UNIVERSITAS INDONESIA

The Determinants Factors of Retail Price of Rice in Indonesia 1992-2006

THESIS

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FACULTY OF ECONOMICS
MASTER OF PLANNING AND PUBLIC POLICY

JAKARTA
July 2010

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The Determinants Factors of Retail Price of Rice in Indonesia 1992-2006

THESIS

Submitted in partial fulfillment of the requirements for
the degree of Master of Economics

ANDI WINAYA MAHDAR
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FACULTY OF ECONOMICS
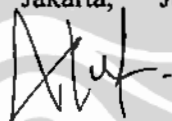MASTER OF PLANNING AND PUBLIC POLICY
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ABSTRACT

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This study aims to analyze the influence of the domestic farmer price of rice farmer, exchange rate, income per capita, world price of rice, dummy import tariff policy and dummy crisis in 1998/1999 on domestic retail price of rice in the long term and short term. This study period was from 1992 until the year 2006 by using quarterly data.

The approaches used in this study are Johansen Multivariate Co-Integration to see long-term relationship of all variables and Error Correction Model (ECM) to see the relationship in the short term.

From the Co-Integration test results and ECM test results can be seen that there are differences in behavior (influence) of the explanatory variables (domestic farmer price of rice, exchange rate, income per capita, world price of rice, dummy import tariff policy and dummy rice crisis in 1998/1999) to bound variables (domestic retail price of rice) in the long term and short term. in the long run all explanatory variables that influence positively and significantly impact to domestic retail price of rice. While in the short run, variable domestic farmer price of rice, world price of rice, dummy import tariff policy and dummy crisis in 1998/1999 do not have a significant influence on improving the domestic retail price of rice even has a positive direction. ECT(-1) show a negative and significant effect, it indicates that there is a relationship between long term and short term and the ability to correct for disequilibrium toward equilibrium condition.

Keywords:
Rice, Domestic Retail Price of Rice, Error Correction Model (ECM), Johansen Cointegration.

ABSTRAK

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Judul : Faktor-Faktor yang Mempengaruhi Harga Eceran Beras di Indonesia 1992-2006

Penelitian ini bertujuan untuk menganalisis pengaruh harga beras petani dalam negeri kurs, pendapatan per kapita, harga beras dunia, dummy kebijakan tarif impor beras dan dummy krisis pada tahun 1998/1999 terhadap harga eceran beras dalam negeri dalam jangka panjang dan pendek panjang. Periode penelitian adalah dari tahun 1992 sampai tahun 2006 dengan menggunakan data triwulanan.

Pendekatan yang digunakan dalam tesis ini adalah Johansen Multivariate Co-Integration untuk melihat hubungan semua variabel dalam jangka panjang dan Error Correction Model untuk melihat hubungan jangka pendek.

Dari hasil uji Co-Integration dan hasil tes ECM dapat dilihat bahwa terdapat perbedaan perilaku (pengaruh) dari variabel-variabel penjelas (harga beras di tingkat petani dalam negeri, kurs, pendapatan per kapita, harga beras dunia, dummy kebijakan tarif impor dan dummy krisis beras tahun 1998/1999) terhadap variabel terikat (harga eceran beras dalam negeri) dalam jangka panjang dan pendek. Dalam jangka panjang semua variabel penjelas yang berpengaruh positif dan signifikan berpengaruh terhadap harga eceran beras dalam negeri. Sementara dalam jangka pendek, variabel harga beras di tingkat petani dalam negeri, harga beras dunia, dummy kebijakan tarif impor dan dummy krisis pada tahun 1998/1999 tidak memiliki pengaruh signifikan pada peningkatan harga eceran beras dalam negeri dan memiliki arah yang positif. Variabel ECT (-1) mempunyai tanda negatif dan signifikan. Kondisi ini menunjukkan adanya hubungan antara keseimbangan jangka panjang dengan jangka pendek dan kemampuan untuk mengkoreksi kesalahan pada kondisi ketidakseimbangan menuju kondisi keseimbangan

Kata Kunci:
Beras, Harga Eceran Beras Dalam Negeri, Error Correction Model (ECM), Johansen Cointegration.

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CHAPTER 1
INTRODUCTION

1.1 Background

Rice is an important commodity for Indonesia, because it is a main staple for the majority of the Indonesian people. Rice is one of the basic food commodities for the Indonesian people and it is a strategic commodity for national development. A shortage of rice could affect the instability of national development. Even up to now, not only at the national, regional, and household level but also globally where the size of the visible impact occurred due to the shortage of food supplies for rice. Rice is one of the agricultural commodities that have been defined as the Indonesian special product in the forum of World Trade Organization negotiations, being together with sugar, corn and soybean.

The issue of rice is a complex issue which is related to the majority of the people of Indonesia. The increasing of Indonesian population affects the increasing of rice consumption rapidly. Among all the food products, the price of rice is one of the important roles in determining the rate of inflation, in addition to the price of sugar and cooking oil (Bank Indonesia, 2007). Rice is also become one of the basic needs of society and a source of carbohydrates therefore the estimated rice demand for the future will also continue increasing along with the increasing of income and population (Ministry of Agriculture, 2005). The Government through the Ministry of Trade, assessing commodity rice and two other commodities, namely rice and cooking oil are the strategic commodities which will be tried to become controlled together with the other institutions, such as BULOG. The Government's concern of the intensive increasing of rice, not only because rice is one of strategic commodities in Indonesia, but also rice is one of the source of income for about 900 thousands farmers in the amount of involved labor to reach approximately 1.3 millions of people (Ministry of Agriculture, 2005). Therefore the government's policy is required for maintaining, supervising and stabilizing the price and the availability of rice.

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Based on the data from FAO, import rice had fluctuated from the period 2000 – 2007. The import of rice reached the highest level in year 2000, the high consumption of rice for food reached 121.6 kg's per capita. The level of food consumption may have been filled from the domestic production reached 107.5% of the national food needs. However, the rice import is still done to reach the national needs, namely the average amount per year to reach about 1,043,140 tons, or approximately 4.7% of national supply. Indonesian domestic rice production for the last four decades has been able to reach approximately 97% of the total supply which is needed in each year. The amount of rice supply had reached the highest in the period of 1981-1990 which reached 101% of the total supply per year, but then decreased continuously until the last four years reaching an average of 94% of the total supply per year. Along with the increase of Indonesian population, the food needs could not be avoided anymore. Government's obligation is to reach the abundance of needs of the main food for rice.

In 1998, Habibie's administration had opened Indonesian rice market with a zero percent import duty. In 1999, rice imports reached four million tons. Depressing the grain prices from farmers to 700/kg rupiah's have an effect of decreasing in production. Abdurrahman Wahid administration levied the rice import duties to 25 percents and imports decreased drastically. Megawati administration by Instruction President No. 9 / 2002, which had become effective since January 2003, restricted the import of rice, followed up to one year by Susilo Bambang Yudhoyono administration. The result of restricted the import of rice policy is rice prices were raising and farmers got profits. The rice production increased rapidly. It seemed, there was a direct correlation between the import of rice, price of rice and grain production.

Although the national rice production is currently quite abundance but it could not provide for the national rice. To cover these shortages, it must be a rice import policy. These conditions are not only influenced by the conditions or the availability of rice production in the country, but many factors for consideration. The increase of rice productivity is not possible anymore to be relied on and many lands have been reduced as a result of the transition function

of fertile land into economic activities other than agriculture (FAO, 2006). Indonesia is an area that has very good potential in the agricultural sector, so that Indonesia at the international level is one of the producers and consumers of the world's largest rice under China. The condition requires the creativity of the people of Indonesia to create Indonesian rice production to be increased or at least stable. With production stability can maintain national food security. With food security conditions are better then the food price stability can be maintained. To maintain the availability of rice in Indonesia have increased the role of communities and local governments to ensure the availability of rice at the national level. One way to increase the role of society in order to maintain the availability of rice at the local level and rural areas is to continue growing rice and improve their products. Therefore the role of government is to maintain the availability of support materials for rice production. The availability of rice will affect the price of rice, besides rice prices are also influenced by the price of other goods and the policy of the government.

The price of rice has uniqueness in determination process, so that the necessary caution in determining the price. Uniqueness includes rice as Indonesian main staple, to improve the welfare of farmers we should increase in rice prices, but if the rice prices higher it will increase poor people. Domestic rice prices are influenced by many factors. The results of study Malian, Mardianto and Ariani (2004) showed that these factors include the price of rice in the international market, the real value, excess demand of rice, rice production and the total base price of grain. Ikhsan (2001) stated that any increase in rice prices by 10% will cause the poor population by 1% or more than two millions of people. The decrease of grain and rice prices also posed a dilemma for the government, because contrast to the increase in production costs resulting from the farmer's fertilizer prices. This conclusion means that every time there is an increase in the price of rice will bring poor population. In the other hand, the decline in rice prices would reduce poverty, but it will increase poverty in the agricultural group. Another study issued by Hosain (2006) concluded that farmers and other workers especially rice farming will be motivated to try even harder when the price of rice improved. So that the domestic market protection will guarantee

improvements in the price of rice. As a result, the village economy will move so that the price of commodities in the country improved. Hosain give an example, rice farming in China began less attractive after rice prices are always low.

Sihono (2007) concluded in his study of the differentiation of rice prices in Indonesia Post-Economic Crisis, said that rice supplies in the gatherer greatly affect the price of rice at the local level, while the season was also a significant effect on the price of rice because if the dry season rice yields will better be compared with the rainy season. But the most influential factor on the price of rice is rice import policy by the government.

According to the information provided by the Directorate Import, Ministry of Trade, the consideration in setting import rice policy based on factors such as supply of rice in the country, domestic production of rice, and increasing of domestic rice prices. Development of the domestic price of rice is one of the important considerations for the government in setting import policy. By import of rice, the government aims to stabilize the price of rice in the domestic market so that the people of Indonesia, as a consumer of rice, not declining levels of welfare due to his life by the increase in the price of rice. By looking at the phenomenon that occurs in the determination of the price of rice in Indonesia must be careful, so that the observed effects of rice pricing policy should look at the factors that influence it. Indonesia is a country which has various potentials and problems related to the food, so it is very interesting to be observed. However, this study only performs limited to whether the retail price of rice is affected by the price of rice from farmers, income per capita, exchange rates, world prices of rice and import tariffs.

1.2 Research Objective

According to the background, therefore it is interesting to identify the determinant factors of Retail Price of Rice in Indonesia such as the price of rice from farmers, income per capita, exchange rates, world prices of rice, the dummy crisis 1998/1999 and the dummy import tariffs policy in the period of 1992 – 2006 (long run and short run).

1.3 Scope of Research

This study performed only limited to whether the retail price of rice is affected by the price of rice from farmers, income per capita, exchange rates, world prices of rice, the dummy crisis 1998/1999 and the dummy import tariffs with quarterly data in the period of 1992 – 2006.

1.4 Research Methodology

In order to analyze the impact of import rice policy to the retail domestic price of rice in Indonesia determinants of import rice of Indonesia, it will carry out an econometric model by using the approach Error Correction Model. The sources of data are from The Central Board of Statistic (BPS), Ministry of Trade, International Finance Statistic (IFS), UNCTAD and other electronic sources.

There shall be a modification to adjust the objective of the research, characteristic, and availability of the data.
The modification of the model is:

$$HDOM_t = f(HP_t, Y_t, NER_t, WP_t, CRS, TR) \dots\dots\dots\dots\dots\dots(1.1)$$

Where :

HDOM	= Retail Price Of Rice
HP	= Price of Rice at the level of farmer
Y	= GDP Per capita
NER	= Nominal Exchange Rate
WP	= World Rice Price
CRS	= Dummy Crisis
TR	= Dummy Import Tariffs on Rice

According on the price function as in equation (1.1) above hypothesis proposed in this study as follows:

- Price of rice at the level of farmer has a positive impact (+) to the retail price of rice in Indonesia in the long term and short term;
- GDP per capita has a positive impact (+) to the retail price of rice in Indonesia in the long term and short term;

- Nominal Exchange Rate has a positive impact (+) to the retail price of rice in Indonesia in the long term and short term;
- World Rice Price has a positive impact (+) to the retail price of rice in Indonesia in the long term and short term;
- Dummy of Crisis has a positive impact (+) to the retail price of rice in Indonesia in the long term and short term;
- Dummy of import tariff policy has a positive impact (+) to the retail price of rice in Indonesia in the long term and short term.

And to test hypotheses on the previous analysis of the retail price of rice in Indonesia in the long term are as follows:

$$\log HDOM_t = \alpha_0 + \alpha_1 \log HP_t + \alpha_2 \log Y_t + \alpha_3 \log NER_t + \alpha_4 \log WP_t + \alpha_5 CRS_t + \alpha_6 TR_t + \mu_t \dots$$
$$\dots (1.2)$$

Expected value of the coefficient is $\alpha_1 > 0$, α_2, α_3, $\alpha_4 < 1$, where μ is Error Term. While analysis of the retail price of rice in the short term is as follows :

$$\Delta \log HDOM_t = \beta_0 + \beta_{1i} \Delta \log HDOM_{t-1} + \sum_{i=0}^{n} \beta_{2i} \Delta \log HP_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta \log Y_{t-i} + \sum_{i=0}^{n} \beta_{4i} \Delta \log NER_{t-i}$$

$$+ \sum_{i=0}^{n} \beta_{4i} \Delta \log WP_{t-i} + \beta_5 CR + \beta_6 TR + \beta_7 ECT (-1) + \varepsilon \dots \dots (1.3)$$

expected value of the coefficient is $\beta_2 i > 0$, β_3, β_4, $\beta_5 < 1$; $0 < \beta_1 i < 1$; where $\beta_1 ECT(-1)$ = Error Correction Term; n is amount of lag ; t is the quarter; and t-i is *time lag* in t- i

1.5. Outline of Research

In order to facilitate the understanding of this thesis, brief description about the content of each chapter of the thesis is given as follows:

Chapter 1: Introduction

This part will discuss the background of the problem which explain about the recent condition of research object, objective of the research, research coverage, research methodology, thesis hypothesis and the organization of thesis.

Chapter 2: Theoretical Background

This chapter consists of several theories which underlie the issues. The theories used in this research include international trade theories, demand theory, theory of trade barrier especially about tariff barrier. Moreover, this part also consists of several literature studies about the previous empirical research which related to the topic in this thesis.

Chapter 3: World and Indonesia Rice Profile

This chapter contains general descriptions concerning the condition of Indonesia's and world rice production, consumption and trade. In addition, the rice regulation in Indonesia and market structure will also be included.

Chapter 4: Research Methodology

This chapter will describe how the problems being analyzed. This chapter consists of construction of the models, data source and description, and analysis method.

Chapter 5: Results and Analysis

In this chapter, data will be analyzed by using method developed in Chapter 4. Then both result of regression and its analysis will be presented in order to achieve the objective of the research.

Chapter 6: Conclusion and Recommendation

This chapter consists of the conclusion based on the analysis on Chapter 5 and policy recommendation which can be used as an input for policy makers. Suggestion for research in the future is also presented.

CHAPTER 2

LITERATURE STUDY

2.1 Theoretical Background

2.1.1. Theory of Absolute Advantage

Adam Smith (Krugman and Obstfeld, 2003) said that trade between two countries is based on absolute advantage. If a country is more efficient and has an absolute advantage than any other country in the production of other commodities, then both countries can benefit by specializing in producing a commodity. This has an absolute advantage, and exchange with other commodities that have an absolute loss. Through this process, resources in both countries can be used in the most efficient way. Output produced commodities will increase. Increased output is a measure of the benefits of specialization of production for the two countries that do trade.

Adam Smith believed that all countries can benefit by the existence of international trade. Smith advocated, *laissez-faire* policy, if a policy which suggests minimal government interference in the economy. Through international Trafficking, natural resources the world can be used efficiently and to maximize the welfare of the world.

Smith's view is contrary to the current reality in which many limitations *(distortion)* of international trade flows. Therefore the trade restrictions would only benefit few and harm the many.

2.1.2 Theory of Comparative Advantage

Ricardo's theories in 1817 is one of law in the export-import. According to this theory, if a country is less efficient than other countries in producing commodities, but there is still trade. The first country to specialize in producing and exporting commodities which have a smaller absolute loss or has a comparative advantage, another country import commodities which have the greater absolute loss or hasn't a comparative advantage.

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The assumptions of David Ricardo's theory based on comparative advantage , namely: (1) there are only two countries and two commodities, (2) there is free trade, and (3) labor mobility is perfect, constant production costs, no transportation costs, no change in technology and use the labor theory of value.

