while imports were nil. Indonesia's export of cassava, however, has fluctuated throughout the period with a declining trend. The declining export quantity in the 1991-1997 period may be attributed to a slight decline in production and increases in domestic use, besides a heavy trade restriction (quota) imposed by importing countries. The world market of cassava and its derived products has been severely distorted. If this distortion were removed, or the world market of cassava liberalized, world prices of cassava may be expected to increase by 6%.

A 65 increase in the world price would eventually decrease the quantity demanded by 0.04% or 7,000 tons. In contrast, this increase in the world price would eventually increase the quantity supplied by 0.44% or 74,990 tons. These changes would generate a potential increase for export by around 81,990 tons. As a consequence, consumer surplus would be expected to decrease by Rp 109.4 billion and the producer surplus to increase by Rp 110.7 billion. The net surplus would increase by approximately Rp 1.3 billion. This is to say that any increase in the world price of cassava would eventually improve social welfare. At the farm level, the world price change would improve net revenue by 4.39% or Rp 85,666 per hectare per season.

Potato

Production of potato in Indonesia has grown steadily during the last two decades. Total production increased from 230 thousand tons in 1980 to 1.1 million tons in 1996, at an average rate of 10.3% per annum over the period. Although long-term production and consumption indicate a positive trend, fluctuation has been experienced over the last ten years. The increase in production is mainly attributable to a steady increase in yield, from 9.4 tons per ha in 1980 to 15-16 tons per ha in 1996-1997. Yield of potato has fluctuated somewhat for a number of reasons, and there has been indication that yield of potato in major highland production areas has been declining. Factors leading to reduced yields in highland areas are, among others, the use of degenerated and infested seed, occurrence of pest and disease complexes, and decreasing soil fertility. Erosion has been frequently noticed in most highland areas.

Indonesia is a net exporter of potatoes. During the 1980-1997 period, export of potato increased from 365 tons to 36,758 tons, at an average rate of 31% per annum. The principal export destinations of potato are Malaysia and Singapore. Although relatively small, import of potato is continuously increasing. Potato is imported in the form of seeds, fresh or chilled and frozen. During the 1988-1997 period, import of potato increased from 18.9 tons to 2,035 tons, at an average annual rate of 68%. The principal countries of origin of imported potato are Australia, USA and the Netherlands for potato seeds; Australia and the Netherlands for fresh/chilled potato; and the USA for frozen potato.

Unlike other food commodities, as indicated before, government policies on production, marketing and trade have been very limited. On the production side, as potato is not considered a main staple, there have been limited production programs on potato undertaken by both national and provincial governments. Except for tariff regulation, potato trade and marketing have long been liberalized. Moreover, potato-related products which have been tariffied are of little importance, since they are not widely used in production and are relatively small in import volume. In addition, domestically produced potatoes are not perfect substitutes of the imported ones. Therefore, any policy for liberalizing the potato trade is expected to have limited effects not only on potato industries but also on the economy.

The decrease in the domestic wholesale price following tariff reduction (from 22 to 17%) would increase the demand for potato by 4,400 tons or 0.42% higher than the base year level. In contrast, the supply of potato would decline by 2.8% (29,900 tons), from 1,035 thousand tons to 1,005 thousand tons in response to the drop in producer price of potato. Import quantity would increase by around 43,000 tons, from 2,100 tons to 36,500 tons. As a result, the

net welfare gains from tariff removal would be around Rp 10.4 billion. This is attributable to the consumer surplus gain amounting to Rp 33.8 billion net to the producers and the government surplus losses of Rp 26.0 billion and Rp 2.6 billion, respectively. At the farm level, this 5% tariff reduction would reduce gross revenue and total variable cost of potato farming by 5.4% and 0.2%, respectively. The eventual result would be a decline in net revenue by 7.9%, from Rp 10,356,164 to Rp 9,533,752 per ha per season.

6.2 Effects of the economic crisis and policy reforms

Since the economic crisis hit the county the government has undertaken massive policy reforms in agriculture, including: (i) eliminating the BULOG import monopoly over wheat, wheat flour, sugar, soybeans, garlic, and quite recently rice, (ii) reducing tariff rates on all food items to a maximum of 5% and abolishing local content regulations, (iii) removing restrictive trade and marketing arrangements for a number of commodities including local content requirement, and (iv) deregulating trade in agricultural products across district and provincial boundaries including cloves, oranges, and livestock. It is expected that consistent implementation of these reforms will restore investor confidence and to allow more efficient and productive investment.

Despite the ongoing reforms, the economy remains in a deep crisis. The massive currency depreciation has serious implications on domestic demand, the banking system, corporate balance sheets, inflation, trade and the balance of payments, government finances, and eventually growth, incomes, employment, welfare, and poverty. The most immediate effect of the exchange rate depreciation was a collapse in domestic demand. The collapse of domestic demand overwhelmed producers of import substitutes who might otherwise have benefited from the exchange rate depreciation. Exporters of manufacturing products have been handicapped by a shortage in trade finance due to lack of confidence among the trading partners. The main gainers were exporters, especially those exporting agricultural and natural resource based products.

The currency depreciation caused inflation to soar. Inflation over the 12 months to the end of June 1998 reached 59%. The bulk of this increase was caused by a rise in the price of tradable goods, especially food and clothing. This has serious implications for the welfare of the poor. Agricultural supply shocks due to weather problems combined with the high inflation have sharply reduced consumer purchasing power and triggered an alarming rise in the number of food insecure families. A large number of families with incomes marginally above the poverty line in 1996 have found that their incomes no longer keep pace with the rapidly rising prices of essential goods. Up to now, the government is retaining a targeted subsidy on rice, particularly to food insecure families, and it still seeking the most appropriate mechanisms to deregulate trading in this staple and to make the price affordable. Market operations to help people severely affected by the crisis have been conducted in 23 out of the country's 27 provinces.

Weather problems and the economic crisis have pushed Indonesia into a serious food crisis. In terms of rice, the supply shocks occurred after several years of slow growth of rice production. The monetary crisis, which has disrupted agricultural input and output markets, seriously affected the food supply. Rice production, in the form of dried paddy, dropped from 51 million tons in 1996 to 49 million tons in 1997 at a rate of 4.1%. According to the second production forecast of the Central Bureau of Statistics, rice production in 1998 is forecast to drop further by 6.5%, to a total amount of 46.3 million tons. Similar situations occurred in the production of other food crops. The case of soybean was the worst, and its production declined continuously during the 1995-1998 period.

The decline in domestic food supply has been partially offset by an increase in food imports. Imports of rice, soybeans and sugar, in particular, have increased significantly to offset

the low level of domestic production. The import of wheat has also increased to meet an increasing demand in relation with the food and social safety net program. The decline in rice production in 1997 has been offset by a rice import of 3.6 million tons plus 4.3 million tons of wheat import. For the 1998/99 fiscal year, the government plans to import a million tons of sugar, 700 thousand tons of soybeans, and 4.1 million tons of rice.

Whether it is timely to undertake abrupt policy reforms in agriculture when the delivery system has collapsed is now a controversial policy issue. Many argued that before the subsidies were removed, the government should have secured an effective food delivery system in order to reach those who are food insecure. In terms of fertilizer subsidy removal, negative reaction spread out not long after the policy was announced, since fertilizer not only disappeared from the market but their prices were too expensive. Many people suggested that subsidy elimination should instead be done gradually.

6.3 Policy recommendations

Trade liberalization would act to redistribute income between consumers and producers. In the case of import substitution commodities, such as rice, soybean and maize, trade liberalization through tariff reduction would increase the social welfare of society. In the case of export commodities such as cassava, an increase in world price resulting from trade liberalization would also increase the social welfare of society. The negative effects arising from trade liberalization can be attenuated if the government could act to help enhance productive efficiency. In addition, government policies should also act to better redistribute the welfare gains arising from trade liberalization.

Since unilateral trade liberalization on import substitution commodities would likely reduce the welfare of producers, at least in the short-run, attempts should be made to prevent producers from income squeeze. Agricultural policy reform should be directed to further increasing farm productivity and marketing efficiency. Introduction of improved production technology, provision of farm credits, and improvement of infrastructure such as transportation facilities, are among other policies expected to minimize the negative effects, and at the same time, open opportunities to gain from trade liberalization.

Government intervention on rice remains a debatable policy issue. Although the rice trade has been liberalized, the government is still attempting to use a floor price and market operations program to support producer incomes and stabilize consumer prices. Three options might be considered as follows. At one extreme, the government could abandon all efforts to stabilize domestic rice prices, abolish the public procurement and distribution system, and rely solely on private trade. The question is whether domestic producers and consumers would be willing to accept the consequences of considerable price volatility. Another extreme option would be to restore government's monopoly on rice imports and return to its pre-1998 rice price stabilization policy. The compromise option would be to retain many of its previous rice policy objectives, while implementing them in a more transparent and cons-effective way.

7. References

Adiyoga, W.; Suherman, R.; and Asgar, A. 1996 Potato System in West Java, Indonesia. Research Institute for Vegetables, AARD.

Amang, B.; Sawit, H.M.; and Rachman, A. 1996. Ekonomi Kedele di Indonesia. Penerbit Institute Pertanian Bogor.

Bahri, S.; Erwidodo; Stringer, R.; and Witter, Glyn. 1998. Crisis induced policy reforms and food security in Indonesia. Paper read at ACIAR 9449's 4th Workshop on the Linkages Between Indonesia's Agricultural Production, Trade and Environment. Bogor, 21 September.

Biro Pusat Statistik (BPS). 1997-1998. Economic Indicators (various issues). Biro Pusat Statistik, Indonesia.

Bottema, J.W. Taco; Siregar, H.; Pasaribu, S.M.; Gijsbers, G.; and Basuki, R.S. 1989. Potato in Indonesia: Prospects for Medium Altitude Production. Monograph No. 21, CGPRT Centre, Bogor.

Erwidodo. 1990. Panel Data Analysis on Farm-Level Efficiency, Input Demand and Output Supply of Rice Farm in West Java, Indonesia. Unpublished PhD dissertation, Dept. of Agricultural Economics, Michigan State University.

Erwidodo. 1998. A multilevel modelling approach: impact of trade liberalization on food production and farm income. Paper read at the Third Workshop of the ACIAR-Indonesia Research Project on Agriculture, Trade and the Environment, CIES, University of Adelaide, 24-25 February.