2.1.3. Heckscher and Ohlin theory

Heckscher-Ohlin theory (HO) is one of the most influential theories in pure trade theory and can explain the pattern of trade. This theory proposed that a country will export goods that have an abundance of production factors intensively. A country is said to have an abundance of production factors (labor for example) if the ratio of labor to other factors is greater than the ratio of its partner countries. Heckscher-Ohlin (HO) tries to explain the pattern of world trade with a specific disclosure of why there different prices between countries, before the country's trade between them. There are some things that are considered as causes of price differences, such as demand factors or differences in technology. But Heckscher-Ohlin (HO) doubted this, and instead he proposed the concept of proportion in the use of factors of production factors as the basis of comparative cost differences.

According to the theory of comparative advantage , differences in comparative advantage have due to a state endowment of factors which are owned respective by countries. Factor endowments according to HO model are:

1. Soil factors

Factor lands or natural resources, consisting of many elements of natural resources contributes to the production of goods and services. Natural resources can be classified into agricultural land, forests, fisheries, and mineral resources.

2. Human Factors

Variation of International human endowment factors. In the underdeveloped and poor countries, the available labor force is unskilled workers (Unskilled Labor) and working in traditionally agricultural sector. Only the smallest part which has the expertise and work in industry sector. And only the smallest part which has the

ability and management techniques. Instead of labor in developed countries like America and Japan is labor which has expertise and a lot of work in the industrial sector. Therefore to measure the differences in the international quality of the labor factor is not easy but it is important.

3. Capital Factors

Capital is the most important dynamic factor of production. The economy will become more productive by an increase in supply of capital for production factors and by increase of the quality of capital. International investment may be in addition to domestic investment, which can increase in supply of capital for production.

Increasing a flow of funds will be result increase domestic demand and capital inflow. Krugman (1989) argue that the inflow of capital will accelerate the effects of terms of trade.

2.1.4. Demand Theory

Demand theory gives an explanation of the nature of the demand from consumers for the goods / services. Consumer demand for some goods / services is determined by many factors. The important factors are:

1. Price of goods,
2. Other goods prices is closely related to those goods,
3. Income households / communities,
4. Population,
5. Income distribution,
6. Predictions about the state of the future,
7. Sense of community,
8. And others.

For the analysis of the influence of these factors on the demand for a goods / services is not easy. Therefore in discussing the theory of demand, many economists make some assumptions, such as the demand is influenced by price with assuming other

factors remain unchanged (cetirus paribus). However other factors (which are considered fixed) do not mean ignored.

In theory explained the relationship between the demand of goods / services with the price. Sukirno provide hypotheses that the law of demand is, "The lower price of goods will be impact to increasing demand for that's goods, otherwise the higher price of goods will be impact to reduction demand for that's goods" (Sukirno: 52).

Demand can be expressed in mathematical relationship with the factors that influence it. The factors that influence can be expressed in a mathematical equation as follows:

$$Dx = F (Px, Py, Y / Cap, T, Pop, Pp, Prom)$$

Where:

Dx	: Demand for goods "x"
Px	: The price of "x"
Py	: Price "y" (substitutes or complements)
Y / Cap	: Per capita income
T	: tastes or habits
Pop	: Number of population
Pp	: Estimated price of "x" next period
Prom	: The producers increase sales (promotion)

Dx is the dependent variable, because amount of value determined by other variables. variables on the right side of the equation is called the independent variable, because its value is independent of the value of other variables.

Positive sign (+) and negative (-) shows the influence of each independent variable on the demand for goods "x". Positive sign (+) indicates the direction of the relationship, while negative (-) indicates an inverse relationship. For example, population growth will increase demand for goods "x", while if the price of "x" (Px) increased, the demand for goods decreases.

In economic analysis, not all the variables taken into account. Usually considered is a large and direct influence. In this case the considered variables affect the demand for an item is the price of the good itself, the price of other goods and population.

2.1.5. Theory of Export and Import

International trade can occur because of differences in demand and supply of a country. This difference is due to: (a) not all countries have and are able to produce commodities that are traded because of natural factors that do not support (b) the ability of a country to absorb and apply the technology to produce a particular commodity in a more efficient level. Krugman and Obstfeld (2003) explain, if there are two countries, domestic and foreign, they consume the same goods, which are transported from one country to another without generating costs (transportation costs are considered zero). Goods in each country where competitive supply and demand is a function of market prices, supply and demand for domestic rice prices will depend on the domestic currency, while the rice supply and demand in foreign countries will depend on the price of foreign currency. If then it is assumed that the exchange rate between two currencies are not influenced by the form of trade policies applied in the goods market is the price used is the domestic currency. Trafficking occurs when there are price differences in the time before the trade. The example is before trading in the domestic price of goods higher than the foreign. Having established trade relations, began the movement of rice from foreign to domestic goods because domestic prices are higher than in foreign. This trade increases in the price of foreign goods and lower prices on domestic goods until the price difference does not happen again.

To determine the world price and quantity traded in world markets, it is necessary to set up two new curves are: the import demand curve and the export supply curve which is basically foreign derived from supply and demand curves in the country. Demand for imports shows the excess of the amount that consumers are asked for the quantity supplied by domestic producers, while the supply of foreign exports is the excess of the amount offered by foreign producers on the quantity demanded by foreign consumers.

Based on Figure 2.1 for domestic import demand, when price is at P1 domestic consumers requested a total of D1, while the domestic supply is only for S1, so that domestic demand for imports amounted to (D1-S1), in this case excess demand . If the price increases to P2, domestic consumer demand was reduced to D2, while domestic

producers to increase supply S2, so the demand for imports fell to (D2-S2). This condition is the PD, supply and domestic demand as large, which indicates a state without a trade, so that the price curve PD domestic demand for imports cut straight axis, means no imports (import demand in the PD = 0).
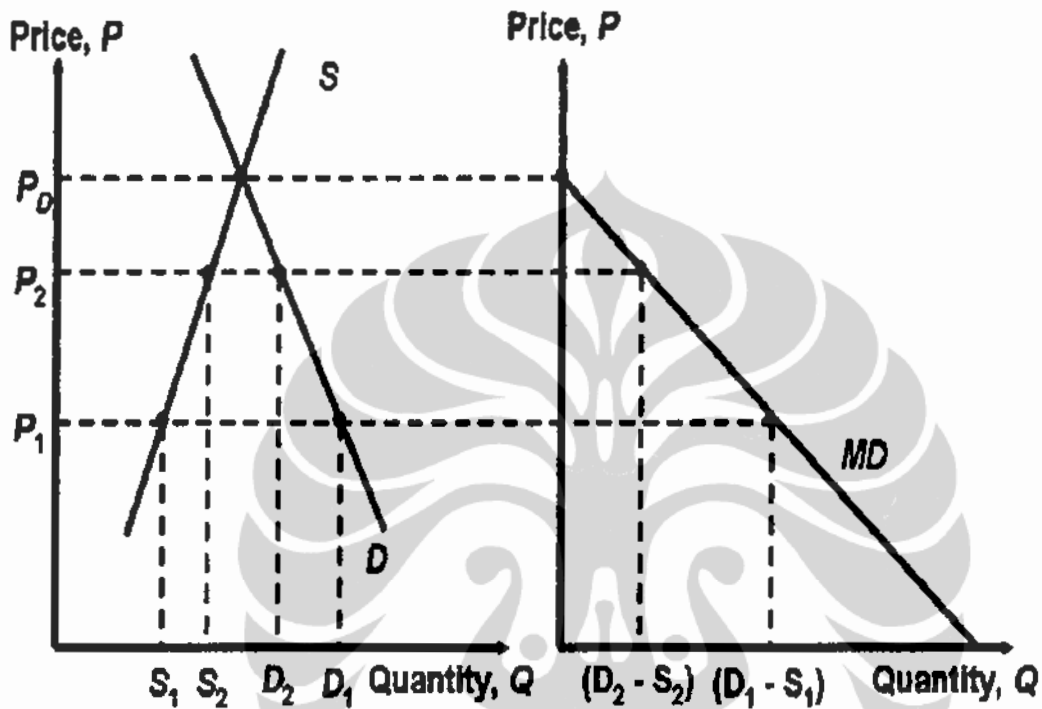

Figure 2.1. The curve for Import Domestic Demand

Source: Krugman & Obstfeld (2003)

Occurs when the balance of world demand imports for domestic with foreign export supply
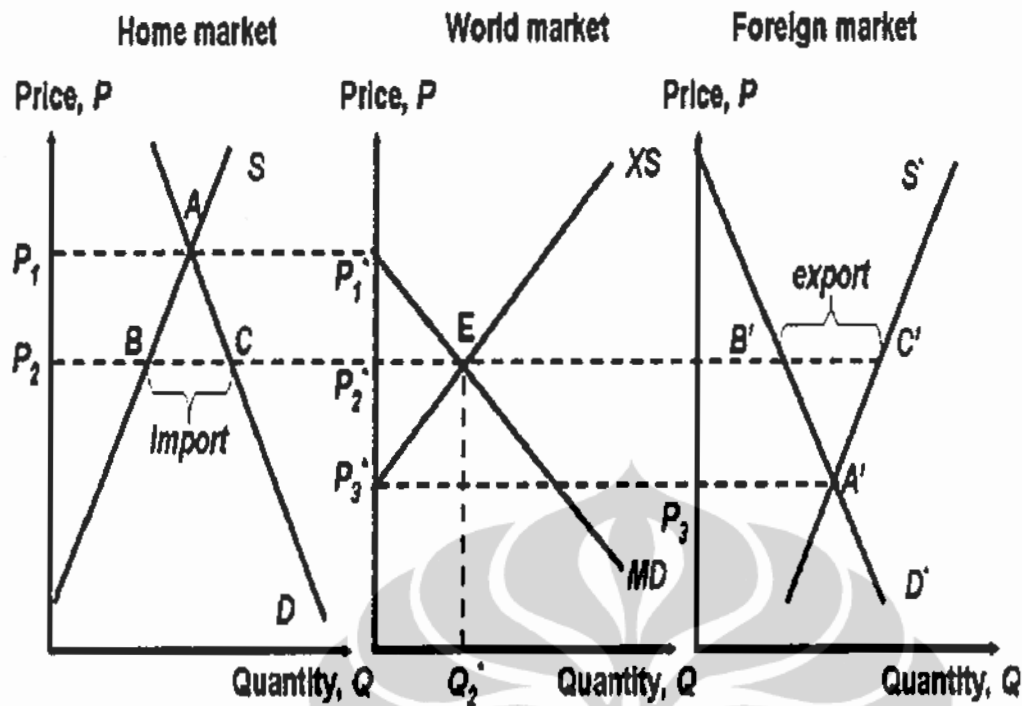
Figure 2.2. Occurrence of International Trade Balance

Source : Salvatore (1993)

In domestic markets, production and consumption occurs at point A when the price reached P1, while the production and consumption in the foreign market occurs at point A 'when the price of P3. When there is trade, the prices established in the world market are among the P1 and P3 when the two countries is a big country. At a price below the PI, the domestic country will ask for more (point C) than the amount produced domestically (point B) so that it will import the excess demand *(excess* demand) for B – C. While the price above P3, foreign countries will produce greater than that requested or consumed. As a result, an excess supply of B'-C 'so that foreign countries are exporting *excess supply.*

At P1 the price, the quantity demanded for consumption commodities in the domestic country equal to the amount they offer, so that the domestic country does not import the commodity. This situation is shown in the import demand curve on the world market, with prices at the point P1 *. In domestic markets, P2 is oversubscribed, indicating that the domestic country must import the P2. On the other hand, in foreign

markets, P3 indicates that the quantity supplied equals quantity demanded that foreign countries do not export these commodities. This state refers to the export supply curve on the world market, which shown at the point P3 *. In foreign markets, P2 is the excess supply which indicates that foreign countries must export to P2. The situation in world markets, the P2 *, where the amount demanded by the domestic market equal to the amount offered by foreign markets, indicated by the intersection curve and MD XS. This intersection is an *equilibrium* in which trade is reached between the two countries, namely the P2 * and

2.1.6. Theory of Income (Gross Domestic Product)

In macroeconomic theory, the income of a country can be seen from the three approaches, there are income approach, production approach and expenditure approach (Nanga, 2001:17, in Mutmainah).

Income Approach

Income approach can be defined as the amount of revenue obtained by owners of production factors from workers, capitals, landowners and businessmen profit.

Production approach

Production approach is income of a country which get from the amount of production final goods and services by economic sectors in the country in a period (one year). In general, the economic sectors can be summarized into three sectors, namely agriculture, manufacturing and service.

Calculations of income with the production approach have classified Indonesian economy in nine sectors of the economy to Indonesia, namely:

1. Mining and quarrying;
2. Agriculture;
3. Manufacturing Industry;
4. Electricity, gas and water supply;
5. Construction;
6. Trade, hotels and restaurants;

7. Transportation, communications and warehousing;

8. Financial Services; and

9. Other services.

Expenditure approach

In the expenditure approach, a country's national income is the amount of spending by the household sector (consumption), the private sector (investment), government sector (government spending) and the foreign sector (exports).

The Weaknesses of Calculation on National Income

1. Several types of output is not get in the calculation of GDP. Where a lot of outputs produced by domestic firms are not included in the calculation of GDP. Including an individual's income earned from illegal activities such as selling drugs and corruption (underground economy).

2. Activities which have bad consequences for environment does not included in the calculation of GDP. The example of this case is pollution and environmental destruction due to logging. One study in Indonesia revealed that if environmental degradation included in the calculation of GDP, would reduce GDP growth of 3 percent each year.

3. Calculation of GDP also does not include the value of increased quality of output. The examples are electronic goods and motor vehicles which have depreciation value of goods.

2.1.7. Theory of Exchange Rate

Exchange rate is defined as the price of foreign currency from domestic financial views (Blanchard, 2003). According to Krugman and Obstfelt (2003) can be divided into two, namely depreciation and appreciation. Depreciation is the decline in price of domestic currency against foreign currencies, while appreciation is the increase in the price of domestic currency against foreign currencies. If other conditions remain (ceteris paribus), then: Depreciation of the currency of a country to make the price of the goods becomes cheaper for foreign parties and the appreciation of the country's currency led to price the goods become more expensive for foreign parties.

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Exchange rates can be divided into two, namely nominal exchange rate and real exchange rate. Nominal exchange rates is the ratio between the value of domestic currency to foreign exchange currency. Meanwhile, the real exchange rate is the value used to exchange goods and services from a country with goods and services from other countries (reflecting the relative price of an item between the two countries). Real exchange rate can be used to measure the competitiveness of nations in international trade. The real exchange rate is often referred to as the ratio of prices (terms of trade).

In general, the determinations of exchange rates are closely related to trade between countries, as well as financial flows between countries. The exchange rate determines a nation's competitiveness in trade and also be an attraction in the process of international financial transactions.

Trade balance in the system, the level of responsiveness of domestic demand for exports and imports of domestic currency depreciation is different. The level of responsiveness can be referred to as price elasticity of demand for domestic exports and domestic imports. Price elasticity of export demand for domestic goods is expressed as:

$$\eta^{\bullet} = \frac{\Delta X / X}{\Delta E / E} \qquad \text{or} \qquad \eta^{\bullet} = \frac{\Delta M^{\bullet} / M^{\bullet}}{\Delta E / E} \qquad \dots\dots\dots\dots\dots\dots\dots\dots(2.2)$$

The higher the η *, the greater the export response to changes in real exchange rate (E). Price elasticity of import demand for domestic goods is expressed as:

$$\eta = \frac{-\Delta M / M}{\Delta E / E} \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2.3)$$

The higher the greater the response η imports due to changes in real exchange rate (E). The equation is finally showing some definite conclusions which will be a positive relationship of the domestic currency depreciation on the trade balance if conditions met:

$$\eta^{\bullet} + \eta > 1 \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2.4)$$

Or what is known as the Marshall-Lerner Condition, which states that the direct effect of the depreciation of the domestic currency on the trade balance is positive when the amount of price elasticity of demand for domestic exports and domestic imports exceed 1 (one). Assuming the Marshall-Lerner Condition applies, the increase in exchange rate will improve the trade balance at each level of income.

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2.1.8. Protection of Trade Theory

International economic policy in broadest sense is government's economic policies which directly or indirectly impact to composition, direction and shape for trade and international finance. These policies are not only in the form of tariffs, quotas, subsidies and ext. However also includes government policy in the country which indirectly has an influence on trade and international finance, such as monetary and fiscal policy.

International trade policy in the field of import is defined as the act of government, either directly or indirectly, which would impact to structure, composition and the effort to protect or promote the growth of domestic industry. The one of policy is tariff barrier. The policy is to provide protection to an domestic economic sector or domestic industry to competition from foreign products. Protection imposed by reason to make domestic product can compete with imported product which there are more cheaper, better quality, more attractive appearance, or general economic sector is not able to compete because of less efficient in producing these product than other countries, and many other causes.