Erwidodo. 1999. Effects of Trade Liberalization on Agriculture in Indonesia: Institutional and Structural Aspects. Working Paper No. 41, CGPRT Centre, Bogor.

Erwidodo; and Gerard, F. 1997. Impact of agricultural trade liberalization on food crop production and farm income: the situation of Java's lowland, Indonesia. Paper read at CGPRT Centre-CIRAD Seminar, 25-27 March, UN/ESCAP, Bangkok.

Francoise, Joe; McDonald, B; and Nordstrom, H. 1995. Assessing the Uruguay Round. Paper read at the World Bank Conference on the Uruguay Round and Developing Economies, Washington, D.C.

Gerard, F.; and Erwidodo. 1996. Consequences of Agricultural Trade Liberalization on Food Crop Production and Farm Income in Java Lowland. Paper read in the ASAE 2nd Conference, August 6-9, 1996, Bali, Indonesia.

Hadi, P.U. 1998. Market Assessment and Agribusiness Investment Opportunity: Cereals, Root, Tuber and Pulses. Center for Agro Socioeconomic Research, Bogor.

Hadi, P.U.; Waluyo; and Sugiarto. 1992. Studio on Agribusiness (Book II: Maize), Center for Agro Socioeconomic Research, Bogor.

Hayami, Y.; Kawagae, T.; Marroko, Y.; and Siregar, M. 1987. Agricultural Marketing and Processing of Soybeans in Upland Java: A Perspective from a Sunda Village. Monograph No. 8, CGPRT Centre, Bogor, Indonesia.

Horton, D. 1980. Potato Marketing in Developing Countries. Social Science Department Training Document. International Potato Center, Lima, Peru.

ILO. 1998. Employment Challenges of the Indonesian Economic Crisis. International Labor Organization, Jakarta Office, Indonesia.

Jierwiriyapant, P.; Hermanto; Roche, F.; and Bottema, J.W. Taco. 1992. Local Soybean Economics and Government Policies in Thailand and Indonesia. Monograph No. 27, CGPRT Centre, Bogor.

Lewis, J.D.; and Robinson, S. Partners or predators? The impact of regional trade liberalization on Indonesia. Paper read at the ISEI-World Bank Conference on Economic Deregulation: "Building on Success: Maximizing the gains from Deregulation", Jakarta 26-27 January.

Pakpahan, A.; Gunawan, M.; Djauhari, A.; Pasaribu, S.M.; Nasution, A.; and Friatno, S. 1992. Cassava Marketing in Indonesia. Center for Agro Socioeconomic Research, Bogor.

Pameroy, L.J. 1995. Measuring costs and benefits of soymeal deregulation in Indonesia, 1991-1994. Paper read at the ISEI-World Bank Conference on Economic Deregulation: Building on Success: Maximizing the Gains from Deregulation, Jakarta 26-27 January.

Piggot, R.R.; Parton, K.A.; Treadgold, E.M.; and Hutabarat, B. 1993. Food Crop Sector. International Food Policy Research Institute, Washington D.C., and Center for Agro Socioeconomic Research, Bogor, Indonesia.

PSE. 1997. Analisis Permintaan dan Penawaran Komoditas Pertanian Utama dalam Pelita VII. Research Technical Report, the Center for Agro Socioeconomic Research, Bogor, Indonesia.

Rosegrant, M.W.; Kasryna, F.; Gonzales, L.A.; Rasahan, C.A.; and Saefudin, Y. 1987. Price and Investment Policies in the Indonesian Food Crop Sector. International Food Policy Research Institute, Washington D.C., and Center for Socioeconomic Research, Bogor, Indonesia.

Simatupang, P.; et al. 1995. Projecting and Policy Implications of Medium and Long-term Rice Supply and Demand in Indonesia. Center for Agro Socioeconomic Research (CASER), Bogor, in collaboration with IFPRI, Washington, D.C.

Stephenson, S.; and Erwidodo. 1995. The impact of the Uruguay Round on Indonesia's agricultural sector. Paper read at the ISEI-World Bank Conference on Economic Deregulation: Building on Success: Maximizing the Gains from Deregulation, Jakarta 26-27, January.

Sudaryanto, T.; Hermanto; Erwidodo; Pasamdaran, E.; and Rosegrant, M. 1992. Food Situation and Outlook for Indonesia. Research report of the Center for Agro Socioeconomic Research, Bogor, Indonesia in collaboration with International Food Policy Research Institute, Washington D.C.

Tabor, R.T.; Dillon, H.S.; and Sawit, M.H. 1998. Food security on the road to economic recovery. Paper read at the Indonesian Society of Agricultural Economics (PERHEPI) and the Center for Agricultural Policy Studies (CAPS) meeting, 26 June.

Tabor, S.R.; et al. 1988. Supply and Demand for Food Crops in Indonesia. Directorate of Food Crop Economics, Post Harvest, and Processing, Directorate General of Food Crops, Ministry of Agriculture, Jakarta, Indonesia.

Trewin, R.; Erwidodo; and Huang, Y. 1993. Stages of development of an Indonesian computable general equilibrium model (INDOGEM) with application to analysis of key agricultural policies. Paper read at 1993 Conference of Economists, Murdoch University, Perth, Australia, 27-30 September.

World Bank. 1997. Indonesia: Sustaining Development. Report No.11737-IND. World Bank, Washington, D.C.

World Bank. 1997. Indonesia: Sustaining High Growth with Equity. Report No.16433-IND. World Bank, Washington, D.C.

World Bank. 1998. Indonesia in Crisis: A Macroeconomic Update. The World Bank, Washington, D.C.

Appendices

Appendix 3.1 Social welfare effects of tariff cuts on rice.

Commodity:	Rice					
Policy Scenario:	Tariff Cuts					
World price 1996 (US$/ton)	PW	Data	332			
Exchange rate 1996 (Rp/US$)	ER	Data	2,385			
World price 1996 (Rp/kg)	PCIF	PW x ER	791.1			
Import parity price at wholesale level (Rp/kg)	PIP	PCIF x 1.08	854.4			
Wholesale price at to (Rp/kg)	PWSo	Data	995.0			
Initial implicit tariff rate (%)	TR0	Calculated	1&.46			
New implicit tariff rate (%)	TR1	Given	0			
Initial tariff (Rp/kg)	T0	TR0 x PCIF/100	130.19			
New tariff (Rp/kg)	T1	TR1x PCIF/100	0.00			
Tariff change (%)	%dT	TR1-TR0	-16.46			
Producer price at to (Rp/kg)	PF0	Data	330			
Supply of paddy at to (’000 t)	Qso	Data	51,102			
Conversion paddy to rice	CF	Data	0.62			
Import quantity of rice at to (’000 t)	Qmo	Data	2,040			
Demand for rice at to (’000 t)	Qdo	Calculated	33,723			
Demand elasticity	Ed	Regression	-0.1914			
Supply elasticity	Es	Regression	0.2245			
Price transmission elasticity of PWS to PF	Ep	Regression	1.0198			
Effects of tariff change:						
Tariff transmission elasticity	ET	Assumed	0.25	0.50	0.75	1.00
Effect on wholesale price (%)	%dPWS	%dT x ET	-4.11	-8.23	-12.34	-16.46
Change in wholesale price (Rp/kg)	dPWS	%dPWS x PWSo	-40.9	-81.9	-122.8	-163.7
Wholesale price at t1 (Rp/kg)	PWS1	PWS1 + dPWS	954.1	913.1	872.2	831.3
Effect on producer price (%)	%dPF	%dPWS x Ep	-4.1957	-8.3914	-12.5871	-16.7828
Change in producer price (Rp/kg)	dPF	%dPF x PF0	-13.8	-27.7	-41.5	-55.4
Producer price at t1 (Rp/kg)	PF1	PF0 + dPF	316.2	302.3	288.5	274.6
Effect on demand (%)	%dQd	%dPWS x Ed	0.7875	1.5749	2.3624	3.1499
Change in demand quantity (’000 t)	dQd	%dQd x Qdo	265.6	531.1	796.7	1,062.2
Demand quantity at t1 (’000 t)	Qd1	Qdo + dQd	33,988.8	34,254.4	34,519.9	34,785.5
Effect on supply (%)	%dQs	%dPF x Es	-0.9419	-1.8839	-2.8258	-3.7677
Change in supply quantity (’000 t)	dQs	%dQs x Qso	-481.3	-962.7	-1,444.0	-1,925.4
Supply of paddy at t1 (’000 t)		Qso + dQs	50,620.7	50,139.3	49,658.0	49,176.6
Supply of rice at t1 (’000 t)	Qsr1	CF x Qs1	31,384.8	31,086.4	30,787.9	30,489.5
Import quantity at t1 (’000 t)	Qm1	Qd1 - Qs1	2,604.0	3,168.0	3,732.0	4,296.0
Effect on import quantity (’000 t)	dQm	Qm1 - Qmo	564.0	1,128.0	1,692.0	2,256.0
Effect on consumer surplus (Rp million)	dCS	dPWS x (Qd1 - dQd/2)	1,385,953.8	2,782,778.7	4,190,474.7	5,609,041.8
Effect on producer surplus (Rp million)	dPS	dPF x (Qs1 + dQs/2)	-704,216.8	-1,401,769.0	-2,092,656.5	-2,776,879.4
Effect on implicit government revenue (Rp million)	dGR	(Qm1*T1)-(Qmo*T0)	-265,591.3	-265,591.3	-265,591.3	-265,591.3
Effect on net surplus (Rp million)	dNS	dCS + dPS + dGR	416,145.7	1,115,418.4	1,832,226.9	2,566,571.2

Appendix 3.2 Price transmission of wholesale to producer price of rice.

Dependent Variable: LPFR

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	1.52599	1.52599	146.549	0.0001
Error	10	0.10413	0.01041		
C. Total	11	1.63012			

Root MSE	0.10204	R-square	0.9361
Dep Mean	5.23754	Adj R-sq	0.9297
C.V	1.94831		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	-1.190237	0.53178649	-2.238	0.0492
LPWSR	1	1.019771	0.08423873	12.106	0.0001

Durbin-Watson D	1.762
(For Number of Obs.)	12
1st Order Autocorrelation	0.095

Appendix 3.3 Demand function for rice.

Dependent Variable: LQDR

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	0.07073	0.03537	42.714	0.0001
Error	9	0.00745	0.00083		
C. Total	11	0.07819			

Root MSE	0.02877	R-square	0.9047
Dep Mean	17.08859	Adj R-sq	0.8835
C.V	0.16838		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	19.616567	1.43366878	13.683	0.0001
LRPWSR	1	-0.191407	0.11084242	-1.727	0.1183
LYCR	1	0.252962	0.08901606	2.842	0.0193

Durbin-Watson D	1.622
(For Number of Obs.)	12
1st Order Autocorrelation	0.095

Appendix 3.4 Supply function of paddy.

Dependent Variable: LQSPD

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.06483	0.06483	88.306	0.0001
Error	9	0.00661	0.00073		
C. Total	10	0.07143			

Root MSE	0.02709	R-square	0.9075
Dep Mean	10.72120	Adj R-sq	0.8972
C.V	0.25272		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	9.556783	0.12418116	76.958	0.0001
LLPFR	1	0.224509	0.02389133	9.397	0.0001

Durbin-Watson D	2.502
(For Number of Obs.)	11
1st Order Autocorrelation	-0.280

Appendix 3.5 Price transmission of world to wholesale price of rice .

Dependent Variable: LPWSR

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	1.27751	1.27751	67.281	0.0001
Error	10	0.18988	0.01899		
C. Total	11	1.46739			

Root MSE	0.13780	R-square	0.8706
Dep Mean	6.30316	Adj R-sq	0.8577
C.V	2.18614		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	-6.044867	1.50592364	-4.014	0.0025
LPCIFR	1	0.946507	0.11539253	8.202	0.0001

Durbin-Watson D	0.760
(For Number of Obs.)	12
1st Order Autocorrelation	0.525

Appendix 3.6 Social welfare effects of increase in the world price of rice.

Commodity:	Rice		
Policy Scenario	World Price Increase		
World price 1996 (US$/ton)	Pwo	Data	332
Increase world price (%)	%dPw	Uruguay Trade Lib	7.0
World price 1997 (US$/ton)	PW1	Calculated	381.8
Exchange rate 1996 (Rp/US$)	ER	Data	2385
World price 1996 (Rp/kg)	PFOBo	Calculated	791.8
World price 1997 (Rp/kg)	PFOB1	Calculated	910.6
Wholesale price at 1996 (Rp/kg)	PWSo	Data	995.0
Producer price at to (Rp/kg)	PF0	Data	330
Supply quantity at 1996 ('000 t)	Qso	Data	51,102
Conversion factor of paddy to rice	CF	Data	0.62
Import quantity at 1996 ('000 t)	Qmo	Data	2,040
Demand quantity at to ('000 t)	Qdo	Calculated	33,723.24
Demand elasticity	Ed	Regression	-0.1914
Supply elasticity	Es	Regression	0.2245
Price transmission of PFOB to PWS	Ew	Regression	0.9465
Price transmission elasticity of PWS to PF	Ep	Regression	1.0198
Effects of increased world price:			
Change in wholesale price (%)	%dPWS	%dPFOB x Ew	6.63
Change in wholesale price (Rp/kg)	dPWS	%dPWS x PWSo/100	65.92
Wholesale price at 1997 (Rp/kg)	PWS1	PWSo + dPWS	1,060.92
Effect on producer price (%)	%dPF	%dPWS x Ep	6.76
Change in producer price (Rp/kg)	dPF	%dPF x PF0/100	22.30
Producer price at 1997 (Rp/kg)	PF1	PF0 + dPF	352.30
Effect on demand quantity (%)	%dQd	%dPWS x Ed	-1.27
Change in demand quantity ('000 t)	dQd	%dQd x Qdo/100	-427.65
Demand quantity at 1997('000 t)	Qd1	Qdo + dQd	33,295.59
Effect on supply (%)	%dQs	dPF x Es	1.52
Change in supply quantity ('000 t)	dQs	%dQs x Qso/100	30.94
Supply of paddy at 1997 ('000 t)	Qs1	Qso + dQs	51,132.94
Supply of rice at 1997 ('000 t)	Qsr1	Qs1 x CF	31,702.43
Import quantity at 1997 ('000 t)	Qm1	Qd1 - Qs1	1,593.16
Effect on Import quantity ('000 t)	dQm	Qm1 - Qmo	-446.84
Effect on consumer surplus (Rp million)	dCS	dPWS x (Qd1 - dQd/2)	-2,209,065.41
Effect on producer surplus (Rp million)	dPS	dPF x (Qs1 + dQs/2)	1,139,769.35
Effect on net surplus (Rp million)	dNS	dCS + dPS + dGR	-1,069,296.06

Appendix 3.7 Social welfare effect of imposing import tariff on rice.

Commodity:	Rice					
Policy Scenario:	Imposing a 15% Import Tariff					
World price 1998 (US$/ton)	PW	Given	258			
Exchange rate 1998 (Rp/US$)	ER	Given	8250			
World price 1998 (Rp/kg)	PCIF	PW x ER	2,128.5			
Initial tariff rate (%)	TR0	Given	0			
New tariff rate (%)	TR1	Given	15			
Initial tariff (Rp/kg)	T0	TR0 x PCIF/100	0.00			
New tariff (Rp/kg)	T1	TR1x PCIF/100	319.28			
Tariff change	dT	TR1-TR0	15			
Wholesale price at to (Rp/kg)	PWSo	Given	2,400.0			
Producer price at to (Rp/kg)	PF0	Given	1,450			
Supply quantity at to ('000 t)	Qso	Given	46,400			
Conversion paddy to rice	CF	Given	0.62			
Import quantity at to ('000 t)	Qmo	Given	4,200			
Demand quantity at to ('000 t)	Qdo	Given	32,968			
Demand elasticity	Ed	Regression	-0.1914			
Supply elasticity	Es	Regression	0.2245			
Price transmission elasticity of PWS to PF	Ep	Regression	1.0198			
Effects of Tariff Change:						
Tariff transmission elasticity	ET	Assumed	0.25	0.50	0.75	1.00
Effect on wholesale price (%)	%dPWS	dT x ET	3.75	7.50	11.25	15.00
Change in wholesale price (Rp/kg)	dPWS	%dPWS x PWSo	90.0	180.0	270.0	360.0
Wholesale price at t1 (Rp/kg)	PWS1	PWS1 + dPWS	2,490.0	2,580.0	2,670.0	2,760.0
Effect on producer price (%)	%dPF	%dPWS x Ep	3.8243	7.6485	11.4728	15.2970
Change in producer price (Rp/kg)	dPF	%dPF x PF0	55.5	110.9	166.4	221.8
Producer price at t1 (Rp/kg)	PF1	PF0 + dPF	1,505.5	1,560.9	1,616.4	1,671.8
Effect on demand (%)	%dQd	%dPWS x Ed	-0.7178	-1.4355	-2.1533	-2.8710
Change in demand quantity ('000 t)	dQd	%dQd x Qdo	-236.6	-473.3	-709.9	-946.5
Demand quantity at t1 ('000 t)	Qd1	Qdo + dQd	32,731.4	32,494.7	32,258.1	32,021.5
Effect on supply (%)	%dQs	%dPF x Es	0.8585	1.7171	2.5756	3.4342
Change in supply quantity ('000 t)	dQs	%dQs x Qso	398.4	796.7	1,195.1	1,593.5
Supply quantity at t1 ('000 t)	Qs1	Qso + dQs	46,798.4	47,196.7	47,595.1	47,993.5
Supply of rice at t1 ('000 t)	Qsr1	Qs1 x CF	29,015.0	29,262.0	29,509.0	29,755.9
Import quantity at t1 ('000 t)	Qm1	Qd1 - Qsr1	3,716.4	3,232.8	2,749.2	2,265.5
Effect on import quantity ('000 t)	dQm	Qm1 - Qmo	-483.6	-967.2	-1,450.8	-1,934.5
Effect on consumer surplus (Rp million)	dCS	dPWS x (Qd1 - dQd/2)	-2,956,471.1	-5,891,647.0	-8,805,525.7	-11,698,108.0
Effect on producer surplus (Rp million)	dPS	dPF x (Qs1 + dQs/2)	2,584,000.4	5,190,090.7	7,818,271.0	10,468,541.3
Effect on government revenue (Rp million)	dGR	(Qm1*T1)-(Qmo*T0)	1,186,549.2	1,032,143.4	877,737.6	723,331.8
Effect on net surplus (Rp million)	dNS	dCS + dPS + dGR	814,077.8	330,587.1	-109,517.1	-506,234.9

Annex 3.8 Import tariff rates on various soybean products, December 1989 to May 1999.

Soybean	Pakdes 1989	Pakjun 1990	Pakdes 1990	Pakmei 1991	Pakjun 1991	Pakjul 1992	Pakjun 1993	Pakto 1993	Pakjun 1994	BTMI 1994	Pakmei 1995	Pakdes 1995	Pakjun 1996	Pakjul 1997	Pakdes 1998	Pakmei 1999
1. Yellow	10	10	10	10	10	10	10	10	5	0	0	0	0	0	0	5
2. Black	10	10	10	10	10	10	10	10	10	10	5	0	-	-	-	-
3. Green	10	10	10	10	10	10	10	10	10	10	5	0	-	-	-	-
4. Brown	10	10	10	10	10	10	10	10	10	10	5	0	-	-	-	-
5. Mixture	10	10	10	10	10	10	10	10	10	10	5	0	-	-	-	-
6. Flours and meals	10	10	10	10	10	10	10	10	5	0	0	0	0	0	0	0
7. Oil	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
8. Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5

Source: Custom Tariff, 1989 to 1999, Ministry of Finance, Jakarta.

Note: - Pakmei = May policy package.
- Pakjun = June policy package.
- Pakjul = July policy package.
- Pakto = October policy package.
- Pakdes = December policy package.

Appendix 3.9 Demand function for soybean.

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	0.91731	0.45865	46.973	0.0001
Error	9	0.08788	0.00976		
C. Total	11	1.00519			

Root MSE	0.09881	R-square	0.9126
Dep Mean	14.40651	Adj R-sq	0.8931
C.V	0.68590		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	20.280122	3.00112694	6.758	0.0001
LRPWSS	1	-0.428176	0.22599926	-1.895	0.0907
LYCR	1	0.647101	0.15567655	4.157	0.0025

Durbin-Watson D	1.428
(For Number of Obs.)	12
1st Order Autocorrelation	0.081

Appendix 3.10 Supply function of soybean.