Import tariffs are levied on goods which entering area of a country by stipulation that's the end destination country. The type of tariffs are differentiated by : 1) ad valorem tariff which is proportional to the amount of import duty which is expressed as a percentage of the value of goods subject to these duties. 2) the specific tariffs are regressive is the amount of import duty is expressed for each size / physical unit than the goods. 3) a compound rate of import duty which is a combination of specific tariffs and ad valorem tariffs.

In analyzing the impact of the tariff can be viewed in the framework of partial equilibrium. partial equilibrium in many cases (but not always) are widely used to analyze the impact of trade policy in one sector's is understood without seeing the impact on other sectors usually using demand and supply curves.

Impact economic from implementation of import tariffs by one country can be explained graphically. Assuming domestic as importer while others are exporters and in this case Indonesia is a major rice importer in the world, so the changes will affect the

import of world markets, especially the world rice prices (Krugman, Paul, 1991, and Salvatore, 1997).

The increase in domestic prices is smaller than the size of the tariff, because part of the tariff reduction is reflected in the price of exports by foreign and therefore do not burden the domestic consumer. This is natural consequence of trade policies that are restricting imports. In reality, however great this impact is very small, like a country who was wearing a relatively small import tariffs for certain commodities is also a small effect on the commodity trade, so that the imposition of tariffs is only a small effect on commodity prices.

According to the objectives, policies tariffs *(import duties)* can be classified as follows:

1. Tariff Protection, the imposition of tariffs high to prevent or restrict the import of certain goods;
2. Tariff Revenue, the imposition of tariffs aimed at increasing government revenues.

Based on the above-mentioned objectives, the function tariffs are as follows:

1. The function set *(regulated)*, which is to regulate the protection or economic interests of domestic industry;
2. *Budgeter* function, namely as one of the main sources of national revenue;
3. The function of democracy, namely the determination of the amount tariffs through the approval of Parliament;
4. The function of distribution, namely for the equiTable distribution of national income distribution, such as the imposition of tariffs for imports of high luxury.

The imposition of tariffs on a particular item may be gives effect to the economy of a country, especially against the goods market. As a result of effects from tariffs is the effect on prices (price effect), the effects on consumption (consumption effect), the effect of the product (protective / import substitution effect), the effect on government revenue (revenue effect). and the effects on income redistribution (redistribution effect). As graphically can be described as follows:
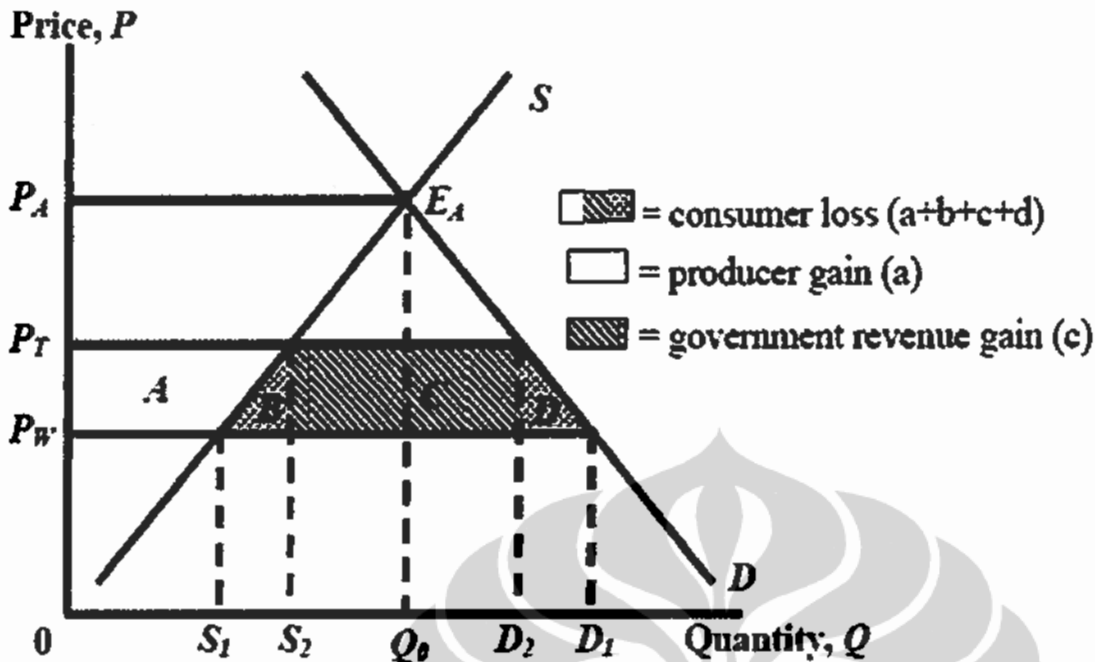
Figure 2.3 Curve of Analysis Tariff Import

Source : Krugman & Obstfeld (2003)

At price P_A and E_A balance point, the economy is in a state of *autarky* in the absence of conditions of exports and imports and domestic production equals domestic consumption (Q_0). Then when the economy is in a state of *free trade* at a price P_W, then the domestic production of S_1 with the level of consumption of D_1, so to meet the needs must be imported for S_1-D_1.

Because of declining domestic production from Q_0 to S_1, the domestic industry will experience a loss. For that the governments provide protection in the form of tariffs of P_W-P_T. Thus the imposition of tariffs of P_W-P_T is going to cause effects such as the following quote:

1. The price of imported goods to be increased from P_W to P_T *(price effect)*;

2. The level of consumption or reduced domestic demand from D_1 to D_2 *(consumption effect)*;

3. Production in the country will also increase from S_1-S_2 *(protective / import substitution effect)*;

4. The government will receive revenues from tariffs for area C *(revenue effect)*;

5. The distribution of income paid by domestic consumers to domestic producers of area A

6. The *dead weight loss* for area C which is the *cost of protection*.

7. Imports in the country will decrease from $S_1 - D_1$ to $S_2 - D_2$.

Imports can be defined as an activity to enter goods into customs territory specific. Or imports can also be interpreted as an activity to purchase goods from other countries, giving rise to the obligation to make payments on the transaction. Economically, the analysis of import behavior is very important issue, because the analysis of can describe how much economic activity of a particular country depends on foreign economies. Or the other explanation, the large amount of imported goods showed a large dependence on the state of foreign economies and the potential to meet the domestic to domestic economic needs.

In describing the behavior of a country's imports, there are a few things to note relating to the purposes and analysis of import behavior. According to Goldstein and Khan (1985, 1044), analysis of import behavior should consider the type of traded goods (if goods are homogeneous perfect primary or goods manufacturers who have a high differentiation), the use of the goods imported (whether for final consumption or as a production factor), institutional framework in which trade occurs (whether in countries where resources are allocated based on relative price differences, or the country where the control government is a very tight).

In analyzing the behavior of a country's imports, there are two general models used in the empirical literature, namely the imperfect substitution model and model of perfect substitutes.

2.1.9. Trade Liberalization on Rice.

The nature of trade liberalization is to eliminate various tariff and non tariff on trade. With trade liberalization, agricultural products can improve the access to wider markets, reduction of export subsidies and domestic subsidies, and not just in the show to

increase the volume of products traded international market, but also to ensure a fair trading system.

The position of the rice trade in international trade is very unique given the complexity of the problems faced in relation to economic, social and political a nation. However, intense competition and the protection provided for these to be adjusted with the agreement as stipulated in the GATT / WTO.

Developing countries including Indonesia are very brave in trade policy in accordance with the demands of the market mechanism. In the world rice trade, Indonesia has making ratification with WTO provisions and without reducing protection to farmers. WTO agreement still allows Indonesia to impose import tariffs for rice commodities. The challenge in the near future to be faced by the Indonesian government is the implementation of the scheme Common Effective Preferential Tariffs (CEPT) within the framework of the AFTA agreement. CEPT scheme in its implementation was agreed to classify non-processed agricultural products into 3 groups.

1. commodity groups which immediately went into the CEPT (intermediate inclusion list)
2. commodity groups to temporarily excluded from the CEPT scheme (temporary exclusion list)
3. commodity groups by the member states is considered sensitive and need special mechanisms (sensitive list).

And further countries also agreed to divide the category of sensitive products to be sensitive and very sensitive. Indonesia register rice as the product is very sensitive (highly sensitive) (Amang and Sawit, 2002). International Trade open and transparent through the process of globalization and closely associated with the global market. World market prices of rice quickly and strongly impact to the dynamics of prices in the domestic market. In other words that the formation of prices in the domestic rice market has a close relationship with changes in the international market rice prices and changes in exchange rate values that occur.

An increase in the International trade is an instrument of import tariffs in the face of trade liberalization, especially rice commodities. According to the Amang and Sawit, import tariffs can be classified in two types as follow specific import tariffs and ad

valorem rates. Defined as specific tariffs per unit Rupiah, many imported goods are not ad valorem percentage determined on the basis of imports value (CIF price multiplied by volume). As has been agreed that the tariff is only of 0 - 5% for crops.

2.2. Empirical Study

Previous study which is similar to this research has been carried out by Malian, Mardianto and Ariani (2006) analyze the factors affecting production, consumption and price of rice and inflation in Indonesia. The simultaneous equation econometric model approach through the Two Stage Least Squares (2SLS) estimation method had been implemented in order to reach the objectives this research. The analysis results shown that Rice price policy is one of important instrument and the factors that influence of domestic rice price are from real exchange rate value, domestic corn price and basic rice price.

Study from Center of Research and Development, Ministry of Agriculture written by Hadi and Waryono (2005) using partial balance model approach to analyze Impact of Economic Policies in the World Rice. The study can be concluded that the protection policy has been successful in significantly reducing imports and raise domestic prices, the amount of production, and producer surplus farmers' income. The study has a good model, but the implications of the model are dependence to the protection policy which is a combination of tariff and non tariff. Where if one of these policies will cause the deleted feared destroyed rice farming so that the dependence of Indonesia on the world market will thin bigger.

Another study from Center of Research and Development, Ministry of Agriculture which written by Hadi (2006) had analyze the impact of policy on basic price producer price, consumer price and area planted of rice. The result study was government has launched various policies so as to increase rice production, one of which was floor price for husked rice. From the results of the analysis employing regression methods and time series data of 1969-1999, the following conclusions may be drawn. *Firstly*, the floor price of husked rice tended to increase during the period under study. *Secondly*, a 10% increase in the floor price of husked rice resulted in a 9,75% increase in the producer price; and a 10% increase in the producer price brought about a 8,39% increase in the

consumer price of milled rice and a 0,61% increase in area planted of rice. This indicates that an increase in the floor price directly increased the producer price and indirectly increased the consumer price and the area planted of rice. *Finally,* the government policy successfully stabilized the domestic prices, and even the producer price was more stable than the consumer prices. It is suggested that the floor price policy needs to be continued with sufficient considerations of farmer's profit and the world (Bangkok) price of milled rice.

Jones (1995) use regression model to analyze rice price stabilization in Indonesia. The regression result concluded that the domestic price of rice in Indonesia has been less variable in real terms than the international price, both within each year and over the entire period 1979 to 1991. The storage scheme has reduced rice price variability. Therefore that grower risks are reduced only to the extent that growers' real incomes are linked through taxation to the financial flows of the storage scheme. This is because their real incomes and the financial flaws are negatively correlated. Under current arrangements this linkage is negligible, so price stabilization raises the share of production risk they face. Recent increases in production are shown to result from larger expected grower profits, and not from reduced risk. In addition to profiting from price stabilization, growers have benefited from government subsidies on fertilizer, irrigation and plant research, and from increases in the average domestic price of rice through Bulog intervention.

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Briefly, the summary of these previous studies can be seen in this Table below:

TABLE 2.1. Previous Studies

Author	Title	Result
Hadi, Prajogo U. and Waryono, Budi (2005)	Dampak Kebijakan Ekonomi Beras di Dunia (The Impact of Economic Policy of Rice in the World)	examined the impact of protectionist policies on the economy of rice in Indonesia by using partial balance model approach in which the study can be concluded that the protection policy has been successful in significantly reducing imports and raise domestic prices, the amount of production, and producer surplus farmers' income.
Jones, Chris (1995)	Rice Price Stabilization In Indonesia An Economic Assessment Of The Changes In Risk Bearing	In addition to profiting from price stabilization, growers have benefited from government subsidies on fertilizer, irrigation and plant research, and from increases in the average domestic price of rice through Bulog intervention.
Hadi, Prajogo U. (2005)	Dampak Kebijakan Harga Dasar Pada Harga Produsen, Harga Konsumen Dan Luas Tanam Padi (The Impact of Basic Price in Producer Price, Consumer Price, and Area Planted of Rice)	The government has launched various policies so as to increase rice production, one of which was floor price for husked rice. From the results of the analysis employing regression methods and time series data of 1969-1999, the following conclusions may be drawn indicates that an increase in the floor price directly increased the producer price and indirectly increased the consumer price and the area planted of rice.

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Author	Title	Result
A. Husni Malian, Sudi Mardianto and Mewa Ariani (2004)	Faktor-Faktor Yang Mempengaruhi Produksi, Konsumsi dan Harga Beras Serta InfLasi Bahan Makanan (The Determinants Factors of Production, Consumption, Price of Rice, and Inflation of Foods)	Rice price policy is one of important instrument and the factors that influence of domestic rice price are from real exchange rate value, domestic corn price and basic rice price.
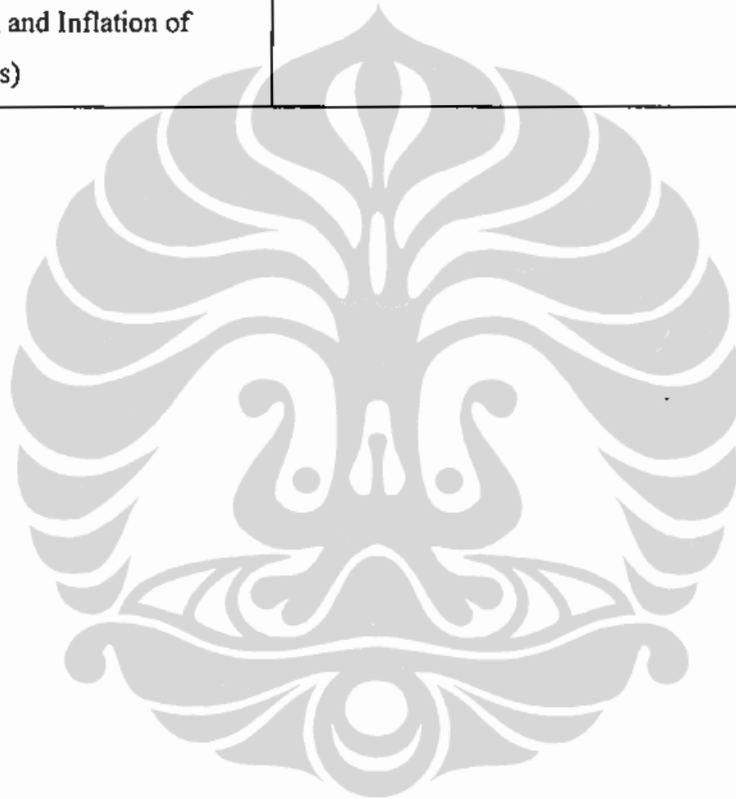
CHAPTER 3
WORLD AND INDONESIA RICE PROFILE

3.1 Introduction

Rice is an old phenomenon in the history of political economic policy, especially in Indonesia. Rice is the staple food for almost all Indonesian people, therefore rice is always a major concern for the government, legislature and public. Once proven the importance role of rice in case of food supply instability or fluctuation of rice prices is if it is not immediately anticipated to trigger the emergence of national unrest. Food commodities rice occupies a very strategic role in Indonesian economy, because about 95 percent of the population currently numbering nearly 220 million people, still rely on rice as main food commodities. In such conditions, the availability and affordability distribution of rice and people's purchasing power is the central issue is not only crucial to economic stability, but also the social stability and national politics. Food security programs can not be separated entirely from rice as a strategic commodity. This is explicit in formulation of agricultural development that the indicative target of primary commodity production of food crops until the year 2006 and the government food stocks are still based on rice.

Policies related to the commodity of rice will impact too performance of agricultural sector which formed the backbone of Indonesian economy. Rice policy has several objectives including (Ministry of Trade, 2008) :

1. Protection of farmers' income
2. Purposes of purchasing rice for various government needs
3. Guarantees of life, or subsidize the poor.

The goals of rice policy there are very vulnerable to the conflicts of interest. The simplest example is to protect income of farmers by purchase of rice in high price and will be impact to consequences of people's purchasing power as consumers. Conversely, if the price of rice is too low, then the income of farmers would be difficult to be improved. Banging these interests require a very careful and fundamental. The government's policy on rice is the key achievement of the objectives above.

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3.2 World Trade on Rice

World rice market is very thin, which is marked with a volume of rice traded in world markets between 27-28 million tons/year

Rice market has resulted rice prices more volatile in the appeal of corn, wheat, and soybeans. Therefore for Indonesia depends on imports clear will be make at risk on market. International price fluctuations will be easily transmitted to domestic price through a variable rate that is still fluctuating.