Dependent Variable: LQSS

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.14199	0.14199	14.471	0.0042
Error	9	0.08831	0.00981		
C. Total	10	0.23029			

Root MSE	0.09905	R-square	0.6165
Dep Mean	7.28243	Adj R-sq	0.5739
C.V	1.36019		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	3.393790	1.02267020	3.319	0.0090
LLPFS	1	0.584272	0.15359138	3.804	0.0042

Durbin-Watson D	1.742
(For Number of Obs.)	11
1st Order Autocorrelation	-0.039

Appendix 3.11 Price transmission of world to wholesale price of soybean.

Dependent Variable: LPWSS

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.47747	0.47747	29.770	0.0003
Error	10	0.16039	0.01604		
C. Total	11	0.63786			

Root MSE	0.12664	R-square	0.7486
Dep Mean	6.71478	Adj R-sq	0.7234
C.V	1.88604		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	-2.583382	1.70453496	-1.516	0.1606
LPCIFS	1	0.715169	0.13107429	5.456	0.0003

Durbin-Watson D	1.427
(For Number of Obs.)	12
1st Order Autocorrelation	0.260

Appendix 3.12 Price transmission of wholesale to producer price of soybean.

Dependent Variable: LPFS

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.49109	0.49109	128.495	0.0001
Error	10	0.03822	0.00382		
C. Total	11	0.52931			

Root MSE	0.06182	R-square	0.9278
Dep Mean	6.68485	Adj R-sq	0.9206
C.V	0.92480		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	0.793014	0.52007280	1.525	0.1583
LPWSS	1	0.877443	0.07740638	11.336	0.0001

Durbin-Watson D	2.386
(For Number of Obs.)	12
1st Order Autocorrelation	-0.225

Appendix 3.13 Social welfare effects of tariff cuts on soybean.

Commodity:	Soybeans					
Policy Scenario:	Tariff Cuts					
World Price 1996 (US$/ton)	PW	Data	350			
Exchange Rate 1996 (Rp/US$)	ER	Data	2,385			
World price 1996 (Rp/kg)	PCIF	PW x ER	834.8			
Initial tariff rate (%)	TR0	Data	5			
New tariff rate (%)	TR1	Given	0			
Initial tariff (Rp/kg)	T0	TR0 x PCIF/100	41.74			
New tariff (Rp/kg)	T1	TR1x PCIF/100	0.00			
Tariff change	dT	TR1-TR0	-5			
Wholesale price at to (Rp/kg)	PWSo	Data	1,320.0			
Producer price at to (Rp/kg)	PF0	Data	1,020			
Supply quantity at to (’000 t)	Qso	Data	1,680			
Import quantity at to (’000 t)	Qmo	Data	533.6			
Demand quantity at to (’000 t)	Qdo	Calculated	2,213.6			
Demand elasticity	Ed	Regression	-0.428176			
Supply elasticity	Es	Regression	0.5843			
Price transmission elasticity of PWS to PF	Ep	Regression	0.8774			
Effects of tariff change:						
Tariff transmission elasticity	ET	Assumed	0.25	0.50	0.75	1.00
Effect on wholesale price (%)	%dPWS	dT x ET	-1.25	-2.50	-3.75	-5.00
Change in wholesale price (Rp/kg)	dPWS	%dPWS x PWSo	-16.5	-33.0	-49.5	-66.0
Wholesale price at t1 (Rp/kg)	PWS1	PWS1 + dPWS	1,303.5	1,287.0	1,270.5	1,254.0
Effect on producer price (%)	%dPF	%dPWS x Ep	-1.0968	-2.1936	-3.2904	-4.3872
Change in producer price (Rp/kg)	dPF	%dPF x PF0	-11.2	-22.4	-33.6	-44.7
Producer price at t1 (Rp/kg)	PF1	PF0 + dPF	1,008.8	997.6	986.4	975.3
Effect on demand (%)	%dQd	%dPWS x Ed	0.5352	1.0704	1.6057	2.1409
Change in demand quantity (’000 t)	dQd	%dQd x Qdo	11.8	23.7	35.5	47.4
Demand quantity at t1 (’000 t)	Qd1	Qdo + dQd	2,225.4	2,237.3	2,249.1	2,261.0
Effect on supply (%)	%dQs	%dPF x Es	-0.6408	-1.2817	-1.9225	-2.5633
Change in supply quantity (’000 t)	dQs	%dQs x Qso	-10.8	-21.5	-32.3	-43.1
Supply quantity at t1 (’000 t)	Qs1	Qso + dQs	1,669.2	1,658.5	1,647.7	1,636.9
Import quantity at t1 (’000 t)	Qm1	Qd1 - Qs1	556.2	578.8	601.4	624.1
Effect on import quantity (’000 t)	dQm	Qm1 - Qmo	22.6	45.2	67.8	90.5
Effect on consumer surplus (Rp million)	dCS	dPWS x (Qd1 - dQd/2)	36,622.1	73,439.8	110,452.9	147,661.5
Effect on producer surplus (Rp million)	dPS	dPF x (Qs1 + dQs/2)	-18,734.6	-37,348.8	-55,842.5	-74,215.8
Effect on government revenue (Rp million)	dGR	(Qm1*T1)-(Qmo*T0)	-22,271.1	-22,271.1	-22,271.1	-22,271.1
Effect on net surplus (Rp million)	dNS	dCS + dPS + dGR	-4,383.6	13,819.9	32,339.3	51,174.6

Appendix 3.14 Social welfare effects of Uruguay Round trade liberalization.

Commodity:	Soybeans		
Policy Scenario	World Price Increase		
World price 1996 (US$/ton)	Pwo	Data	350
Increase world price (%)	%dPw	Uruguay Trade Lib	7.0
World price 1997 (US$/ton)	PW1	Calculated	402.5
Exchange rate 1996 (Rp/US$)	ER	Data	2,385
World price 1996 (Rp/kg)	PFOBo	Calculated	834.8
World price 1997 (Rp/kg)	PFOB1	Calculated	960.0
Wholesale price at 1996 (Rp/kg)	PWSo	Data	1,320.0
Producer price at to (Rp/kg)	PF0	Data	1,020.0
Supply quantity at 1996 ('000 t)	Qso	Data	1,680.0
Import quantity at 1996 ('000 t)	Qmo	Data	533.6
Demand quantity at to ('000 t)	Qdo	Calculated	2,213.6
Demand elasticity	Ed	Regression	-0.4282
Supply elasticity	Es	Regression	0.5843
Price transmission of PFOB to PWS	Ew	Regression	0.7152
Price transmission elasticity of PWS to PF	Ep	Regression	0.8774
Effects of increased world price:			
Change in wholesale price (%)	%dPWS	%dPFOB x Ew	5.01
Change in wholesale price (Rp/kg)	dPWS	%dPWS x PWSo/100	66.08
Wholesale price at 1997 (Rp/kg)	PWS1	PWSo + dPWS	1,386.08
Effect on producer price (%)	%dPF	%dPWS x Ep	4.39
Change in producer price (Rp/kg)	dPF	%dPF x PF0/100	44.80
Producer price at 1997 (Rp/kg)	PF1	PF0 + dPF	1,064.80
Effect on demand quantity (%)	%dQd	%dPWS x Ed	-2.14
Change in demand quantity ('000 t)	dQd	%dQd x Qdo/100	-47.45
Demand quantity at 1997 ('000 t)	Qd1	Qdo + dQd	2,166.15
Effect on supply (%)	%dQs	dPF x Es	2.57
Change in supply quantity ('000 t)	dQs	%dQs x Qso/100	13.70
Supply quantity at 1997 ('000 t)	Qs1	Qso + dQs	1,693.70
Import quantity at 1997 ('000 t)	Qm1	Qd1 - Qs1	472.45
Effect on import quantity ('000 t)	dQm	Qm1 - Qmo	-61.15
Effect on consumer surplus (Rp million)	dCS	dPWS x (Qd1 - dQd/2)	-144,716.62
Effect on producer surplus (Rp million)	dPS	dPF x (Qs1 + dQs/2)	75,578.67
Effect on net surplus (Rp million)	dNS	dCS + dPS + dGR	-69,137.96

Appendix 3.15 Import tariff rates on various maize products, December 1989 to May 1999.

Maize	Pakdes 1989	Pakjun 1990	Pakdes 1990	Pakmei 1991	Pakjun 1991	Pakjul 1992	Pakjun 1993	Pakto 1993	Pakjun 1994	BTMI 1994	Pakmei 1995	Pakdes 1995	Pakjun 1996	Pakjul/sep 1997	Pakdes 1998	Pakmei 1999
1. Seed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Others	10	10	10	10	10	10	10	10	5	5	0	0	0	0	0	0
3. Flours	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4. Groats and meals	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5. Maize grains	20	15	15	15	15	15	15	15	15	15	10	10	5	5	5	5
6. Maize starch																
- for battery	10	10	10	10	10	10	10	10	5	5	5	5	5	5	5	5
- for backing (net 30 kg or more)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
7. Oil and fractions																
- crude oil	20	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0
- others	20	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0
8. Sweet corn	30	30	30	30	30	30	30	30	30	30	25	25	25	20	5	5
9. Corn flakes	60	40	40	40	40	40	40	40	35	35	30	30	30	25	5	5
10. Maize bran	10	10	10	10	10	10	10	10	10	10	5	5	5	5	5	5

Source: Custom Tariff, 1989 to 1999, Ministry of Finance, Jakarta.

Note: - Pakmei = May policy package.
- Pakjun = June policy package.
- Pakjul = July policy package.
- Pakto = October policy package.
- Pakdes = December policy package.

Appendix 3.16 Price transmission of wholesale to producer price of maize.

Dependent Variable: LPFM

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	1.28854	1.28854	488.472	0.0001
Error	10	0.02638	0.00264		
C. Total	11	1.31492			

Root MSE	0.05136	R-square	0.9799
Dep Mean	5.44333	Adj R-sq	0.9779
C.V	0.94355		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	0.145949	0.24014333	0.608	0.5569
LPWSM	1	0.956663	0.04328519	22.101	0.0001

Durbin-Watson D	2.211
(For Number of Obs.)	12
1st Order Autocorrelation	-0.160

Appendix 3.17 Social welfare effects of tariff cuts on maize.

Commodity:	Maize					
Policy Scenario:	Tariff Cuts					
World price 1996 (US$/ton)	PW	Data	174.9			
Exchange rate 1996 (Rp/US$)	ER	Data	2,385			
World price 1996 (Rp/kg)	PCIF	Calculated	417.1			
Initial tariff rate (%)	TR0	Given	5.00			
New tariff tate (%)	TR1	Given	0			
Initial tariff (Rp/kg)	T0	TR0 x PCIF/100	20.86			
New tariff (Rp/kg)	T1	TR1x PCIF/100	0.00			
Tariff change	dT	TR1-TR0	-5.00			
Wholesale price at to (Rp/kg)	PWSo	Data	491.0			
Producer price at to (Rp/kg)	Pfo	Data	411.8			
Supply quantity at to ('000 t)	Qso	Data	9,307.4			
Import quantity at to ('000 t)	Qmo	Data	616.9			
Demand quantity at to ('000 t)	Qdo	Calculated	9,924.3			
Demand elasticity	Ed	Regression	-0.8134			
Supply elasticity	Es	Regression	0.476158			
Price transmission elasticity of PWS to PF	Ep	Regression	0.956663			
Effects of tariff removal:						
Tariff transmission elasticity	ET	Assumed	0.25	0.50	0.75	1.00
Effect on wholesale price (%)	%dPWS	dT x ET	-1.25	-2.50	-3.75	-5.00
Change in wholesale price (Rp/kg)	dPWS	%dPWS x PWSo	-6.14	-12.28	-18.41	-24.55
Wholesale price at t1 (Rp/kg)	PWS1	PWSo + dPWS	484.9	478.7	472.6	466.5
Effect on producer price (%)	%dPF	%dPWS x Ep	-1.1958	-2.3917	-3.5875	-4.7833
Change in producer price (Rp/kg)	dPF	%dPF x Pfo	-4.92	-9.85	-14.77	-19.70
Producer price at t1 (Rp/kg)	PF1	PFo + dPF	406.9	402.0	397.0	392.1
Effect on demand (%)	%dQd	%dPWS x Ed	1.0168	2.0336	3.0504	4.0672
Change in demand quantity ('000 t)	dQd	%dQd x Qdo	100.9	201.8	302.7	403.6
Demand quantity at t1 ('000 t)	Qd1	Qdo + dQd	10,025.2	10,126.1	10,227.0	10,327.9
Effect on supply (%)	%dQs	dPF x Es	-0.5694	-1.1388	-1.7082	-2.2776
Change in supply quantity ('000 t)	dQs	%dQs x Qso	-53.0	-106.0	-159.0	-212.0
Supply quantity at t1 ('000 t)	Qs1	Qso + dQs	9,254.4	9,201.4	9,148.4	9,095.4
Import quantity at t1 ('000 t)	Qm1	Qd1 - Qs1	770.8	924.7	1,078.6	1,232.5
Effect on import quantity ('000 t)	dQm	Qm1 - Qmo	153.9	307.8	461.7	615.6
Effect on consumer surplus (Rp million)	dCS	dPWS x (Qd1 - dQd/2)	61,220.1	123,059.5	185,518.2	248,596.3
Effect on producer surplus (Rp million)	dPS	dPF x (Qs1 + dQs/2)	-45,703.1	-91,145.2	-136,326.3	-181,246.5
Effect on government revenue (Rp million)	dGR	(Qm1*T1)-(Qmo*T0)	-12,866.6	-12,866.6	-12,866.6	-12,866.6
Effect on net surplus (Rp million)	dNS	dCS + dPS + dGR	2,650.4	19,047.7	36,325.3	54,483.3

Appendix 3.18 Demand function of maize.

Dependent Variable: LQDM

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	0.45148	0.22574	27.082	0.0002
Error	9	0.07502	0.00834		
C. Total	11	0.52650			

Root MSE	0.09130	R-square	0.8575
Dep Mean	15.47185	Adj R-sq	0.8259
C.V	0.59009		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	25.491531	4.19400155	6.078	0.0002
LRPWSM	1	-0.813449	0.34486743	-2.359	0.0427
LYCR	1	0.881441	0.27223563	3.238	0.0102

Durbin-Watson D	1.207
(For Number of Obs.)	12
1st Order Autocorrelation	0.148

Appendix 3.19 Supply function of maize.

Dependent Variable: LQSM

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.21572	0.21572	31.748	0.0003
Error	9	0.06115	0.00679		
C. Total	10	0.93406			

Root MSE	0.08243	R-square	0.7791
Dep Mean	8.82496	Adj R-sq	0.7546
C.V	0.93406		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	6.258061	0.45624485	13.716	0.0001
LLPFM	1	0.476158	0.08450746	5.635	0.0003

Durbin-Watson D	2.668
(For Number of Obs.)	11
1st Order Autocorrelation	-0.408

Appendix 3.20 Price transmission of world to wholesale price of maize.

Dependent Variable: LPWSM

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	1.21409	1.21409	62.636	0.0001
Error	10	0.19383	0.01938		
C. Total	11	1.40792			

Root MSE	0.13922	R-square	0.8623
Dep Mean	5.53735	Adj R-sq	0.8486
C.V	2.51427		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	-6.509780	1.52272940	-4.275	0.0016
LPCIFM	1	0.985488	0.12452001	7.914	0.0001

Durbin-Watson D	2.624
(For Number of Obs.)	12
1st Order Autocorrelation	-0.321

Appendix 3.21 Social welfare effects of increased world price on maize.

Commodity:	Maize		
Policy Scenario:	World Price Increase		
World price 1996 (US$/ton)	PW	Data	174.9
World price change	%PW	Data	4.00
World price 1997 (US$/ton)	PW1	Calculated	181.9
Exchange rate 1996 (Rp/US$)	ER	Data	2385
World price 1996 (Rp/kg)	PCIFo	Calculated	417.1
World price 1997 (Rp/kg)	PCIF1	Calculated	433.8
Wholesale price at to (Rp/kg)	PWSo	Data	491.0
Producer price at to (Rp/kg)	Pfo	Data	411.8
Supply quantity at to (’000 t)	Qso	Data	9,307.4
Import quantity at to (’000 t)	Qmo	Data	616.9
Demand quantity at to (’000 t)	Qdo	Calculated	9,924.3
Demand elasticity	Ed	Regression	-0.8134
Supply elasticity	Es	Regression	0.4762
Price transmission elasticity of PCIF to PWS	Ew	Regression	0.9122
Price transmission elasticity of PWS to PF	Ep	Regression	0.9567
Effects of increased world price :			
Effect on wholesale price (%)	%dPWS	%dPW x Ew	3.65
Change in wholesale price (Rp/kg)	dPWS	%dPWS x PWSo	17.92
Wholesale price at t1 (Rp/kg)	PWS1	PWSo + dPWS	508.92
Effect on producer price (%)	%dPF	%dPWS x Ep	3.49
Change in producer price (Rp/kg)	dPF	%dPF x Pfo	14.37
Producer price at t1 (Rp/kg)	PF1	PFo + dPF	426.17
Effect on demand (%)	%dQd	%dPWS x Ed	-2.97
Change in demand quantity (’000 t)	dQd	%dQd x Qdo	-294.56
Demand quantity at t1 (’000 t)	Qd1	Qdo + dQd	9,629.74
Effect on supply (%)	%dQs	dPF x Es	1.66
Change in supply quantity (’000 t)	dQs	%dQs x Qso	154.70
Supply quantity at t1 (’000 t)	Qs1	Qso + dQs	9,462.10
Import quantity at t1 (’000 t)	Qm1	Qd1 - Qs1	167.64
Effect on import quantity (’000 t)	dQm	Qm1 - Qmo	-449.26
Effect on consumer surplus (Rp million)	dCS	dPWS x (Qd1 - dQd/2)	-175,161.22
Effect on producer surplus (Rp million)	dPS	dPF x (Qs1 + dQs/2)	134,901.90
Effect on net surplus (Rp million)	dNS	dCS + dPS + dGR	-40,259.32

Appendix 3.22 Price transmission of world to wholesale price of cassava.

Dependent Variable: LPWSC

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.32355	0.32355	17.295	0.0020
Error	10	0.18708	0.01871		
C. Total	11	0.51064			

Root MSE	0.13678	R-square	0.6336
Dep Mean	5.07958	Adj R-sq	0.5970
C.V	2.69270		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	-0.671968	1.38357787	-0.486	0.6377
LPCIFC	1	0.473110	0.11376394	4.159	0.0020

Durbin-Watson D	1.680
(For Number of Obs.)	12
1st Order Autocorrelation	-0.079

Appendix 3.23 Social welfare effects of world price increase on cassava.

Commodity:	Maize		
Policy Scenario:	World Price Increase		
World price 1996 (US$/ton)	Pwo	Data	123.3
World market price change	%PW	Given	6.00
World price 1997 (US$/ton)	PW1	Calculated	130.7
Exchange rate 1996 (Rp/US$)	ER	Data	2,385
World price 1996 (Rp/kg)	PFOBo	Calculated	294.1
World price 1997 (Rp/kg)	PFOB1	Calculated	311.7
Wholesale price at 1996 (Rp/kg)	PWSo	Data	232.0
Producer price at to (Rp/kg)	PF0	Data	191.5
Supply quantity at 1996 (’000 t)	Qso	Data	17,002.5
Export quantity at 1996 (’000 t)	Qxo	Data	386.1
Demand quantity at to (’000 t)	Qdo	Calculated	16,616.4
Demand elasticity	Ed	Regression	-0.0149
Supply elasticity	Es	Regression	0.12997
Price transmission of PFOB to PWS	Ew	Regression	0.47311
Price transmission elasticity of PWS to PF	Ep	Regression	1.19539
Effects of increased world price:			
Change in wholesale price (%)	%dPWS	%dPW x Ew	2.839
Change in wholesale price (Rp/kg)	dPWS	%dPWS x PWSo/100	6.59
Wholesale price at 1997 (Rp/kg)	PWS1	PWSo + dPWS	238.59
Effect on producer price (%)	%dPF	%dPWS x Ep	3.393
Change in producer price (Rp/kg)	dPF	%dPF x PF0/100	6.50
Producer price at 1997 (Rp/kg)	PF1	PF0 + dPF	198.00
Effect on demand quantity (%)	%dQd	%dPWS x Ed	-0.04
Change in demand quantity (’000 t)	dQd	%dQd x Qdo/100	-7.00
Demand quantity at 1997 (’000 t)	Qd1	Qdo + dQd	16,609.40
Effect on supply (%)	%dQs	dPF x Es	0.44
Change in supply quantity (’000 t)	dQs	%dQs x Qso/100	74.99
Supply quantity at 1997 (’000 t)	Qs1	Qso + dQs	17,077.49
Export quantity at 1997 (’000 t)	Qx1	Qs1 - Qd1	468.09
Effect on export quantity (’000 t)	dQx	Qx1 - Qxo	81.99
Effect on consumer surplus (Rp million)	dCS	dPWS x (Qd1 - dQd/2)	-109,407.41
Effect on producer surplus (Rp million)	dPS	dPF x (Qs1 + dQs/2)	110,728.95
Effect on net surplus (Rp million)	dNS	dCS + dPS + dGR	1,321.54

Appendix 3.24 Price transmission of wholesale to producer price of cassava.