The information from research of Ministry of Trade (2008) that when FAO has alerting to world in responding to changes in the structure of commodity markets grain, rice-producing countries of the world instantly stop production for the domestic stock. Only the U.S. and Thailand are still willing to sell his rice. Vietnam as the second rice exporter after Thailand, in early 2005 has to impose export tax on rice. Volume of rice in Vietnam is taxed to reach 3.5 million tons for the first shipment of 10 months, including contracts with the Philippines. With the competitor's country in market, Thailand predicted his country over 45% of world trade in 2006. There are Table rank exporter country of rice :

Table 3.1 Top Rice Exporter

Rank	Area	Quantity (ton)	Value (1000 $)	Unit value ($/ton)
1	Thailand	1247300	308698	247
2	India	271085	53759	198
3	Brazil	229254	41224	180
4	Senegal	100181	29449	294
5	Netherlands	48731	21804	447
6	Italy	56330	20532	364
7	Spain	50402	18773	372
8	United States	45379	15322	338
9	Uruguay	63259	12777	202
10	Egypt	63189	12456	197

Source : FAO (2006)

3.3 Production and Import Growth of Rice in Indonesia

In Indonesia there is a strong tendency that agriculture sector is always required to provide inexpensive rice to secure the macro variables (inflation, economic growth and trade balance). The agricultural sector is also expected to support the industrial sector by providing cheap rice for the workers in the city.

In terms of nutrition, rice has a relative advantage over other food. Based on BPS data on the share of rice per capita energy consumption reached 54.3% which means more than half of our energy intake comes from rice. Farming in Indonesia has involving 25.4 million households or more than half the population of this country. Indonesia is the third largest producer after China and India. Indonesia is the third largest producer after China and India. Indonesia's production share is around 57157.436 MT, India 144.570.000 MT, and China 187,397,460 MT of world production (Table).

Table 3.2 Top Rice Producer

Rank	Area	Production (Int $1000)	Production (MT)
1	China	35,526,760	187,397,460
2	India	29,968,800	144,570,000
3	Indonesia	11,845,150	57,157,436
4	Bangladesh	7,981,474	43,057,000
5	Viet Nam	7,334,530	35,867,500
6	Thailand	6,357,229	32,099,401
7	Myanmar	6,224,919	32,610,000
8	Philippines	3,229,486	16,240,194
9	Japan	2,310,732	10,893,000
10	Brazil	2,309,714	11,060,700

Source : FAO (2006)

Thailand and Vietnam, although the share of production is relatively low as 32,099,401 MT and 35,867,500 MT, there are the nation's largest suppliers to the export market, which is 28.23 percent and 13.86 percent to world market. The role of India and

China in supply of exports for world markets each only 10 percent, since the two countries have a very large population and consumes quite a lot of rice too. Domestic rice production in Indonesia at last four decades has been able to meet approximately 97% of the total supply is needed each year. Amount of supply of rice reached the highest in period 1981-1990 have reach 101% of the total supply per year, but then decreased continuously until last four years reaching an average of 94% of total supply per year. Information from BPS (2009) shows, Growth of rice production from 2000-2007 of 0.9% is a number smaller than the period before. However, increase is not able to offset increasing consumption of rice amounting to 2% per year Indonesian rice imports should be average of 2 million tons per year. This shows that the equilibrium of rice national balance sheet is still dishpan by imports.

Indonesia Rice Production (000 ton)

	2000	2001	2002	2003	2004	2005	2006	2007
Indonesia	51898	50461	51490	52138	54088	54151	54455	57049
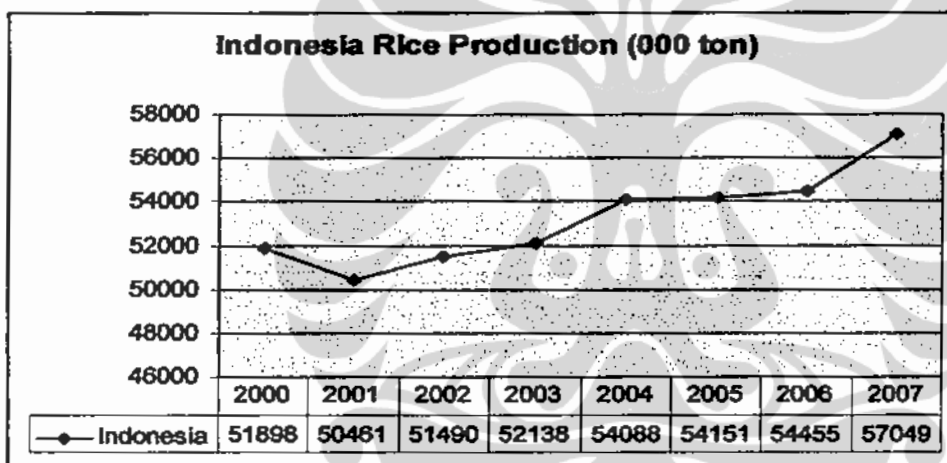
Figure 3.1 Trend of Rice Production in Indonesia

Source : BPS (2009)

TABLE 3.3 Top Rice Importers

Rank	Area	Quantity (ton)	Value (1000 S)	Unit value (S/ton)
1	Senegal	1018729	350397	344
2	Cuba	575831	224650	390
3	Indonesia	374320	118446	316
4	Ghana	372251	124802	335
5	Côte d'Ivoire	192211	73313	381
6	Kenya	126599	33065	261
7	Belgium	125351	43435	347
8	Japan	105638	49216	466
9	France	96088	40971	426
10	United Kingdom	85804	36775	429

Source : FAO (2006)

Indonesia is the third largest importer, with an average share of 9.55 percent. Fluctuations of rice policy in Indonesia have always observed by market. The condition was a key consideration in government's rice import policy because the potential increase in volume of imports impact to domestic prices and in turn will affect to community as producers and as consumers. Based on data from FAO, import rice has fluctuated from the period 2000 – 2007. Import of rice reached the highest in 2001, the high consumption of rice for food reached 121.6 kg per capita. Level of consumption for food may have been filled from domestic production reached 107.5% of national food needs. However, imported rice is still done to meet national needs, namely average amount per year to reach about 1,043,140 tons, or approximately 4.7% of national supply.
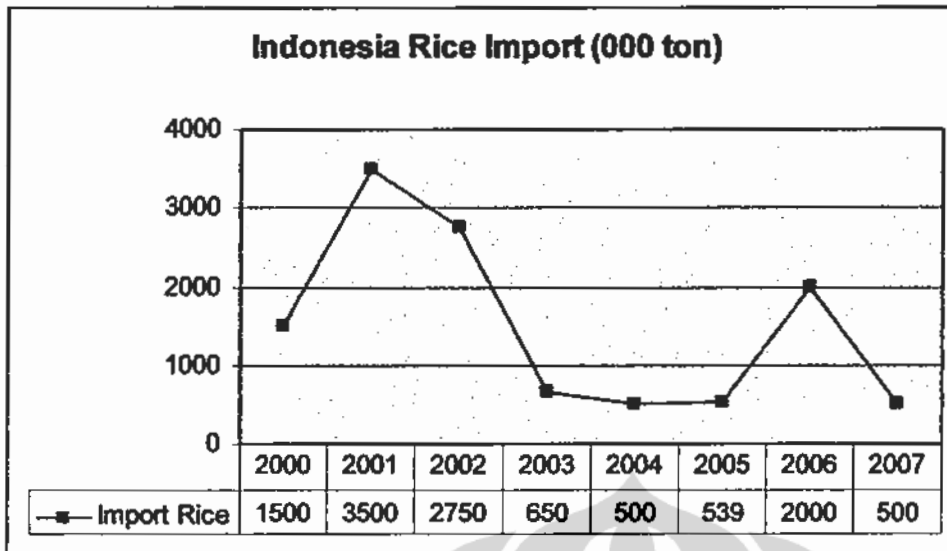
Figure 3.2 Trends of Rice Import in Indonesia
Source : FAO (2009)

Indonesia, such as other developing countries, is a country where the commodity side of food consumption have biggest consumer, and from the producer side is the largest of total employment. In Indonesia, the commodity of rice reached 7.2% of the average expenditure for consumption. From the production side, labor force absorb to 7.1% of overall work force in agricultural sector. Workers with primary school education or even less than it was in the labor sector of production of rice produced in agricultural level of 19% of total labor force (FAO, 2009).

3.4 Rice Policy in Indonesia

In pre-crisis period (1969 - 1996), government pursued policy rice into two levels namely farming level and market / consumer level. Government policy consists of basic grain prices, Subsidized input prices (seeds, fertilizers, Pesticides) and credit interest subsidy. While market policy as follow stock management and import monopoly by the BULOG. By policy, rice relatively stable prices, although tends to increase with the rate of inflation. The price of dry grain harvest (GKP) is received by farmers is also relatively stable. Rice can not be left to market mechanisms and need an instrument for controlling the price of rice. These instruments serve as a reference pricing of rice in the market. Usually at the time of rice harvest / grain farmer level falls below the reference price of government purchases. This condition allows BULOG to buy rice from the

market. Government policy on the basic of rice prices also have an interesting dynamic that is periodically since 1983/1984 until 1997, government made adjustments to the basic rice prices nationally.

In crisis period (1997 - 1999), the government determines the basic price of grain different for each region. Government distinguishes the basic price of grain for 3 areas of the region I includes Jawa, Bali, NTB, South Sulawesi, Southeast Sulawesi, Central Sulawesi; region II, which covers the whole of Sumatra and the region III covering Kalimantan, NTT, Sulawesi, Maluku, Irian Jaya and Timor Timur . These policies continue to apply until 2000. IMF encouraged the government to do the liberalization of rice imports began September 1998 and set the rice tariffs at zero per cent (according to Decision of the Ministry Industry and Trade No. 439/MPP/Kep / 9 / 1998).

In post-crisis period (2000-until now), government will only implement policies without treating rice import policy instruments. Such as supporting a policy made at previous period is in line with commitment to economic policy changes encouraged by the IMF. In the period-changes rice policy changes include:

1. In 2000 the government set tariffs rice is Rp. 430/kg or 30% ad valorem
2. In 2001, the basic pricing of grain back to the previous mechanism is applied nationally.
3. In the year 2001 - 2002 occurred rice policy reform is the establishment of the Presidential Instruction No. 9 of 2001 which was renewed by Presidential Instruction No. 9 Year 2002. Both are in essence the policy are:
   a. Implement the basic policy of the purchase price of grain by the government. HDPP is different from earlier periods in which the government sets the basic price as the lowest price that must be guaranteed by the government in order to stabilize farmers' income.
   b. Establish a rice import policy in order to provide support for increased productivity of farmers and the national rice production
   c. Provide support for diversification of economic activities of rice farmers in order to increase farmers' opinions

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d. Provide protection to farmers and consumers and provide collateral for the supply and distribution of rice and other foodstuffs for the poor and food-insecure.

4. In January 2004, government established the provisions of rice imports through decision of the Ministry Industry and Trade No. 9/MPP/Kep/1/2004. This decree principally on setting up the rice import ban in period one month before harvest, during harvest, and two months after harvest.

5. In May 2004, the changes of Decision of the Ministry Industry and Trade No. 9/MPP/Kep/1/2004 by Decision of the Ministry Industry and Trade No.357/MPP/5/2004. New decree regulates the changes in rice import ban which was originally from January 21 to 30 June 2004 to January 21, until July 31, 2004. Thus rice import can be done starting on August 1, 2004 until one month before rice harvest in 2005

6. In year 2005 through Presidential Instruction No. 2 year 2005 there is a change to term of base price purchase of rice. Government Purchase Price (HPP) is determined by government just a day after the government announced fuel price hike. Price is also distinguished for the quality of grain or rice.

7. In year 2008, through Presidential Instruction No. 1 year 2008, the imported rice can be done if availability of rice in domestic is not sufficient to meet the interests of government stock of rice, and to maintain domestic price stability. The Indonesian government issued a policy import and export of rice through the rules Minister of Trade, Number: 12/M-DAG/PER/4/2008 about provisions rice import and export with consideration to achieve food security, increasing income and welfare of rice farmers, and create stability of national economies.

3.5 Trend Price of Rice in Indonesia

Food commodity prices in global markets increased more sharply. During the period 1990 - 2008, grain prices and domestic rice showed a high increase. Similarly, international rice prices when converted in dollars also showed a high increase of about 38.53% / year. However, in U.S. dollars / tons of international rice prices fell by

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approximately 3.14% / year. Allegedly there are four main causes of rising food prices in the world.

1. Rise in fuel prices. As fuel prices rise above 100/barrel U.S. dollars will affect production costs of food commodities. The cost of mechanization and increasing input prices, especially fertilizer and pesticides. Food transportation costs also increased, rising nearly doubled.

2. Increasing population and income, thus encouraging increased food demand.

3. Climate Change and natural disasters

4. The existence of the role of speculation in commodities markets, switching from the money or the stock market. Rice is considered as a commodity that is stored and transported easily. But according to this venture is a dangerous gamble because rice market is not very liquid, making it difficult to conduct hedging against risk.

Based on data from the current price of basic commodities some of the BPS, there is some increase in commodity prices and the decline in September (week III) than average price in August 2007 as seen in Table 3.4

Table 3.4 Trend of Price Some Commodity

No	Commodity	Change (%)			
		2004	2005	2006	2007
1	Rice	1.03	6.77	-0.53	-1.49
2	Sugar	6.54	1.09	-0.81	-0.15
3	Cooking Oil Without Brand	-3.16	6.35	1.44	-1.03
4	Beef	4.10	11.62	0.41	-1.08
5	Broiler Chicken	2.31	1.38	-0.91	6.14
6	Eggs	6.06	13.20	-4.89	n.a
7	Red Onion	11.47	8.29	-17	n.a
8	Red Chili	1.67	29.3	23.98	7.93

Note: *) price comparison Sunday Sept. average in August 2007

Source : BPS (2007)

The price level of grain farmers, price of domestic rice and international rice prices in period 1990 - 1997 and period 1997 - 2006 show a different growth. Growth in differences in the price level of grain farmers, the price of domestic rice and international rice prices is divided into three periods. In period 1990 - 1997 policy applies import

tariffs that protect domestic prices from international price fluctuations. In period 1998 - 2000 which transition policy that releases almost all instruments of import tariffs and exchange rate changes are large, so that international rice prices greatly impact to price of domestic rice and grain prices at farmer level. Later in period 2000 - 2006 imposed tariffs of rice is Rp 430/kg, so the influence of international rice price movements on domestic rice prices and price level of grain farmers are not too far away. The above situation can be seen in Figure.
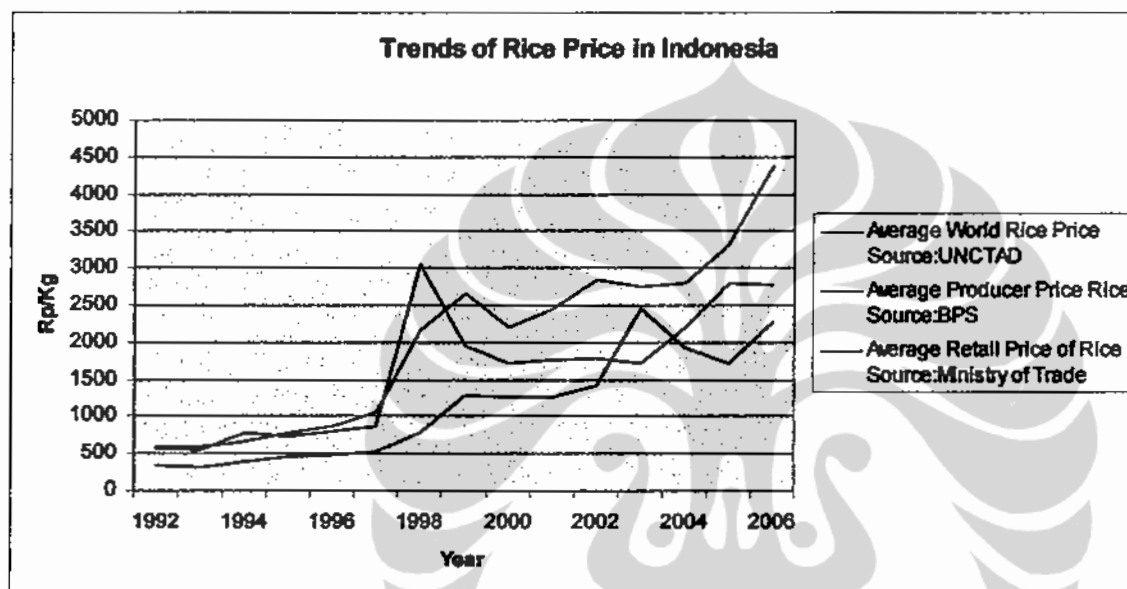
Source : UNCTAD, BPS, Ministry of Trade (Processed)

When there is an increase in food prices, poor farmers suffer more than net producers. So this will be a high risk of nutrition and food insecurity (food insecurity). When there is an increase in food prices, poor farmers suffer more than producers. So this will be a high risk of malnutrition and food insecurity. Research from Ministry of Trade (2008) showed the majority of revenues in Indonesia earmarked for food, which reached 50-60%. Two-thirds of thousands of poor rice farmers and most farmers are net consumers of rice due to limitations of land ownership. Therefore, the impact of increases price of rice on the poor people is very large. Only 6% of rice farmers who have farms of more than one hectare and there are the group that got most benefit from the increased price of rice.