Dependent Variable: LPFC

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.72968	0.72968	27.004	0.0004
Error	10	0.27021	0.02702		
C. Total	11	0.99988			

Root MSE	0.16438	R-square	0.7298
Dep Mean	4.95359	Adj R-sq	0.727
C.V	2.51427		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	-1.118488	1.16943996	-0.956	0.3614
LPCIFM	1	1.195390	0.23003434	5.197	0.0004

Durbin-Watson D	2.042
(For Number of Obs.)	12
1st Order Autocorrelation	-0.071

Appendix 3.25 Demand function for cassava.

Dependent Variable: LPFC

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.03562	0.01781	2.011	0.1897
Error	9	0.07972	0.00886		
C. Total	11	0.11533			

Root MSE	0.09411	R-square	0.3088
Dep Mean	16.04222	Adj R-sq	0.1552
C.V	0.58666		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	16.251817	1.24779666	12.058	0.0001
LRPWSC	1	-0.014849	0.11639660	-0.128	0.9013
LYCR	1	0.080400	0.07238124	1.111	0.2955

Durbin-Watson D	1.497
(For Number of Obs.)	12
1st Order Autocorrelation	0.174

Appendix 3.26 Supply function of cassava.

Dependent Variable: LQSC

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.01522	0.05122	2.938	0.1207
Error	9	0.04662	0.00518		
C. Total	10	0.06184			

Root MSE	0.07197	R-square	0.2461
Dep Mean	9.66554	Adj R-sq	0.1623
C.V	0.74462		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	9.025273	0.37417861	24.120	0.0001
LLPFC	1	0.129971	0.07582910	1.714	0.1207

Durbin-Watson D	0.955
(For Number of Obs.)	11
1st Order Autocorrelation	0.287

Appendix 3.27 Import tariff rates on various potato products, December 1989 to May 1999.

Potatoes	Pakdes 1989	Pakjun 1990	Pakdes 1990	Pakmei 1991	Pakjun 1991	Pakjul 1992	Pakjun 1993	Pakto 1993	Pakjun 1994	BTMI 1994	Pakmei 1995	Pakdes 1995	Pakjun 1996	Pakjul/sep 1997	Pakdes 1998	Pakmei 1999
1. Prepared or preserved otherwise than by acid vinegar or acetic acid, frozen	30	30	30	30	30	30	30	30	25	25	20	20	20	15	5	5
2. Prepared or preserved otherwise than by acid vinegar or acetic acid, unfrozen																
- in airtight container	30	30	30	30	30	30	30	30	25	25	20	20	20	15	5	5
- others	30	30	30	30	30	30	30	30	25	25	20	20	20	20	5	5
3. Fresh or chilled																
- seed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- others	30	30	30	30	30	30	30	30	25	25	20	20	20	20	5	5
4. Sliced or unprepared further	10	10	10	10	10	10	10	10	10	10	5	5	5	5	5	5
5. Flours, meal, flakes, granules																
- packed (net 20 kg or more)	5	5	5	5	5	5	5	5	5	5	5	5	-	-	-	-
- flour, meal and powder													5	5	5	5
- flakes, granules and pellets													5	5	5	5
6. Uncooked by steaming or boiling, frozen	30	30	30	30	30	30	30	30	30	30	25	25	25	20	5	5
7. Potato Starch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5

Source: Custom Tariff, 1989 to 1999, Ministry of Finance, Jakarta.

Note: - Pakmei = May policy package. - Pakto = October policy package.
- Pakjun = June policy package. - Pakdes = December policy package.
- Pakjul = July policy package.

Appendix 3.28 Demand function for potatoes.

Dependent Variable: LQDP

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	1.09677	0.54838	7.543	0.0119
Error	9	0.65432	0.07270		
C. Total	11	1.75109			

Root MSE	0.26963	R-square	0.6263
Dep Mean	12.95952	Adj R-sq	0.5433
C.V	2.08058		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	14.623627	7.90940826	1.849	0.0975
LRPWSP	1	-0.114171	0.62074408	-0.184	0.8581
LYCR	1	0.498203	0.53254159	0.936	0.2729

Durbin-Watson D	1.436
(For Number of Obs.)	12
1st Order Autocorrelation	0.252

Appendix 3.29 Supply function of potatoes.

Dependent Variable: LQSP

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	1.05516	1.05516	27.121	0.0006
Error	9	0.35016	0.03891		
C. Total	10	1.40531			

Root MSE	0.19725	R-square	0.7508
Dep Mean	6.46666	Adj R-sq	0.7231
C.V	3.05021		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	1.375915	0.97934294	1.405	0.1936
LLPFP	1	0.865267	0.16615032	5.208	0.0006

Durbin-Watson D	2.060
(For Number of Obs.)	11
1st Order Autocorrelation	-0.046

Appendix 3.30 Price transmission of wholesale to producer prices of potatoes.

Dependent Variable: LPDP

Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	1.91439	1.91439	1,419.133	0.0001
Error	10	0.01349	0.00135		
C. Total	11	1.92788			

Root MSE	0.03673	R-square	0.9930
Dep Mean	5.94612	Adj R-sq	0.9923
C.V	0.61769		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for HO: Parameter=0	Prob > | T |
INTERCEP	1	-0.267279	0.16527719	-1.617	0.1369
LPWSP	1	1.020793	0.02709730	37.671	0.0001

Durbin-Watson D	2.608
(For Number of Obs.)	12
1st Order Autocorrelation	-0.312

Appendix 3.31 Social welfare of tariff cuts on potatoes.

Commodity:	Potato					
Policy Scenario:	Tariff Cuts					
World price 1996 (US$/ton)	PW	Given	188.5			
Exchange rate 1996 (Rp/US$)	ER	Given	2,385			
World price 1996 (Rp/kg)	PCIF	PW x ER	449.6			
Initial tariff rate (%)	TR0	Given	22			
New tariff rate (%)	TR1	Given	17			
Initial tariff (Rp/kg)	T0	TR0 x PCIF/100	98.91			
New tariff (Rp/kg)	T1	TR1x PCIF/100	76.43			
Tariff change	dT	TR1-TR0	-5			
Wholesale price at to (Rp/kg)	PWSo	Given	868			
Producer price at to (Rp/kg)	PF0	Given	762			
Supply quantity at to (’000 t)	Qso	Given	1,035.3			
Import quantity at to (’000 t)	Qmo	Given	2.1			
Demand quantity at to (’000 t)	Qdo	Given	1,037.4			
Demand elasticity	Ed	Regression	-0.1142			
Supply elasticity	Es	Regression	0.8652			
Price transmission elasticity of PWS to PF	Ep	Regression	1.0208			
Effects of tariff change:						
Tariff transmission elasticity	ET	Assumed	0.25	0.50	0.75	1.00
Effect on wholesale price (%)	%dPWS	dT x ET	-1.25	-2.50	-3.75	-5.00
Change in wholesale price (Rp/kg)	dPWS	%dPWS x PWSo	-10.9	-21.7	-32.6	-43.4
Wholesale price at t1 (Rp/kg)	PWS1	PWS1 + dPWS	857.2	846.3	835.5	824.6
Effect on producer price (%)	%dPF	%dPWS x Ep	-1.2760	-2.5520	-3.8280	-5.1040
Change in producer price (Rp/kg)	dPF	%dPF x PF0	-9.7	-19.4	-29.2	-38.9
Producer price at t1 (Rp/kg)	PF1	PF0 + dPF	752.3	742.6	732.8	723.1
Effect on demand (%)	%dQd	%dPWS x Ed	0.1428	0.2855	0.4283	0.5710
Change in demand quantity (’000 t)	dQd	%dQd x Qdo	1.5	3.0	4.4	5.9
Demand quantity at t1 (’000 t)	Qd1	Qdo + dQd	1,038.8	1,040.3	1,041.8	1,043.3
Effect on supply (%)	%dQs	%dPF x Es	-1.1040	-2.2080	-3.3120	-4.4160
Change in supply quantity (’000 t)	dQs	%dQs x Qso	-11.4	-22.9	-34.3	-45.7
Supply quantity at t1 (’000 t)	Qs1	Qso + dQs	1,023.8	1,012.4	1,001.0	989.5
Import quantity at t1 (’000 t)	Qm1	Qd1 - Qs1	15.0	27.9	40.8	53.7
Effect on import quantity (’000 t)	dQm	Qm1 - Qmo	12.9	25.8	38.7	51.6
Effect on consumer surplus (Rp million)	dCS	dPWS x (Qd1 - dQd/2)	11,263.4	22,542.8	33,838.3	45,149.9
Effect on producer surplus (Rp million)	dPS	dPF x (Qs1 + dQs/2)	-10,010.4	-19,909.6	-29,697.8	-39,374.8
Effect on government revenue (Rp million)	dGR	(Qm1*T1)-(Qmo*T0)	939.5	1,926.2	2,912.8	3,899.5
Effect on net surplus (Rp million)	dNS	dCS + dPS + dGR	2,192.5	4,559.3	7,053.4	9,674.7

Appendix 4.1 Effect of implicit tariff reduction by 16.5% on rice production and farm income, West Java, 1996.

Item	Base-1996					Scenario I				
	Quantity	Price	Value	Share (%) GrossR	Total Cost	Quantity	Price	Value	Share (%) GrossR	Total Cost
Gross revenue	5,238	330	1,728,540	100.00		5,165	288	1,487,424	100.00	
Seed	41	696	28,397	1.64	3.40	41	696	28,397	1.91	3.60
Fertilizer:										0.00
Urea	214	355	75,970	4.40	9.08	202	355	71,619	4.81	9.08
Za	15	375	5,625	0.33	0.67	14	375	5,303	0.36	0.67
TSP	98	535	52,430	3.03	6.27	92	535	49,427	3.32	6.26
Others	20	481	9,614	0.56	1.15	19	481	9,063	0.61	1.15
Pest-insecticides	8	4,550	35,945	2.08	4.30	8	4,550	35,671	2.40	4.52
Labor	135	3,500	472,500	27.34	56.49	125	3,500	436,418	29.34	55.31
Other costs										0.00
Rent of Equip/animal			58,319	3.37	6.97			58,319	3.92	7.39
Irrigation fees			13,177	0.76	1.58			13,177	0.89	1.67
Transport cost			18,993	1.10	2.27			18,993	1.28	2.41
Others			16,250	0.94	1.94			16,250	1.09	2.06
Variable cost			787,220	45.54	94.12			742,637	49.93	94.12
Cost of capital			49,201	2.85	5.88			46,415	3.12	5.88
Total variable cost			836,421	48.39	100.00			789,052	53.05	100.00
Net revenue										
Nominal (Rp)			892,119					698,373		
Real (kg gabah)			2,703					2,425		
Changes (%)										
Nominal								-21.72		
Real								-10.3		

Notes:
1. Production elasticity with respect to price of rice: 0.11
2. Fertilizer demand elasticity with respect to price of rice: 0.45
3. Labor demand elasticity with respect to price of rice: 0.60
4. Own price elasticity of demand for urea: -0.10
5. Own price elasticity of demand for ZA: -0.10
6. Own price elasticity of demand for SP36: -0.30
7.Own price elasticity of demand for KCL: -0.40
8. Interest rate 25% per year

Simulated factor cost

	Base-1998		Simulated	
	% GR	%TC	% GR	% TC
Seed	1.64	3.40	1.91	3.60
Fertilizer	8.31	17.17	9.10	17.16
Pesticides	2.08	4.30	2.40	4.52
Labor	27.34	56.49	29.34	55.31
Other costs	9.02	18.64	10.30	19.41
Total variable cost	48.39	100.00	53.05	100.00
Net revenue	51.61		46.95	
Gross revenue	100.00		100.00	

Appendix 4.2 Effect of world price increase on rice production and farm income, West Java,1996.

Item	Base-1996					Scenario I				
	Quantity	Price	Value	Share (%) GrossR	Total Cost	Quantity	Price	Value	Share (%) GrossR	Total Cost
Gross revenue	5,238	330	1,728,540	100.00		5,276	352	1,857,297	100.00	
Seed	41	696	28,397	1.64	3.40	41	696	28,397	1.53	3.30
Fertilizer:										0.00
Urea	214	355	75,970	4.40	9.08	220	355	78,249	4.21	9.09
Za	15	375	5,625	0.33	0.67	15	375	5,794	0.31	0.67
TSP	98	535	52,430	3.03	6.27	101	535	54,003	2.91	6.27
Others	20	481	9,614	0.56	1.15	21	481	9,902	0.53	1.15
Pest-insecticides	8	4,550	35,945	2.08	4.30	8	4,550	36,089	1.94	4.19
Labor	135	3,500	472,500	27.34	56.49	140	3,500	491,400	26.46	57.06
Other costs										
Rent of Equip/animal			58,319	3.37	6.97			58,319	3.14	6.77
Irrigation fees			13,177	0.76	1.58			13,177	0.71	1.53
Transport cost			18,993	1.10	2.27			18,993	1.02	2.21
Others			16,250	0.94	1.94			16,250	0.87	1.89
Variable cost			787,220	45.54	94.12			810,573	43.64	94.12
Cost of capital			49,201	2.85	5.88			50,661	2.73	5.88
Total variable cost			836,421	48.39	100.00			861,234	46.37	100.00
Net revenue										
Nominal (Rp)			892,119					996,063		
Real (kg gabah)			2,703					2,830		
Changes (%)										
Nominal								11.65		
Real								4.67		

Notes:
1. Production elasticity with respect to price of rice: 0.11
2. Fertilizer demand elasticity with respect to price of rice: 0.45
3. Labor demand elasticity with respect to price of rice: 0.60
4. Own price elasticity of demand for urea: -0.10
5. Own price elasticity of demand for ZA: -0.10
6. Own price elasticity of demand for SP36: -0.30
7.Own price elasticity of demand for KCL: -0.40
8. Interest rate 25% per year

Simulated factor cost

	Base-1998		Simulated	
	% GR	%TC	% GR	% TC
Seed	1.64	3.40	1.53	3.30
Fertilizer	8.31	17.17	7.97	17.18
Pesticides	2.08	4.30	1.94	4.19
Labor	27.34	56.49	26.46	57.06
Other costs	9.02	18.64	8.47	18.28
Total variable cost	48.39	100.00	46.37	100.00
Net revenue	51.61		53.63	
Gross revenue	100.00		100.00	

Appendix 4.3 Effect of tariff reduction on soybean production and farm income, East Java,1996.

Item	Base-1996					Scenario I				
	Quantity	Price	Value	Share (%) GrossR	Total Cost	Quantity	Price	Value	Share (%) GrossR	Total Cost
Gross revenue	1,170.0	1,020	1,193,400	100.00		1,168.4	986	1,152,082	100.00	
Seed	46.6	1,257	58,597	4.91	18.27	46.6	1,257	58,597	5.09	18.33
Fertilizer:										
Urea	82.3	339	27,923	2.34	8.70	81.1	339	27,504	2.39	8.60
TSP	41.7	470	19,602	1.64	6.11	41.1	470	19,308	1.68	6.04
Others	3.1	335	1,052	0.09	0.33	3.1	335	1,036	0.09	0.32
Pest-insecticides	1.6	4,369	6,946	0.58	2.17	1.6	3,369	6,932	0.60	2.17
Labor	34.2	3,500	119,563	10.02	37.27	43.1	3,500	119,324	10.36	37.32
Other costs										
Rent of Equip/animal			11,302	0.95	3.52			11,302	0.98	3.53
Irrigation fees			16,193	1.36	5.05			16,193	1.41	5.06
Transport cost			10,366	0.87	3.23			10,366	0.90	3.24
Others			30,358	2.54	9.46			30,358	2.64	9.49
Variable cost			301,902	25.30	94.12			300,920	26.12	94.12
Cost of capital			18,869	1.58	5.88			18,808	1.73	5.88
Total variable cost			320,771	26.88	100.00			319,728	27.75	100.00
Net revenue										
Nominal (Rp)			872,629					832,354		
Real (kg gabah)			856					844		
Changes (%)										
Nominal								-4.62		
Real								-1.33		

Notes:
1. Production elasticity with respect to price of soybeans: 0.04
2. Fertilizer demand elasticity with respect to price of soybeans: 0.25
3. Labor demand elasticity with respect to price of soybeans: 0.60
4. Own price elasticity of demand for urea: -0.10
5. Own price elasticity of demand for ZA: -0.20
6. Own price elasticity of demand for SP36: -0.30
7.Own price elasticity of demand for KCL: -0.40
8. Interest rate 25% per year

Simulated factor cost

	Base-1998		Simulated	
	% GR	%TC	% GR	% TC
Seed	4.91	18.27	5.09	18.33
Fertilizer	4.07	15.14	4.15	14.97
Pesticides	0.58	2.17	0.60	2.17
Labor	10.02	37.27	10.36	37.32
Other costs	7.30	27.15	7.55	27.22
Total variable cost	26.88	100.00	27.75	100.00
Net revenue	73.12		72.25	
Gross revenue	100.00		100.00	

Appendix 4.4 Potential effect of UR trade liberalization (increase world price) on soybean production and farm income, East Java, 1996.

Item	Base-1996					Scenario I				
	Quantity	Price	Value	Share (%) GrossR	Total Cost	Quantity	Price	Value	Share (%) GrossR	Total Cost
Gross revenue	1,170.0	1,020	1,193,400	100.00		1,172.1	1,065	1,248,005	100.00	
Seed	46.6	1,257	58,597	4.91	18.27	46.6	1,257	58,597	4.70	18.19
Fertilizer:										
Urea	82.3	339	27,923	2.34	8.70	83.9	339	28,475	2.28	8.84
TSP	41.7	470	19,602	1.64	6.11	42.5	470	19,989	1.60	6.21
Others	3.1	335	1,052	0.09	0.33	3.2	335	1,073	0.09	0.33
Pest-insecticides	1.6	4,369	6,946	0.58	2.17	1.6	4,369	6,965	0.56	2.16
Labor	34.2	3,500	119,563	10.02	37.27	34.3	3,500	119,878	9.61	37.21
Other costs										
Rent of Equip/animal			11,302	0.95	3.52			11,302	0.91	3.51
Irrigation fees			16,193	1.36	5.05			16,193	1.30	5.03
Transport cost			10,366	0.87	3.23			10,366	0.83	3.22
Others			30,358	2.54	9.46			30,358	2.43	9.42
Variable cost			301,902	25.30	94.12			303,195	24.29	94.12
Cost of capital			18,869	1.58	5.88			18,950	1.52	5.88
Total variable cost			320,771	26.88	100.00			322,145	25.81	100.00
Net revenue										
Nominal (Rp)			872,629					925,860		
Real (kg gabah)			856					870		
Changes (%)										
Nominal								6.20		
Real								1.64		

Notes:
1. Production elasticity with respect to price of soybeans: 0.04
2. Fertilizer demand elasticity with respect to price of soybeans: 0.25
3. Labor demand elasticity with respect to price of soybeans: 0.60
4. Own price elasticity of demand for urea: -0.10
5. Own price elasticity of demand for ZA: -0.20
6. Own price elasticity of demand for SP36: -0.30
7.Own price elasticity of demand for KCL: -0.40
8. Interest rate 25% per year

Simulated factor cost

	Base-1998		Simulated	
	% GR	%TC	% GR	% TC
Seed	4.91	18.27	4.70	18.33
Fertilizer	4.07	15.14	3.97	15.38
Pesticides	0.58	2.17	0.56	2.16
Labor	10.02	37.27	9.61	37.21
Other costs	7.30	27.15	6.98	27.06
Total variable cost	26.88	100.00	25.81	100.00
Net revenue	73.12		74.19	
Gross revenue	100.00		100.00	

Appendix 4.5 Effect of tariff removal on maize production and farm income, East Java, 1996.