Many developing countries in world, whether net exporter or net importer including Indonesia has to try variations of policies to minimize the impact of increases price. In general, these policies include restrictions / ban on food exports, rising food prices at consumer level, and a combination of both. Some examples include China banned exports of rice and corn, Bolivian bans the export of soybeans and Bangladesh using a combination of rice market liberalization and national social security system. Research from Ministry of Trade (2008) showed anti-export sentiment caused by

a. Effect locomotive, which when a country adopted a policy, other countries follow the policy

b. Some countries compete to protect its food security by ignoring regard to hunger in other countries

c. Exporting to take advantage much of the increase in food prices.

Policies from these countries are a short-term reaction. This is often hampering the pace of growth in agriculture, especially food.

3.6 Market Structure of Rice

Supply of rice in rice market comes from domestic production and imports. In general, the average share of rice imports to total domestic volume of rice less than 5% but have impact to volume of sales of grain supply, price of grain from farmers that flows into processing industry (milling grain) for a chain effect on supply and retail prices of rice at consumer level.

In general, the three kinds of rice selling (Sawit, 2008), namely :

1. Stroke system.

   These systems are transactions of rice sales which conducted from farmers to rice ready to harvest.

2. Sell-free.

   Farmers manage their own implementation of harvesting and sell rice at once.

3. Gradually bidding.

   Some farmers have sold at harvest time and saving others for stock to sell gradually.

Table 3.5 Distribution System of Rice

No	Regional	Stroke system	Sell-free	Gradually
1	North Sumatra	1.1	87.9	11.0
2	West Java	5.6	61.1	33.3
3	East Java	8.0	56.0	36.0
4	South Sulawesi	1.4	81.5	17.1

Source : Sawit(2008)

Sawit (2008) research results show that the popular system is Sell-free system (Table 3.4). Stroke system is more popular on Java than outside Java. This phenomenon indicates that only a period of not less than three days after harvest, the potential supply of rice in direct control of traders and rice mills far greater than in farmers.

Purchases of rice from middlemen and wholesalers have been in large. Then wholesalers sell rice to merchant district / provincial / between islands in large numbers too. Traders District / Province / between islands are what sells to agents in a smaller amount. Furthermore agents will sell to retailers in smaller quantities so on, retailers will sell in same package or smaller according to customer needs.

3.7 Consumption of Rice in Indonesia

The development of commodity consumption of rice in Indonesia has fluctuated each year. Between 1999 until 2005, consumption per capita fell from 129 kg / cap / year to 119.98 kg / cap / year and a 120.02 kg / cap / year. Consumption of rice increased to 139.15 kg / per capita in the year 2007. There are growths in rice consumption during the years 1999 to 2007 (in Table)
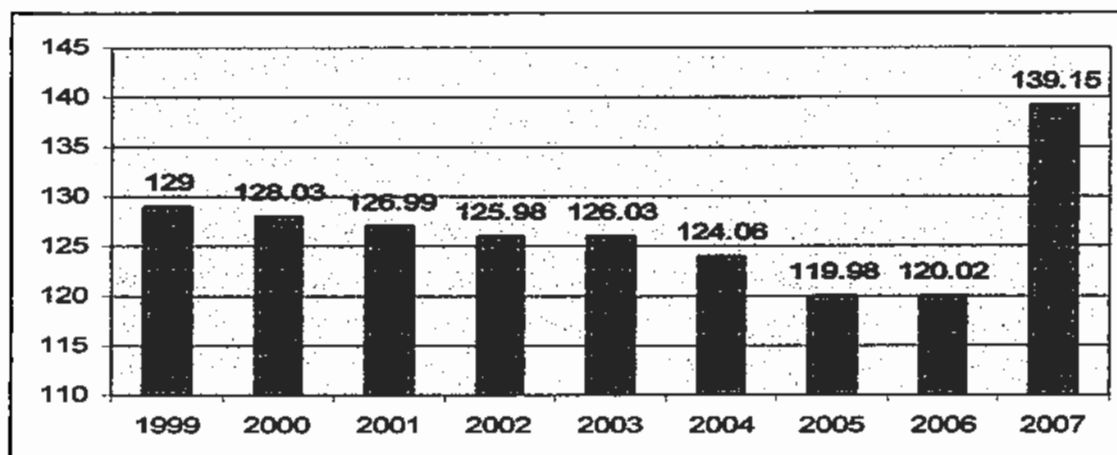
Figure 3.4 Trend of Rice Consumption in Indonesia 1999-2007 (kg/capita)

Source : BPS (2008)

Compared with other countries, rice consumption from population in Indonesia is considered very high for international measures, especially when compared with Japan (45 kg / cap / year), Malaysia (80/kg/cap/tahun), and Thailand (90 kg / cap / year).

Based on source from ministry of trade consumed species of rice in Indonesia include IR64, Ramos, Pandan Wangi, Rojo Lele, Bromo, dan Kuku Balam.
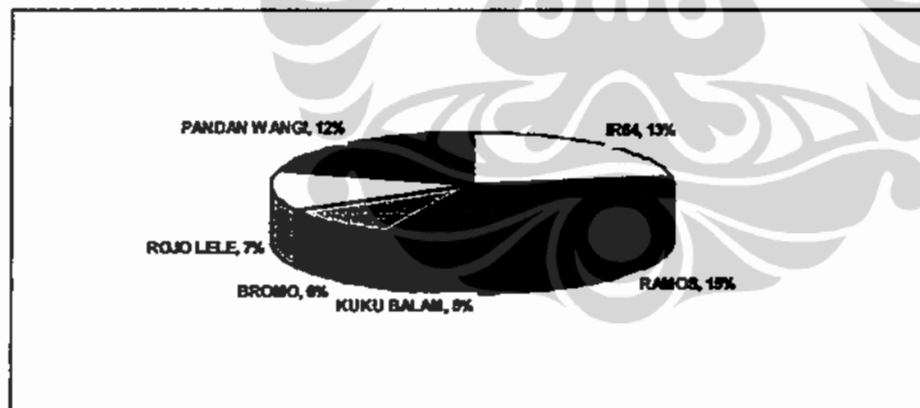
Figure 3.5 Species of Rice on Consumers in Indonesia

Source : Ministry of Trade (Processed)

While from the quality side is 79% consuming middle quality rice, 15% consuming high quality rice, and 6% consume low quality rice
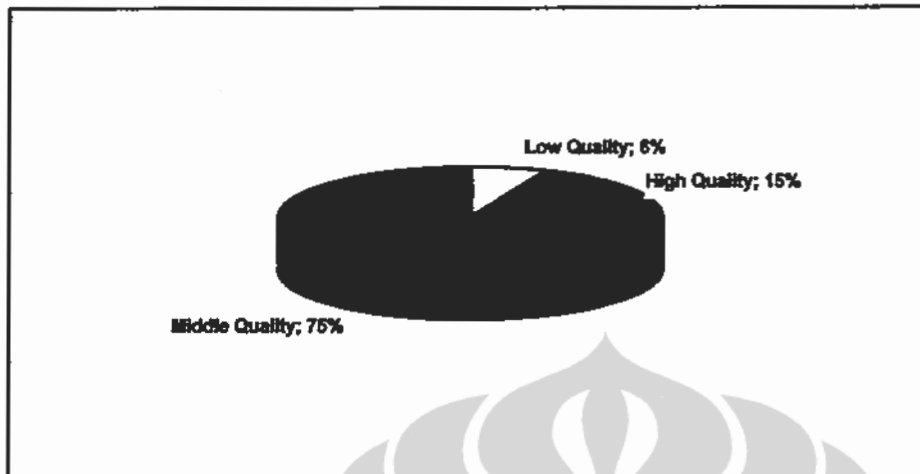
Figure 3.6 Species of Rice on Consumers From the Quality Side
Source : Ministry of Trade (Processed)

3.8 Import Duties of Rice in Indonesia

Since the increase on price of rice in world markets, government set up a number of tips to reduce increase in domestic prices of rice. One of them enforcement duties. Over the last few decades, domestic price of rice is much higher than price of rice in world markets. If price controls are relatively more difficult, because price of rice is highly diverse, although originating from the same country and same quality. The difference is price that to mismanagement in the field.

An import duty is one of the instruments of protection to farmers and domestic rice prices. Indonesia have selects a specific tariff (TS) rather than ad valorem for rice and sugar. One advantage is the protections of specific tariffs are high, when the price of rice falls abroad, with the assumption of Rupiah against the U.S. dollar has not changed. In addition, the specific tariff is more easily implemented at border, because only control the volume (not yet). Indonesia did not register a specific tariff for rice in WTO. Applied tariff for rice converted from specific tariffs to ad valorem. The average monthly amount of applied tariffs for rice is 26.5% in period January 2000 to December 2004. Although

specific tariff was raised to Rp. 550, - (Aug-December 2007), but the amount of ad valorem is only 18%. The amount for the rice is still far below the level of registered (bound) in WTO, which the amount is 160% (outside tariff quotas).

Table 3.6

Import Tariffs for Rice in Indonesia : 2000 - 2007 (monthly)

Period	Specific tariff Rp / Kg	Ad valorem average tariff (%)
January 2000 - December 2004	430	26.5
Jan 2005 - August 2007	450	17.4
Sept - December 2007	550	18.2

Source : Ministry of Trade (Processed)

3.9 Public Programs on Price of Rice

Alderman and Hodinot (2007) argues that the social safety network contribute to economic growth through asset creation, asset protection, resource allocation, and redistribution for the poor. While Tabor and Sawit (2001 and 2006) in his research concluded that the option to overcome price fluctuation of food in general subsidies through direct market intervention and subsidies targeted to poor people.

Public subsidies (general subsidy) are used to suppress increases on price of food, so the price will be lower. One example of this policy is market operation. Government must have the stock to implement the policy. The weakness of this public subsidy is all communities will enjoy the food which has depressed low prices. Therefore this program has no specific target households. The program is seen as less fair and ate a relatively large cost. At the peak of crisis period 1997-1999 in Indonesia, the rice market operations conducted BULOG reached 1.6 million tons/year. Government tried to reduce increases price of rice / inflation by market intervention. The study from Tabor (1999) had calculated the impact of policy on consumers and producers

Since 2005, Indonesia had taken control public stock of rice. Stock of rice is used for price stabilization purposes, over the food in emergencies (natural disasters, ext). Targeted subsidy directed to the poor. These subsidies can be targeted form of cash transfers or transfer donations. Both of subsidies are same as to increase the real income

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beneficiary groups. The challenge in subsidy program is determination of directional beneficiary households. This is caused partly because of: a lot of recipients, uneven distribution and poor of infrastructure.

Food subsidies can be channeled through two instruments, which there are namely: food stamps and food for work.

(i)   Food Stamps

These other forms of income transfer for target groups to increase consumption of food. This allows them to restrict target group to buy a particular food. Coupons have given both quantity and value of from used by beneficiaries to trade with the food or the equivalent amount as given. This program can be done in strong country retail and disbursements are easy on the bank.

United States is one of the most popular countries by food stamps program. At last few years' developing countries have been implementing this program such as Jamaica, Honduras, Sri Lanka and Colombia. Leakage of this program is relatively small, because rich people are less interested to buy food and go to a store that has been determined by government.

(ii)   Food for work

This program is one type of food based transfer. The households in public work earn wages in the form of food. The purpose of this program is to solve three aspects of food security at the same time, create jobs and improvements of public infrastructure.

Strength of food for work programs:

- Payment in the form of food providing nutritional benefits and improvement of nutritional.

- Increasing demand of food during the crisis

- Increasing real income of workers when the high inflation rate

- There is one specific provision of working conditions.

The weaknesses of food for work program are:

- When the crisis is not supplied may increase food price causing stress and bad for the producers.
- Parents, children or persons with disabilities can participate in the program
- This program is only for emergency purposes I(short term or bad season)
- Require substantial funds from the government in public infrastructure development and procurement experts.

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CHAPTER 4
RESEARCH METHODOLOGY

4.1. Design Model

The model used in this study was designed according to the research objectives, namely to know how the impact of the price of rice producers, real income per capita, the nominal exchange rate, world rice prices, the crisis dummy and dummy import duty tariff commodity retail price of rice to Indonesia at the level of rice wholesalers. The model used by the researchers based on the model refers to combination of Hadi and Waryono model's (2005) and Malian, Mardianto and Ariani model's (2004). Differences in this study with previous studies is :

1. This study use two models, namely long-term models by co-integration models and short-term model by Error Correction Model (ECM), while pervious study were use the simultaneous equation econometric model approach through the Two Stage Least Squares (2SLS) and partial balance model.

2. In this study has the addition of variables dummy import tariff policy of rice which there is an effort to capture the existence of external factors such as the impact of deregulation can impact to retail prices of rice in Indonesia.

3. The difference from objective of the research, characteristic, and availability of the data.

Referring to the literature that have been outlined in chapter 2, where the function of the retail price depends on the price of rice producers, real income per capita, the nominal exchange rate, world rice prices, the crisis dummy and dummy import duty rates. Mathematically a function of price can be written as follows:

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$$HDOM_t = f(HP_t, Y_t, NER_t, WP_t, CRS, TR)$$

.... (4.1)

Where:

HDOM	= Retail Price Of Rice
HP	= Price of Rice at the producer level
Y	= GDP
NER	= Exchange Rate
WP	= World Rice Price
CRS	= Dummy Crisis in 1997/1998
TR	= Dummy Import Tariffs on Rice

Research model was designed based on the goals of the research to analyze the relationship between variables in domestic retail price of rice with the variables that influence it. The aims of research are to identify the variables that significantly affect the domestic retail price of rice in Indonesia.

In order to analyze the factors that allegedly led to domestic retail price of rice in Indonesia, then refer to the above mathematical model with modifications to suit the purpose of this study, the condition of the Indonesian economy, the characteristics and data availability. The models / econometric equation to answer the purposes of this research is divided into two models, namely long-term models by co-integration models and short-term model by Error Correction Model (ECM). Co-integration analysis and error correction model is a solution to solve problem of stationary and spurious regression from time series variables, which often occurs in economic research. Then when the variables of research into the co-integration occurs long-term equilibrium, however an imbalance can happened in the short term (disequilibrium). This imbalance can we often encounter in economic behavior, which the expectations from economic actors not necessarily same as what happened, therefore need analyzed adjustments through an error correction model.

The selection of model co-integration analysis and Error Correction Model (ECM) is based on consideration that the data will be used is a time series. Where at the time series data are usually not stationary and will be get spurious regression.

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This analytical model becomes more relevant if the data used in this study are not stationary. By using co-integration and error correction model (ECM), the spurious regression and stationary problem can be avoided or resolved.

Long-term model for retail rice prices is using procedures *Johansen Multivariate Co-integration* (1990). The long-term model of this research is:

Where:

$$\log HDOMt = \alpha_0 + \alpha_1 \log HP_t + \alpha_2 \log Y_t + \alpha_3 \log NER_t + \alpha_4 \log WP_t + \alpha_5 CRS_t + \alpha_6 TR_t + \mu_t \quad \text{............. (4.2)}$$

HDOM	= logarithm Retail Price of Rice to the period-t
HP	= logarithm Price of Rice in the period to producer-t
Y	= logarithm of the GDP Map of the period t
NER	= logarithm of the Exchange Rate period t
WP	= World Rice Prices logarithm to the period-t
CRS	= Dummy Crisis in 1997/1998
TR	= Dummy Import Tariffs on Rice
μ_t	= *Error term* to the period-t

As for seeing the behavior of each variable to the Indonesian domestic price of rice in the short term, use an error correction model *(Error Correction Model / ECM)* by estimating the impact of the delay period *(time lag)* of each variable. Model of short-term *(ECM)* can be written as follows:

$$\Delta \log HDOM_t = \beta_0 + \beta_{1i}\Delta \log HDOM_{t-1} + \sum_{i=0}^{n} \beta_{2i}\Delta \log HP_{t-i} + \sum_{i=0}^{n} \beta_{3i}\Delta \log Y_{t-i} + \sum_{i=0}^{n} \beta_{4i}\Delta \log NER_{t-i}$$
$$+ \sum_{i=0}^{n} \beta_{4i}\Delta \log WP_{t-i} + \beta_5 CR + \beta_6 TR + \beta_7 ECT(-1) + \varepsilon \quad \text{............. (4.3)}$$

4.2. Data Analysis

4.2.1. Stationarity Test

The validity of the hypothesis function of the domestic retail price of rice in Indonesia by data period 1992.1 - 2006.4 can be proved by way of stationer testing each variable to be analyzed.