Item	Base-1996					Scenario I				
	Quantity	Price	Value	Share (%) GrossR	Total Cost	Quantity	Price	Value	Share (%) GrossR	Total Cost
Gross revenue	2,376.0	411.8	978,437	100.00		2,371.7	397.0	951,577	100.00	
Seed	34.000	1,009.6	34,327	3.51	14.10	34.000	1,009.6	34,327	3.65	14.17
Fertilizer:										
Urea	162.400	309.7	50,301	5.14	20.67	159.482	309.7	49,397	5.25	20.39
TSP	29.010	418.6	12,144	1.24	4.99	28.989	418.6	12,135	1.29	5.01
Others	1.070	424.3	454	0.05	0.19	1.069	424.3	454	0.05	0.19
Pest-insecticides			469	.05	0.19			469	0.05	0.19
Labor	23.764	3,500	83,174	8.50	34.18	23.721	3,500	83,025	8.82	34.27
Other costs										
Rent of Equip/animal			14,557	1.49	5.98			14,557	1.55	6.01
Irrigation fees			7,212	0.64	2.96			7,212	0.77	2.98
Transport cost			7,981	0.82	3.28			7,981	0.85	3.29
Others			18,437	1.88	7.58			18,437	1.96	7.61
Variable cost			229,056	23.41	94.12			227,994	24.21	94.12
Cost of capital			14,316	1.46	5.88			14,250	1.51	5.88
Total variable cost			243,372	24.87	100.00			242,243	25.73	100.00
Net revenue										
Nominal (Rp)			735,065					699,334		
Real (kg gabah)			1,785					1,762		
Changes (%)										
Nominal								-4.86		
Real								-1.31		

Notes:
1. Yield elasticity with respect to price of maize: 0.05
2. Fertilizer demand elasticity with respect to price of maize: 0.02
3. Labor demand elasticity with respect to price of maize: 0.05
4. Own price elasticity of demand for urea: -0.10
5. Own price elasticity of demand for ZA: -0.10
6. Own price elasticity of demand for SP36: -0.30
7.Own price elasticity of demand for KCL: -0.40
8. Interest rate 25% per year

Simulated factor cost

	Base-1998		Simulated	
	% GR	%TC	% GR	% TC
Seed	3.51	14.10	3.65	14.17
Fertilizer	6.43	25.84	6.58	25.59
Pesticides	0.05	0.19	0.05	0.19
Labor	8.50	34.18	8.82	34.27
Other costs	6.39	25.68	6.63	25.77
Total variable cost	24.87	100.00	25.73	100.00
Net revenue	75.13		74.27	
Gross revenue	100.00		100.00	

Appendix 4.6 Effect of increase world price on maize production and farm income, East Java, 1996.

Item	Base-1996			Share (%)		Scenario I			Share (%)	
	Quantity	Price	Value (Rp)	GrossR	Total Cost	Quantity	Price	Value (Rp)	GrossR	Total Cost
Gross revenue	2,376.0	411.8	978,437	100.00		2,380.1	426.2	1,014,347	100.00	
Seed	34.000	1,009.6	34,327	3.51	14.10	34.00	1,009.6	34,327	3.38	14.04
Fertilizer:										
Urea	162.400	309.7	50,301	5.14	20.67	165.234	309.7	51,179	5.05	20.93
TSP	29.010	418.6	12,144	1.24	4.99	29.030	418.6	12,152	1.20	4.97
Others	1.070	424.3	454	0.05	0.19	1.071	424.3	454	0.04	0.19
Pest-insecticides			469	0.05	0.19			469	0.05	0.19
Labor	23.764	3,500	83,174	8.50	34.18	23.805	3,500	83,319	8.21	34.08
Other costs					0.00					
Rent of Equipment			14,557	1.49	5.98			14,557	1.44	5.95
Irrigation fees			7,212	0.74	2.96			7,212	0.71	2.95
Transport cost			7,981	0.82	3.28			7,981	0.79	3.26
Others			18,437	1.88	7.58			18437	1.82	7.54
Variable cost			229,056	23.41	94.12			230,088	22.68	94.12
Cost of capital			14,316	1.46	5.88			14,380	1.42	5.88
Total variable cost			243,372	24.87	100.00			244,468	24.10	100.00
Net revenue										
Nominal (Rp)			735,065					769,879		
Real (kg gabah)			1,785					1,807		
Changes (%)										
Nominal								-4.74		
Real								-1.20		

Notes:
1. Yield elasticity with respect to price of maize: 0.05
2. Fertilizer demand elasticity with respect to price of maize: 0.02
3. Labor demand elasticity with respect to price of maize: 0.05
4. Own price elasticity of demand for urea: -0.10
5. Own price elasticity of demand for ZA: -0.10
6. Own price elasticity of demand for SP36: -0.30
7. Own price elasticity of demand for KCL: -0.40
8. Interest rate 25% per year

Simulated factor cost

	Base-1996		Simulated	
	% GR	%TC	% GR	% TC
Seed	3.51	14.10	3.38	14.04
Fertilizer	6.43	25.84	6.29	26.09
Pesticides	0.05	0.19	0.005	0.19
Labor	8.50	34.18	8.21	34.08
Other costs	6.39	25.68	6.17	25.59
Total variable cost	24.87	100.00	24.10	100.00
Net revenue	75.13		75.90	
Gross revenue	100.00		100.00	

Appendix 4.7 Effect of world price increase by 6% on cassava production and farm income, East Java, 1996.

Item	Base-1996					Scenario I				
	Quantity	Price	Value	Share (%) GrossR	Total Cost	Quantity	Price	Value	Share (%) GrossR	Total Cost
Gross revenue	12,700	191.5	2,432,050	100.00		1,272.2	198.0	2,518,868	100.00	
Seed			58,740	2.42	12.24			58,740	2.33	12.21
Fertilizer:										
Urea	119.650	315.5	37,748	1.55	7.87	121.681	315.5	38,389	1.52	7.98
TSP	33.690	416.9	14,045	0.58	2.93	33.713	416.9	14,055	0.56	2.92
Others	0.050	380.0	19	0.00	0.00	0.050	380.0	19	0.00	0.00
Pest-insecticides			1,002	0.04	0.21			1,002	0.04	0.21
Labor	53.895	3,500	188,631	7.76	39.32	53.986	3,500	188,951	7.50	39.29
Other costs										
Rent of Equip/animal			20,492	0.84	4.27			20,492	0.81	4.26
Irrigation fees			8,906	0.37	1.86			8,906	0.35	1.85
Transport cost			30,428	1.25	6.34			30,428	1.21	6.33
Others			43,987	1.81	9.17			43,987	1.75	9.15
Variable cost			403,998	16.61	84.21			404,968	16.08	84.21
Cost of capital			75,750	3.11	15.79			75,932	3.01	15.79
Total variable cost			479,748	19.73	100.00			480,900	19.09	100.00
Net revenue										
Nominal (Rp)			1,952,302					2,037,968		
Real (kg gabah)			10,195					10,293		
Changes (%)										
Nominal								4.39		
Real								0.96		

Notes:
1. Production elasticity with respect to price of soybeans: 0.05
2. Fertilizer demand elasticity with respect to price of soybeans: 0.02
3. Labor demand elasticity with respect to price of soybeans: 0.05
4. Own price elasticity of demand for urea: -0.10
5. Own price elasticity of demand for ZA: -0.10
6. Own price elasticity of demand for SP36: -0.30
7.Own price elasticity of demand for KCL: -0.40
8. Interest rate 25% per year

Simulated factor cost

	Base-1998		Simulated	
	% GR	%TC	% GR	% TC
Seed	2.42	12.24	2.33	12.21
Fertilizer	2.13	10.80	2.08	10.91
Pesticides	0.04	0.21	0.04	0.21
Labor	7.76	39.32	7.50	39.29
Other costs	6.38	37.43	7.14	37.38
Total variable cost	19.73	100.00	19.09	100.00
Net revenue	80.27		80.91	
Gross revenue	100.00		100.00	

Appendix 4.8 Effect of tariff reduction on potatoes products and farm level, West Java, 1996.

Item	Base-1996					Scenario I				
	Quantity	Price	Value	Share (%) GrossR	Total Cost	Quantity	Price	Value	Share (%) GrossR	Total Cost
Gross revenue	20,269	762	15,444978	100.00		19,854	736	14,612,576	100.00	
Seed	1,125	1,500	1,687,500	10.93	33.16	1,125	1,500	1,687,500	11.55	33.23
Fertilizer:										
Urea/ZA	429	322	137,994	0.89	2.71	422	322	135,875	0.93	2.68
TSP	420	467	195,899	1.27	3.85	413	467	192,891	1.32	3.80
KCl	101	351	35,600	0.23	0.70	100	351	35,053	0.24	0.69
ZPT/PPC	200	82	16,500	0.11	0.32	197	82	16,247	0.11	0.32
Manure	7,660	24	187,000	1.21	3.67	7,660	24	187,000	1.28	3.68
Pest-insecticides	11	18,340	201,739	1.31	3.96			201,739	1.38	3.97
Labor	404	4,200	1,697,640	10.99	33.36			1,694,165	11.59	33.36
Other costs					0.00					
Land rent			580,000	3.76	11.40			580,000	3.97	11.42
Rent of Equip/animal			18,600	0.12	0.37			18,600	0.13	0.37
Transport cost			0	0.00	0.00			0	0.00	0.00
Others			31,000	0.20	0.61			31,000	0.21	0.61
Production cost			4,789,472	31.01	94.12			4,780,070	32.71	94.12
Cost of capital			299,342	1.94	5.88			298,754	2.04	5.88
Total production cost			5,088,814	32.95	100.00			5,078,824	34.76	100.00
Net revenue										
Nominal (Rp)			10,356,164	67.05				9,533,752	65.24	
Real (kg gabah)			13,591					12,953		
Changes (%)										
Nominal								7.94		
Real								4.69		

Notes:
1. Yield elasticity with respect to price of potato: 0.045
2. Fertilizer demand elasticity with respect to price of potato: 0.45
3.Pesticide demand elasticity with respect to price of potato: 0.02
4. Labor demand elasticity with respect to price of potato: 0.60
5. Own price elasticity of demand for urea: -0.10
6. Own price elasticity of demand for ZA: -0.20
7. Own price elasticity of demand for SP36: -0.30
8. Own price elasticity of demand for KCL: -0.50
9. Own price elasticity of demand for pesticide: -0.75
10. Interest rate 25% per year

Simulated factor cost

	Base-1998		Simulated	
	% GR	%TC	% GR	% TC
Seed	10.93	33.16	11.55	33.23
Fertilizer	3.71	11.26	3.88	11.17
Pesticides	1.31	3.96	1.38	3.97
Labor	10.99	33.36	11.59	33.36
Other costs	6.01	18.25	6.35	18.28
Total variable cost	32.95	100.00	43.76	100.00
Net revenue	67.05		65.24	
Gross revenue	100.00		100.00	