Stationarity test methods and unit roots test that will be used here is by Augmented Dickey Fuller (ADF) method.

In testing whether the data contain unit roots or not, Dickey-Fuller advised to conduct regression models following:

$$\Delta Yt = \emptyset Y_{t-1} + et \dots\dots\dots (4.4)$$

$$\Delta Yt = \beta_1 + \emptyset Y_{t-1} + et \dots\dots\dots (4.5)$$

$$\Delta Yt = \beta_1 + \beta_{2t} + \emptyset Y_{t-1} + et \dots\dots\dots (4.6)$$

where t is the time trend variable

Difference from equation 4.4 with two other regressions is include constant and time trend variables. In every model, if the data time series have contains unit root, that's means the hypothesis of the data is not stationary or $\emptyset = 0$. However the alternative hypothesis is $\emptyset < 0$, which that's means the data is stationary.

Procedures to determine stationary data by comparing statistics between DF values is by critical value of statistical distribution of τ.

DF value indicated by the value of the coefficient statistics $\emptyset Y_{t-1}$. If the absolute value of DF statistic is greater than the critical value, we will reject the null hypothesis that the observed data is stationary. Instead the data is not stationary if the statistical value of DF is smaller than the critical value of statistical distribution of τ.

One assumption of residual from the equation 4.4 - 4.5 is unrelated et. In many cases the residual of et is often associated and autocorrelation element. Dickey and Fuller unit root test developed by incorporating elements of the autocorrelation

model which became known as the *Augmented Dickey-Fuller* (ADF). In practice, the ADF test is used to detect stationary of data. The ADF test formulation as follows:

$$\Delta Yt = \gamma Y_{t-1} + \sum_{i=1}^{z} \beta \, \Delta Y_{t-1+1} + e_t \dots\dots\dots\dots\dots\dots\dots\dots (4.7)$$

$$\Delta Yt = a_0 + \gamma Y_{t-1} + \sum_{i=1}^{z} \beta \, \Delta Y_{t-1+1} + e_t \dots\dots\dots\dots\dots\dots\dots (4.8)$$

$$\Delta Yt = a_0 + a1T + \gamma Y_{t-1} + \sum_{i=1}^{z} \beta \, \Delta Y_{t-1+1} + e_t \dots\dots\dots\dots\dots (4.9)$$

Where:

Y: observed variables

ΔY_t : $Y_t - Y_{t-1}$

T: time trend

Procedure to determine stationary data with comparing the value of ADF statistics is by distribution MacKinnon critical values. ADF statistic value indicated by the value of coefficient t statistic γY_{t-1} in equation 4.7 - 4.9, if the absolute value of the ADF statistic is greater than critical indigo, therefore observed the data shows stationary and if the opposite value of ADF statistic is less than critical value therefore the data is not stationary. This is important in ADF test to determine the length of lag. The length of lag can be determined based on AIC or SC criterion.

4.2.2. Co-integration Test

Co-integration test is used to solve the problem of non stationary from time series data. The number of co-integration from time series data can be deviate average in the short term, and will move together to the conditions of equilibrium in the long term. If the number of variables have some balance in long-term and

integrated in the same order, can be said that the variables in the model co-integration each other.

Granger (1987) noted that a linear combination of two or more series are not stationary may be stationary. If such linear combinations exist, among which are not stationary series is said to co-integration. A stationary linear combination is called co-integration equation and may be presented as a long-term relationship between the series, where the deviation from the stationary condition is equilibrium although these series are non Stationarity.

Co-integration economic interpretation of this is that if two series (or more) related to forming long-term equilibrium relationship, then even though each of these series are not stationary they will always move together over time and differences between them will always be stable. (Harris, 1999). Thus co-integration concepts related to the existence of long-term equilibrium in which the economic system converges over time as desired in the theory and a way to do a test of the theory.

Then if there is *a shock* in an economic system, then in the long run there are forces that drive the economy to recover to the condition of balance *(equilibrium)*. Co-integration technique is based on the fact that most macroeconomic data have a trend that is not stationary (unstable). Forcing the conventional regression models for stationary series which do not, using t test and F test will produce a false pattern of relationships *(Spurious regression relationships)*. Therefore co-integration technique is the solution.

Granger (1987) states that the variables are said to each other if there co-integration linear combination of variables that are not stationary, where the residual obtained from the regression equation with variables that are not stationary, and then issued the residual from a linear combination must be stationary level.

To find out co-integration or long-term equilibrium relationship, in this study also conducted tests with co-integration Johansen procedure. Co-integration Johansen procedure judged better than the Engle Granger procedure in terms of seeing whether or not co-integration between variables if the amount is more than two variables *(multivariate)*, because the Johansen procedure is based on the maximum

possible *(maximum likelihood)* which provides the test statistic the maximum *eigen value* and *trace statistics* for the determine number of vectors in the equation co-integration. Stages of testing co-integration with the Johansen procedure as follows : (Enders, 1995):

1. Stationer test all variables to determine the order of integration of each variable;
2. Estimated vector autoregression using data level *(undifferenced data)*.
3. By using the same lag length, the variable and then tested by using vector autoregression (VAR), with the following models:

$$X_t = A_0 + A_1 X_{t-1} + A_2 X_{t-2} + ... + A_n X_{t-n} + e_t$$

And

$$X_t = A_0 + A_1 X_{t-1} + \mu_t$$

Where X_t is a vector of the variables to be tested. A_0 is the matrix of intercept, A_n is the matrix of coefficient, e_t and μ_t is the vector of the error. Model above and then tested to obtain the rank of the matrix. For example, such a long lag to test the model 2 above can be transformed into:

$$\Delta X_t = A_0 + \Pi_1 X_{t-1} + \Pi_2 X_{t-2} + e_t$$

Where Π is the rank of the matrix X_n.

4. The next procedure of Johansen Test is a test of the hypothesis Ho: $\Pi = 0$. If the test results do not reject the null hypothesis, then do not say co-integration variable.

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4.2.3 Error Correction Model (ECM) Test

Co-Integration test as described above to see the long-term balance in the economy. If you want to see the relationship between variables in the short term, it can use the model error correction (error correction model / ECM).

Techniques for correcting short-term imbalance towards long-term equilibrium is called error correction model introduced by Sargan, and popularized by Engle, and Granger (Nachrowi, and Usman, 2006).

Error correction model is essentially discusses related econometric model with a dynamic linear model, where the proficiency level in these models to explain the relationship between the dependent variable with independent variables in the present and the past. Use of dynamic linear fashion as the model error has several advantages, among others, to avoid spurious regressions and explain the causal relationship as desired in economic theory as well as for estimating the coefficient of long-term and short term (Alias and Cheong, 2000, in Mutmainah, 2005).

Engle and Granger (1987) defines a data time series is not stationary, Xt is said in order co-integration d if the data is stationary after the first level of differentiation denoted as Xt ~ I (d). If two time series, Xt and Yt in order to be co-integration d, Engle and Granger showed that a linear combination zt = Xt - δYt be stationary. As a result the two series Xt and Yt to be co-integration. If there are two variables co-integration then have a long-term relationship. Therefore the long-term relationship between two variables can be estimated by the following equation:

$$Xt = \alpha o + \beta o Yt + \mu t \dots\dots\dots\dots\dots (4.10)$$

$$Yt = \alpha 1 + \beta o Xt + \mu t \dots\dots\dots\dots\dots (4.11)$$

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Granger causality tests based on error correction model can be formulated as follows:

$$DX_t = a_0 + b_0 + \mu_{t-1} + \sum_{i=1} c_{0i} DX_{t-1} + \sum_{i=1} d_{0i} DY_{t-1} + \varepsilon_t \ldots\ldots\ldots (4.12)$$

$$DY_t = a_0 + b_0 + \mu_{t-1} + \sum_{i=1}^{m} c_{1i} DY_{t-1} + \sum_{i=1}^{n} d_{1i} DX_{t-1} + \varepsilon_t \ldots\ldots\ldots (4.13)$$

Where D is the difference or correction variable μ_{t-1} is the residual of the equation co-integration in 4.10 and 4.11.

Having in mind that these two variables co-integration, the question is which variables affect each other and how the short-term conditions are able to correct long-term back condition. By including the error correction variable in the equation of 4.12 and 4.13, error correction model is able to show the direction of causality. Y said to affect the X in the equation not only if 4.12 not significant but also significant. Therefore, unlike the standard Granger causality tests, error correction model capable of explaining the influence of X along Y Values significant error correction coefficient do although not significant.

Granger further indicates that the error correction model capable of producing short-term predictions is much better and able to provide short-term dynamic adjustments to achieve long-term equilibrium conditions. Changes lags in independent variables can interpretation as short-term effects of correction of errors while showing a long-term effect. The main problem in estimating equation model autoregresif is determining the length of lag. As we know that both equations consist of more than one independent variable inertia. Therefore, we must choose a model with the optimum lag length. For that use the method developed by Akaike Information Criterron (AIC) and Schwarz Criterion (SC), the smallest value of AIC and SC are used to determine the optimal lag length.
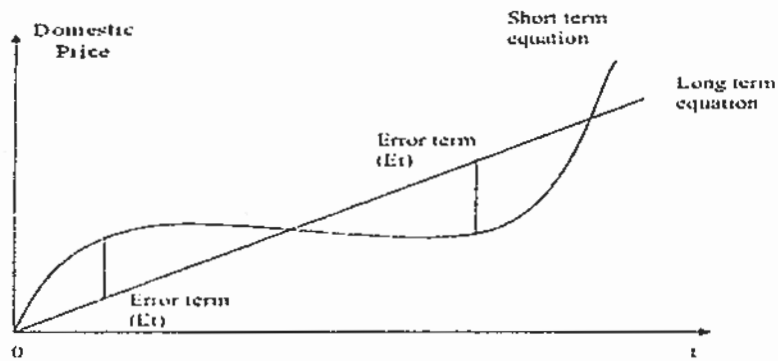
Figure 4.1. ECT Mechanism at Error Correction Model (ECM)
Source : Nachrowi and Usman (2006)

4.2.4 Basic Assumptions Of Econometrics

Diagnostic test against ECM should be done after all parameters are estimated. This test involves two criteria. First, statistical tests which include testing the coefficient of determination (R2), t test and F test. Second, a test of whether there is any violation of classical assumptions (Multicollinearity, Heteroscedasticity, and Autocorrelation). The tests are aimed to obtain the regression results that are BLUE (Best Linear Unbiased Estimator).

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CHAPTER 5
RESULTS AND ANALYSIS

5.1. Stationarity Test Results

The purpose of unit roots tests performed is to know whether the data was stationary or not. This test is needed so that we can know whether a variable has a unit root or coefficient of the model estimated autoregressive have a value of one or not. Because, if we use the data that is not stationary will cause problems *Spurious regression,* in which the estimate is statistically significant but in economic reality does not have any meaning. (Harris, 1999).

In this study the author uses *Augmented Dickey-Fuller test (ADF test)* method to testing the stationarity data from variables (whether containing *unit roots* or not) by econometric software Eviews 5.1.
The hypothesis for this test are:

H_0: the data contain *unit roots* (not stationary)
H_1: the data do not contain *unit roots* (stationary)

If there is enough evidence to reject H_0, means that data is not have roots units, or in other words the data is stationary. Where as if there is no evidence to not reject H_0, means the data contain unit roots or in other words, these data are not stationary.

Test the degree of integration is a continuation of the test unit roots (roots unit test), as a consequence of unfulfilled stationary assumptions on the level or degree level 0 (zero) of all variables. The purpose of this test is to test whether the data has been stationary, or do not contain unit roots at the *first* level of *difference.*

The results of the test unit roots *(roots unit test)* and results of the test the degree of integration can be seen in the Table below. While the complete test results can be seen in the appendix.

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Table 5.1 Unit Roots Test Results

	Level (t-stat)		First Difference (t-stat)		Order
	ADF	Test critical values:	ADF	.	Integration
LOGHDOM	-1.032428	10% level -2.595565	-12.05417	1% level -3.555023	I (1)
LOGNER	-1.217248	10% level -2.596689	-4.735651	1% level -3.560019	I (1)
LOGWP	-1.079927	10% level -2.595033	-6.157951	1% level -3.555023	I (1)
LOGY	-1.468162	10% level -2.596116	-11.67995	1% level -3.557472	I (1)
LOGHP	-0.812955	10% level -2.595033	-6.792354	1% level -3.555023	I (1)

Based on the results of the unit root test as in Table 5.1 above can be concluded that for the test at all levels of data variables are not stationary when the unit root test conducted by the ADF test. The degree of integration tests using the ADF test, it can be stated that all variables have been stationary at *first difference* level or variable data does not contain *unit roots*. So on the whole it can be concluded that all the data variables (LOGHDOM, LOGHM, LOGWP, LOGY and HP) has been stationary at $\alpha = 1\%$.

5.2. Co-integration Test Results

Co-integration test is one test in the form of a dynamic model where the purpose of these tests is to determine the existence of long-term relationship among the variables observed. These variables to say if there are co-integration each linear combinations of variables that are not stationary, and the residuals from the linear combination must be stationary at the level. (Granger, 1987).

Co-integration test can be used to solve the problems of *time series* data are not stationary. This is because although the data from the two individual variables are not stationary (follow the pattern of *random walk),* but if both have been co-integration the linear combination between the two variables are stationary.

The Engle-Granger procedure is usually used to detect the co-integration, where variable residual *(error)* from the equation of domestic price of rice should be stationary, or do not contain unit roots at the level. However, due to the observed variables of more than two *(multivariate),* then the test co-integration used in this research will also be testing procedure co-integration Johansen (1990).

The results of the test unit roots *(roots unit test)* at the variable level of residual *(error)* by using the ADF test can be seen in the Table below. While the complete test results can be seen in appendix.

Table 5.2 Unit Roots Test Results on Variable Residual

Variable	ADF t-statistic	α1%	α5%	α10%	Prob
ECT	-7.37354	-3.55267	-2.91452	-2.59503	0.0000

From Table 5.2.1 can be seen that the variables of the equation residual domestic price of rice declined null hypothesis (H_0) which means that these variables have been stationary at the level at good level of α 10% and 5%. Because the residual variable was stationary at the level, then co-integration between the variables observed.

Meanwhile, the test co-integration using Johansen procedure is to strengthen the co-integration between variables of domestic rice price equation. The results of the test co-integration using Johansen procedure can be seen in the Table below. While the complete test results can be seen in appendix .

Table 5.3 Test Results with Co-integration Johansen Procedure

Hypothesized No. of CE (s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	Probility
None *	0.961492	367.5715	125.6154	0.0000
At most 1 *	0.781642	198.2137	95.75366	0.0000
At most 2 *	0.513731	119.0893	69.81889	0.0000
At most 3 *	0.464641	81.59764	47.85613	0.0000
At most 4 *	0.417034	49.10711	29.79707	0.0001
At most 5 *	0.227594	21.04656	15.49471	0.0066
At most 6 *	0.136272	7.617834	3.841466	0.0058
Trace test Indicates 7 cointegrating eqn (s) at the 0:05 level				
* Denotes rejection of the hypothesis at the 0:05 level				
** MacKinnon-Haug-Michelis (1999) p-values				

From Table 5.3 it can be seen that there is a maximum of 7 (seven) co-integration equation 5% level. This indicates there is a relationship or a long-term balance between the variables observed. This means, in the long run domestic rice price variable is affected by variable exchange rate, world rice prices, gross domestic product, the price of rice producers, the crisis dummy and dummy rate.

The analysis in this study is based only on a single vector co-integration. Co-integration vector chosen by looking at the long-term relationships are same or at least close to the theory underlying these relationships.

Co-integration test results with the Johansen procedure produces equations domestic rice prices long term as follows :

LOGHDOM = 0.575LOGWP +0.335 LOGNER +0.328 LOGY +0.095 LOGHP +0.707 CRS +0.779 TD

t.stat   (6.89382)**   (5.74197)**   (1.30753)*   (2.79536)**   (2.68231)** (2.60417)**

Because the domestic price equation is a *double-log* equation, then the resulting coefficient reflects the domestic price elasticity coefficient of each variable. Partial

elasticity of domestic prices to world rice prices is 0.575, the exchange rate variable is 0.335, gross domestic product is 0.328, the price of rice producers is 0.095, the crisis dummy is 0.707 and dummy rate is 0.779.

5.3 Error Correction Models Test Results

As already described in the previous section, when the variables are observed to form an interrelated set of variables co-integration each other, the dynamic model suitable for short-term balance is an error correction model *(Error Correction Model / ECM)*. Furthermore, error correction model will be a valid model when the variables are supported by co-integration each other and coefficient value *Error Correction Term (ECT)* is statistically significant and negative.

Although based on co-integration test has shown that there can be long-term balance in domestic retail price of rice equation models, but have not seen the variables which play a role in the *short run dynamic* adjustment towards long-term balance. It is used for *Error Correction Model (ECM)* to see the short-term behavior *(short run)* from the equation to estimate the dynamics of domestic retail price of rice. *Lag* length to be used in estimating the short-term equation is determined from the results for the optimum lag obtained from the equation co-integration, then through general method to specific method developed by Hendry (1995) *(Hendry's General to Specific Modeling / HGSM)*, carried out the reduction starting from the longest lag, so get the estimate of the most simple *(parsimonious regression)*.

Error Correction Model (ECM) Results by *Hendry's* method as follows (see Annex for more complete results):

DLOGHDOM = 0.0239 +0.0044 DLOGHDOM (-3) + 0.3945DLOGNER * + 0.1427DLOGHP + 0.8353DLOGY * + 0.2092DLOGWP (-2) - 1.0299ECT (-1) * + 0.0481CRS - 0.0194TD

Description: ***) significant at α = 1%, **) Significant at α = 5%, *) Significant at α = 10%

R-squared   0.534922
Adjusted R-squared 0.450362
Durbin-Watson stat 2.037873

Results from short-term equation *(ECM)* shows that the coefficient of *error correction term (ECT* (-1)) of - 1.0299, which indicates that the adjustment speed *(speed of Adjustment)* domestic price of rice to the balance is 1.0299 percent per quarter. Occurrence of changes in economic variables that affect the domestic price of rice in the short term, the impact of changes in variables affecting the domestic price of rice, or take a little adjustment process of unbalance.

5.4 Diagnostic Test Results

Having obtained the results from simplest short-term equation (ECM), should be an assumption violation test (diagnostic test) in the OLS model formed in order to be free from violations of OLS assumptions that these models are the best models and gives a statistical estimate of the coefficient of unbiased and efficient.

1. Multicollinearity Test

The results of this multicollinearity test can be seen in table below. The complete test results can be seen in appendix.

Table 5.4 Multicollinearity Test Result

	DLOGHDOM	DLOGHDOM (-3)	DLOGNER	DLOGHP	DLOGY	DLOGWP (-2)	ECT	CRS	TD
DLOGHDOM	1.000000	-0.008104	0.099968	0.039627	0.079632	0.083850	-0.679722	0.089750	-0.094345
DLOGHDOM (-3)	-0.008104	1.000000	-0.021800	0.032368	-0.024050	0.164248	-0.002026	0.135122	-0.136919
DLOGNER	0.099968	-0.021800	1.000000	-0.099975	-0.201232	0.192590	0.082346	0.255942	-0.125447
DLOGHP	0.039627	0.032368	-0.099975	1.000000	0.031769	0.085812	0.031679	0.218391	-0.234380
DLOGY	0.079632	-0.024050	-0.201232	0.031769	1.000000	0.032437	0.074745	-0.181061	0.211185
DLOGWP (-2)	0.083850	0.164248	0.192590	0.085812	0.032437	1.000000	-0.168076	0.270743	-0.278032
ECT	-0.679722	-0.002026	0.082346	0.031679	0.074745	-0.168076	1.000000	-0.000607	0.059024
CRS	0.089750	0.135122	0.255942	0.218391	-0.181061	0.270743	-0.000607	1.000000	-0.874325
TD	-0.094345	-0.136919	-0.125447	-0.234380	0.211185	-0.278032	0.059024	-0.874325	1.000000

Because the value of the correlation coefficient from variable each another no more than 0.8, it can be concluded that the model does not contain multicollinearity (Gujarati, 1995).

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2. Autocorrelation Test

Autocorrelation test the hypothesis of this is:

H_0: no serial correlation

H_1: there is serial correlation

Results from tests Autocorrelation can be seen in the Table below. While the complete test results can be seen in the appendix.

Table 5.5 Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.277297	Prob. F (4.40)	0.890919
Obs * R-squared	1.430022	Prob. Chi-Square (4)	0.838961

From the above Table can be concluded that the probability value Obs * R-squared of 0.838961 is greater than $\alpha = 10\%$ (0.1), then the statistical H_0 can not be rejected, this means that short-term equation (ECM) has Autocorrelation free of problems.

3. Heteroscedasticity Test

Hypothesis of autocorrelation test is:

H_0: errors are Homoscedasticity

H_1: error is Heteroscedasticity

Results from tests Heteroscedasticity can be seen in the Table below. While the complete test results can be seen in appendix.

Table 5.6 Heteroscedasticity Test

White Heteroskedasticity Test:			
F-statistic	0.199502	Prob. F (14.38)	0.998873
Obs * R-squared	3.628812	Prob. Chi-Square (14)	0.997316

From the above Table can be concluded that the probability value Obs * R-squared of 0.997316 is greater than $\alpha = 10\%$ (0.10) is statistically H_0 can not be rejected, this means that short-term equation (ECM) has been freed of the problem or error Heteroscedasticity is Homoscedasticityitas.

4. Goodness of Fit Test

The estimate of the error correction model (ECM) shows the value of 0.534922 for R^2 and Adjusted R^2 value of 0.450362. Because this is a regression equation with multiple variables is more relevant to evaluate the value of adjusted R^2. These values *(adjusted $R^{2)}$)* indicates that this model can explain the variations in domestic rice prices 45.03 percent of Indonesia. Or in other words the variation in the dependent variable (bound) can be explained by the independent variables (explanatory) in the ECM model of 45.03 percent.

In a dynamic linear model as ECM, the value of R^2 and Adjusted R-value of ^{2} usually is not worth too much, with an average below 60 per cent [1]. This is because in the short-term variations of variable length bound in this case Indonesian domestic rice price is very possible influenced by noneconomic factors such as socio-political situation, security, government policies and so on.

5. Independent Variable Significance tests together

To test the significance of the influence of independent variables jointly bound variables used to F test F. F test is a significance test of regression coefficients together (simultaneously). F statistic can be used for the multiple regression models to test the statistical R^2. Statistics F allows us to test the hypothesis that none of the explanatory variables can explain the variable Y. In other words hypothesis was as follows:

H_0 : $\beta_1=\beta_2=\beta_3=\beta_4=\beta_5=\beta_6=0$

H_1 : $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ is not equal to zero

From the results of the computer output appear that the value of F statistic is 6:33 Meanwhile, the critical F value or F Table is $F_{(10\%, 9.49)} = 1.79$.

From the results of statistical comparison of F values and F Tables obtained results that the value of F statistic is greater than the value of F Table which means H_0 is rejected. In other words, the estimate showed that the independent variables used in the model jointly have a significant impact on variable binding.

5.5 Evaluation of The Model

5.5.1 Long-run Evaluation

Based on test results using co integration Johansen procedure that has been discussed above and the results of these tests have been obtained long-run equation to model the domestic price of rice Indonesia. Where in the long run all the independent variables affect positively and significantly in accordance with the hypothesis that taken by researcher. Because of the long-run model using *double-log* model, the results will be elasticity.

Value elasticity coefficient of world rice prices to domestic rice price are for 0.575. This means that any increase in world rice prices by 1 percent, *ceteris paribus*, in the long run will increase the total domestic rice price by 0.575 percent. The absolute value of variable coefficient world rice prices are worth less than 1 indicates that domestic rice price in Indonesia is inelastic in the long run of world rice prices. This is equal with price theory that if the world price rises, while Indonesia was not able to determine the rice commodity prices in international markets, the increase in world prices will be transmitted to domestic prices.

Value elasticity coefficient of exchange rate to domestic rice price is for 0.335. This means that any increase in the exchange rate of 1 percent, *ceteris paribus*, in the long run will increase the total domestic rice price by 0.335 percent. The absolute value of variable coefficient world rice prices are worth less than 1 indicates that domestic rice price in Indonesia is inelastic in the long run on the rupiah. The result of nominal exchange rate is in accordance with the theory and the situation in Indonesia. The value of domestic currency (rupiah) has impact to price of import.

Value elasticity coefficient of gross domestic product per capita to domestic rice price amounted to 0.328. This means that any price increase gross domestic product by 1 percent, *ceteris paribus*, in the long run will increase the total domestic rice price by 0.328 percent. The absolute value of variable coefficient world rice prices are worth less than 1 indicates that domestic rice price in Indonesia is inelastic in the long run of gross domestic product. These results are equal with the theory. If there is an increase in income, there will be a tendency to increase the ability to consume more and demand, therefore will be increasing price.

Value elasticity coefficient of domestic producer price of rice to domestic price of rice amounted to 0.095. This means every producer rice price increases by 1 percent, *ceteris paribus*, in the long run will increase the total domestic rice price by 0.095 percent. The absolute value of variable coefficient world rice prices are worth less than 1 indicates that domestic rice price in Indonesia is inelastic in the long run the price of rice producers. These results are also in accordance with the theory. If there is an increase in domestic producer price of rice, there will be a tendency to increase domestic retail price of rice.

Value elasticity coefficient of dummy crisis to domestic rice price amounted to 0.707. The value of dummy crisis variable coefficients for 0.707 shows that with the crisis *ceteris paribus*, in the long run will increase Indonesian domestic rice price by 0707 percent. This can be seen at the time of crisis in 1997/1998 when the rupiah against the U.S. dollar depreciates large enough, which lead to increase prices of rice in domestic market as the impact of decreased supply of rice and lower import demand.

Value elasticity coefficient of dummy tariff policy to domestic rice price elasticity amounted to 0.779. The value of the coefficient of variable dummy tariff policy for 0.779 show that the existence of dummy tariff policy *ceteris paribus*, in the long run will increase Indonesian domestic rice price by 0.779 percent. These results are also in accordance with the theory, which by tariff policy will reduce volume of import and domestic price of rice will increase.

5.5.2 Short-run Evaluation

From the estimate of short-run model (ECM) by Hendry's method we have found the most simple estimation *(parsimonious regression)*. Of all the independent variables used in the study, there are only two variables have a significant effect in the short run to changes in domestic price elasticity of rice today.

The impact of domestic price changes (DLOGHDOM) to changes in domestic price elasticity occurs in three quarters. The increase in variable changes in the domestic rice price logarithms three previous quarters (DLOGHDOM (-3)) has a positive direction but does not have a significant influence on the domestic price change variable current rice. It is quite natural if we look at the reality of what happened that when the earlier

period domestic price of rice increases, then in the next period there is not impact to a possibility that prices will rise.

Variable changes in current exchange rate (DLOGNER) have a positive direction. Where the increase of 1 per cent change in exchange rates is, *ceteris paribus*, will raise the variable changes in the domestic rice price today for 0.3945 percent. This condition has been in accordance with the theory and the situation in Indonesia, where exchange rates has an important influence on import demand and export supply.

Variable changes in world rice prices at the two quarters (DLOGWP (-2)) has a coefficient value of 0.2092 with a positive direction, although it is not significantly impacted to domestic rice price. It indicates that a change in world price is doing not have a significant impact on domestic price changes. A one percent increase in world prices, *ceteris paribus*, will raise domestic prices by 0.2092 percent. The explanation for this condition is related to the increase in global rice prices caused by the two major rice net export countries namely Vietnam and India decided to meet domestic needs. Pressure for increased consumption, land degradation, conversion of agricultural land to non-agriculture and climate change pushing more into the orientation of the country. Many developing countries in the world, including Indonesia has come a variety of policies for minimize the impact of the world rice price increases. This is done because many countries in the world compete to protect its food security without regard to hunger in other countries and the countries competing exporters to take advantage as much of the increase in food prices. So it might be expected the increase in world prices will not provide a significant impact on increases of domestic price of rice.

Variable domestic producer price of rice (DLOGHP) has a coefficient value of 0.1427 with a positive direction, although it is not significantly impacted to domestic rice price. It indicates that a change in world price is doing not have a significant impact on domestic price changes. A one percent increase in domestic producer price, *ceteris paribus*, will raise domestic prices by 0.1427 percent. The explanation for this condition is because government intervenes in the domestic market to make the basic pricing policies (HPP) for farmers' grain with the aim of minimizing the impact of changes in world prices on consumer prices and domestic producer prices. Basic price of rice has a positive and significant impact on selling prices at the level producer (Hadi, 2005). However,

government intervention is not effective because it caused many speculators and illegal rice imports (smuggling of rice). The most active traders absorb large grain / rice from farmers at a price at the time and not directly sold to consumers but to obtain foster margin stock in trade. They will continue to foster and intensify the stock ahead of a bad season. In a bad season that the rice traders predict prices will raise high enough and the right time to sell to consumers.

Variable changes in gross domestic product (DLOGY) shows a positive direction. Where 1 per cent increase in gross domestic product changes, *ceteris paribus*, will raise the variable changes in the domestic rice price for 0.8353 percent. This condition has been in accordance with the theory and the situation in Indonesia, where the value of gross domestic product. An increase at gross domestic product increases demand and encourage the rising price. As has been described in long term condition, that gross domestic product also provides the same effect on domestic prices.

Crisis dummy variable (CRS) provides a negative influence but does not have a significant influence on the variable domestic rice price changes. This is because during the 1997/1998 crisis, policies to increase domestic food supply have been done by the government. This is done to suppress the increase in retail food prices are not favorable for the political and economic situation. According to Irawan study in 1997/1999 crisis period was divided into three period's namely pre-crisis period (Period I), the peak crisis period (Period II) and the transition period of crisis (Period III). In period III can be considered as periods which the impact of post-crisis policies can be regarded as a period of policy implementation. In the production sector, government tried to encourage increased rice production by increasing the base price of grain as much as 4 times, namely from Rp 525/kg in December 1997 to Rp 600/kg in January 1998, Rp 700/kg in April 1998, Rp. 1000/kg in June 1998 and between Rp 1400/kg to Rp/ 1500/kg by province since December 1998. While trade in government trying to increase the food supply is taken with: (a) increase rice imports from BULOG about 2 million tons in 1997 to 5.8 million tons in 1998, (b) improve the distribution of BULOG rice through market operations of approximately 200 thousand tons per month to about 400 thousand to 450 thousand tons per month since December 1997, (c) free in import monopoly of rice and sugar by BULOG

in September 1998. Adjustment policies that the government has succeeded in keeping the rate of increase in retail food prices.

The results of analysis shows that adjustment policies by government effective enough to restrain the rate of increase in retail food prices occurred at the height of the economic crisis especially fourth quarter in 1999. The impact of these policies also tend to be selective according to consumer groups in which the price of food like rice is widely consumed by low-income consumer groups tend to experience greater decline.

Dummy variable tariffs policy of rice (TD) has a negative effect but does not have a significant influence on the variable domestic rice price. Tariff policy rice commodities before and after haven't significant influence on domestic rice prices at consumer level in Indonesia. This is because:

1. In the short run most of the imported rice is only done to national security if the rice stock was not able to do more through the national rice production.

2. Still the number of leaks via the import of corruption and weak supervision authorities in dealing with misbehavior in the reporting importers import volume.

3. Still the application of control mechanisms that are not done in the exporting ports, but done in the Interior, which causes the appearance of corruption acts between surveyors and importers.

4. Lack of coordination between agencies and related institutions in the collection of data for policy so that policy is not working effectively and efficiently.

From the results obtained coefficient ECM *Error Correction Term* previous period (Resid01 (-1)) is significant in -1.02998 is negative, significant, and have a fast speed of adjustment, therefore the changes of economic variables which impact to retail prices of rice in the short term showing the impact of changes has a very short intertemporal correction in the process of adjustment of imbalances leading to a balance condition. In addition, by statistically also shown that the error correction model used is the right model to describe the relationship of the Retail price of rice with another variables in Indonesia at long term and short term.

CHAPTER 6

CONCLUSIONS AND POLICY RECOMMENDATIONS

6.1 CONCLUSION

Based on research objective and research purposes in writing this thesis, the results of research on analyze the determinants factors of domestic retail price of rice in Indonesia with approaches *Error Correction Model* (ECM) in period 1992 to 2006, can be summarized as follows:

1. In the long run, the price of rice farmers, exchange rate, world rice price, income per capita, crisis and tariff policy has a positive impact and significant to retail price of rice Indonesia.

2. From the results of short-term estimates (ECM), exchange rate and income per capita has a positive impact and significant to retail price of rice Indonesia to influence retail rice. However in the short term price of rice in Indonesia has not stable because :

- World rice prices did not have a significant influence on the amount of retail rice prices in Indonesia even though has a positive direction, where it is due to in short-term the increase in global rice prices caused by two major rice net export countries namely Vietnam and India decided to meet domestic needs. Moreover Indonesian government have intervenes to keep the rice at consumer level in order not to increase domestic prices of rice following the world price of rice by fostering domestic rice stocks.

- The price of rice from farmers did not have a significant influence on the amount of retail rice prices in Indonesia even though has a positive direction, where it is due to the short-term government intervention in the form of a basic pricing policies or government purchase price (HPP) for farmers' grain not operate effectively . However, Speculators and illegal rice imports (smuggling of rice)

make the basic price policy is not operate effectively, where speculators are selling rice that was dumped on a bad season.

- Tariffs Policy does not have a significant influence on the amount of retail prices of rice Indonesia, where it is because many leaks due to imports via the corruption and weak supervision from apparatus which avoids importers delinquency rate provisions.

3. From the results obtained coefficient ECM, *Error Correction* previous period (Resid01 (-1)) is negative, significant, and have a fast speed of adjustment. Occurrence of changes of economic variables that affect the retail prices of rice in the short term show is the impact of changes in variables affecting the retail price of rice has a very short intertemporal correction in the process of adjustment of imbalances leading to a balance condition.

6.2 POLICY RECOMMENDATIONS

Price stabilization policies in the country need to be done through a strategic policy instruments include:

1. Based on the result identify determinants factor of the retail price of rice in Indonesia with short term model shows that exchange rate and income per capita has a significant impact and have a fast speed of adjustment, therefore :

   - Government must maintain the stabilization of the rupiah at a point that is conducive for international trade or a country's trade balance.

   - Government needs to increase the effectiveness of diversification on food to suppress consumption of rice. According to some studies such as study from Amang and Sawit (2001) have argue real improvement income of community can develop from effective diversification of food. Therefore, increasing income per capita can not real big influence on domestic retail prices of rice.

2. Based on the results of identify determinants factor of the retail price of rice in Indonesia with long term model shows that:

   - Increasing of the base price of grain (HPP), which have increase price of rice from farmer should remain controlled by government in order not to burden poor consumer of rice

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- Tariff policy has a positive impact and significant to retail price of rice Indonesia, Therefore government in determining tariff should be effective in interest of farmers and consumers to support the stabilization price of rice.
- To anticipate the price of rice in world markets continues to rise, government needs to increase focus for the purchase of domestic rice more than import rice for fostering rice stocks to support price stabilization.

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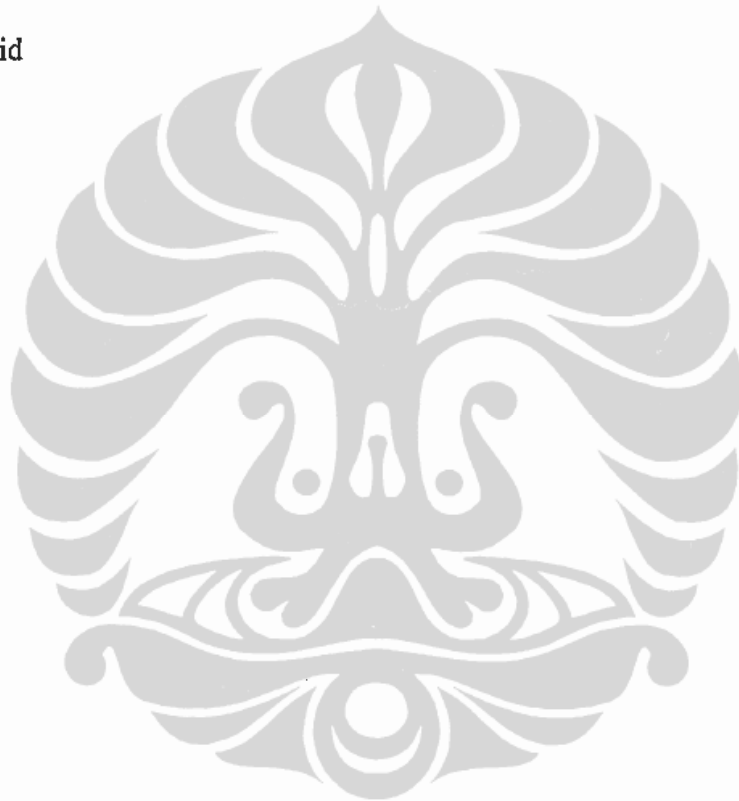
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APPENDIX

I. Stationarity Test Results

Null Hypothesis: LOGHDOM has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.032428	0.7355
Test critical values:	1% level	-3.555023	
	5% level	-2.915522	
	10% level	-2.595565	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOGHDOM) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.05417	0.0000
Test critical values:	1% level	-3.555023	
	5% level	-2.915522	
	10% level	-2.595565	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOGNER has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.217248	0.6605
Test critical values:	1% level	-3.560019	
	5% level	-2.917650	
	10% level	-2.596689	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOGNER) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.735651	0.0003
Test critical values:	1% level	-3.560019	
	5% level	-2.917650	
	10% level	-2.596689	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOGY has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.468162	0.5420
Test critical values:	1% level	-3.557472	
	5% level	-2.916566	
	10% level	-2.596116	

*MacKinnon (1996) one-sided p-values.

Durbin-Watson stat	2.169177	Prob(F-statistic)	0.000001

Null Hypothesis: D(LOGY) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-11.67995	0.0000
Test critical values:	1% level	-3.557472	
	5% level	-2.916566	
	10% level	-2.596116	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOGWP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.079927	0.7177
Test critical values:	1% level	-3.552666	
	5% level	-2.914517	
	10% level	-2.595033	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOGWP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.157951	0.0000
Test critical values:	1% level	-3.555023	
	5% level	-2.915522	
	10% level	-2.595565	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOGHP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.812955	0.8076
Test critical values:	1% level	-3.552666	
	5% level	-2.914517	
	10% level	-2.595033	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOGHP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.792354	0.0000
Test critical values:	1% level	-3.555023	
	5% level	-2.915522	
	10% level	-2.595565	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: ECT10 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.373540	0.0000
Test critical values:	1% level	-3.552666	
	5% level	-2.914517	
	10% level	-2.595033	

*MacKinnon (1996) one-sided p-values.

II. VAR Lag Test Result

VAR Lag Order Selection Criteria
Endogenous variables: LOGHDOM LOGNER LOGHP LOGY
LOGWP CRS TD
Exogenous variables: C
Date: 12/01/09   Time: 03:47
Sample: 1992:1 2006:1
Included observations: 53

Lag	LogL	LR	FPE	AIC	SC	HQ
0	43.28819	NA	6.00e-10	-1.369366	-1.109139	-1.269295
1	307.7290	449.0505	1.80e-13	-9.499208	-7.417390*	-8.698641*
2	359.7011	74.52597	1.77e-13	-9.611361	-5.707953	-8.110299
3	422.7534	73.75930	1.35e-13	-10.14164	-4.416638	-7.940079
4	506.1803	75.55647*	6.49e-14*	-11.44077*	-3.894177	-8.538712

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5%
level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

III. Co-Integration Test Results

Date: 12/01/09 Time: 03:48

Sample (adjusted): 1993:2 2006:1

Included observations: 52 after adjustments

Trend assumption: Linear deterministic trend
Series: LOGHDOM LOGNER LOGHP LOGY LOGWP CRS
TD

Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.961492	367.5715	125.6154	0.0000
At most 1 *	0.781642	198.2137	95.75366	0.0000
At most 2 *	0.513731	119.0893	69.81889	0.0000
At most 3 *	0.464641	81.59764	47.85613	0.0000
At most 4 *	0.417034	49.10711	29.79707	0.0001
At most 5 *	0.227594	21.04656	15.49471	0.0066
At most 6 *	0.136272	7.617834	3.841466	0.0058

Trace test indicates 7 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

1 Cointegrating Equation(s):	Log likelihood	580.2635

Normalized cointegrating coefficients (standard error in parentheses)

LOGHDOM	LOGNER	LOGHP	LOGY	LOGWP	CRS	TD
1.000000	-0.334551	-0.095173	-0.328177	-0.574883	-0.707230	-0.779413
	(0.05826)	(0.03405)	(0.25099)	(0.08339)	(0.26366)	(0.29929)

IV. Error Correction Models Test Result

Dependent Variable: DLOGHDOM
Method: Least Squares
Date: 11/30/09   Time: 20:59
Sample (adjusted): 1993:1 2006:1
Included observations: 53 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOGHDOM(-3)	0.004397	0.105197	0.041802	0.9668
DLOGNER	0.394479	0.217078	1.817220	0.0760
DLOGHP	0.142669	0.228211	0.625162	0.5351
DLOGY	0.835270	0.465493	1.794376	0.0796
DLOGWP(-2)	0.209196	0.201933	1.035969	0.3059
ECT(-1)	-1.029977	0.149537	-6.887755	0.0000
CRS	0.048055	0.162704	0.295353	0.7691
TD	-0.019390	0.176268	-0.110005	0.9129
C	0.023853	0.178649	0.133518	0.8944

R-squared	0.534922	Mean dependent var	0.035615
Adjusted R-squared	0.450362	S.D. dependent var	0.286629
S.E. of regression	0.212500	Akaike info criterion	-0.106229
Sum squared resid	1.986876	Schwarz criterion	0.228349
Log likelihood	11.81506	F-statistic	6.325971
Durbin-Watson stat	2.037873	Prob(F-statistic)	0.000019

V. Diagnostic Test Results

1. Multicollinearity Test Result

	DLOGHDOM	DLOGHDOM(-3)	DLOGNER	DLOGHP	DLOGY	DLOGWP(-2)	ECT(-1)	CRS	TD
DLOGHDOM	1.000000	-0.008104	0.099968	0.039627	0.079632	0.083850	-0.679722	0.089750	-0.094345
DLOGHDOM(-3)	-0.008104	1.000000	-0.021800	0.032368	-0.024050	0.164248	-0.002026	0.135122	-0.136919
DLOGNER	0.099968	-0.021800	1.000000	-0.099975	-0.201232	0.192590	0.082346	0.255942	-0.125447
DLOGHP	0.039627	0.032368	-0.099975	1.000000	0.031769	0.085812	0.031679	0.218391	-0.234380
DLOGY	0.079632	-0.024050	-0.201232	0.031769	1.000000	0.032437	0.074745	-0.181061	0.211185
DLOGWP(-2)	0.083850	0.164248	0.192590	0.085812	0.032437	1.000000	-0.168076	0.270743	-0.278032
ECT(-1)	-0.679722	-0.002026	0.082346	0.031679	0.074745	-0.168076	1.000000	-0.000607	0.059024
CRS	0.089750	0.135122	0.255942	0.218391	-0.181061	0.270743	-0.000607	1.000000	-0.874325
TD	-0.094345	-0.136919	-0.125447	-0.234380	0.211185	-0.278032	0.059024	-0.874325	1.000000

2. Autocorrelation Test Result

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.277297	Prob. F(4,40)	0.890919
Obs*R-squared	1.430022	Prob. Chi-Square(4)	0.838961

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 12/01/09   Time: 05:07
Sample: 1993:1 2006:1
Included observations: 53
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOGHDOM(-3)	0.268229	0.394890	0.679250	0.5009
DLOGNER	0.029864	0.236792	0.126121	0.9003
DLOGHP	0.003701	0.239061	0.015481	0.9877
DLOGY	-0.048606	0.493320	-0.098529	0.9220
DLOGWP(-2)	0.004108	0.217006	0.018930	0.9850
ECT(-1)	0.271597	0.527433	0.514942	0.6094
CRS	0.005825	0.170245	0.034218	0.9729
TD	0.032457	0.188787	0.171923	0.8644
C	-0.037661	0.192764	-0.195371	0.8461
RESID(-1)	-0.310340	0.545195	-0.569228	0.5724
RESID(-2)	-0.054404	0.163612	-0.332516	0.7412
RESID(-3)	-0.286943	0.425995	-0.673584	0.5044
RESID(-4)	0.299751	0.411602	0.728255	0.4707

3. Heteroscedasticity Test Result

White Heteroskedasticity Test:

F-statistic	0.199502	Prob. F(14,38)	0.998873
Obs*R-squared	3.628812	Prob. Chi-Square(14)	0.997316

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/01/09   Time: 05:09
Sample: 1993:1 2006:1
Included observations: 53
Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.147110	0.250709	0.586775	0.5608
DLOGHDOM(-3)	0.018901	0.126146	0.149833	0.8817
DLOGHDOM(-3)^2	-0.045149	0.094647	-0.477019	0.6361
DLOGNER	0.341844	0.392343	0.871288	0.3891
DLOGNER^2	-0.377487	0.596838	-0.632478	0.5309
DLOGHP	0.111666	0.302049	0.369693	0.7137
DLOGHP^2	-0.186854	0.520246	-0.359165	0.7215
DLOGY	0.590941	0.638002	0.926237	0.3602
DLOGY^2	-2.776385	6.584164	-0.421676	0.6756
DLOGWP(-2)	0.204587	0.360572	0.567395	0.5738
DLOGWP(-2)^2	0.321793	0.806146	0.399174	0.6920
ECT(-1)	-0.520777	0.412968	-1.261059	0.2150
ECT(-1)^2	0.375123	0.363686	1.031447	0.3089
CRS	-0.036260	0.199391	-0.181854	0.8567
TD	-0.111267	0.240919	-0.461843	0.6468

R-squared	0.068468	Mean dependent var	0.037488
Adjusted R-squared	-0.274728	S.D. dependent var	0.216891
S.E. of regression	0.244879	Akaike info criterion	0.257225
Sum squared resid	2.278693	Schwarz criterion	0.814855
Log likelihood	8.183534	F-statistic	0.199502
Durbin-Watson stat	1.983713	Prob(F-statistic)	0.998873

VI. The Data

Year	Retail Rice Price (Rp/Kg)	Exchange Rate (Rp/$)	Rice Price of Farmer (Rp/Kg)	World Rice Price (Rp/Kg)	Income Percapita (Rp)	Dummy Import Tariff Policy	Dummy Crisis
Q1 1992	596	2007	354	380	1,262,902	0	0
Q2 1992	602	2025	338	362	1,324,705	0	0
Q3 1992	610	2035	342	365	1,382,283	0	0
Q4 1992	609	2053	347	351	1,418,974	0	0
Q1 1993	602	2067	333	350	1,321,931	0	0
Q2 1993	584	2077	311	314	1,325,487	0	0
Q3 1993	582	2099	322	332	1,472,771	0	0
Q4 1993	594	2106	342	345	1,565,438	0	0
Q1 1994	629	2129	350	334	1,341,910	0	0
Q2 1994	616	2153	344	353	1,446,385	0	0
Q3 1994	697	2172	398	435	1,582,012	0	0
Q4 1994	711	2190	437	484	1,652,804	0	0
Q1 1995	750	2209	465	508	1,596,701	0	0
Q2 1995	733	2232	444	560	1,548,243	0	0
Q3 1995	783	2262	464	673	1,624,061	0	0
Q4 1995	850	2291	493	675	1,693,219	0	0
Q1 1996	865	2318	488	613	1,670,613	0	0
Q2 1996	852	2344	475	570	1,545,535	0	0
Q3 1996	897	2350	488	520	1,822,729	0	0
Q4 1996	913	2357	508	491	1,843,611	0	0
Q1 1997	1,014	2403	514	546	1,730,775	0	0
Q2 1997	1,024	2437	514	554	1,759,358	0	0
Q3 1997	1,066	2791	519	608	1,830,080	0	1
Q4 1997	1,122	4006	554	843	1,812,610	0	1
Q1 1998	1,621	9433	619	1885	1,560,824	0	1
Q2 1998	1,714	10461	682	1989	1,432,114	0	1

Year	Retail Rice Price (Rp/Kg)	Exchange Rate (Rp/$)	Rice Price of Farmer (Rp/Kg)	World Rice Price (Rp/Kg)	Income Percapita (Rp)	Dummy Import Tariff Policy	Dummy Crisis
Q3 1998	2,580	12252	765	2430	1,679,820	0	1
Q4 1998	2,701	7908	1,064	1825	1,618,069	0	1
Q1 1999	2,745	8776	1,224	2104	1,555,569	0	1
Q2 1999	2,762	7921	1,295	1679	1,746,207	0	1
Q3 1999	2,635	7531	1,298	1430	1,694,672	0	1
Q4 1999	2,480	7193	1,298	1440	1,463,855	0	1
Q1 2000	2,452	7391	1,285	1213	1,648,809	1	0
Q2 2000	2,469	8287	1,278	1286	1,771,326	1	0
Q3 2000	2,427	8712	1,214	1244	1,688,082	1	0
Q4 2000	2,350	9297	1,225	1324	1,631,719	1	0
Q1 2001	9,783	9780	1,233	1293	1,715,108	1	0
Q2 2001	2,479	11242	1,255	1482	1,725,377	1	0
Q3 2001	2,550	9614	1,265	1221	1,741,908	1	0
Q4 2001	2,678	10408	1,297	1503	1,704,262	1	0
Q1 2002	2,975	10158	1,361	1409	1,734,237	1	0
Q2 2002	2,845	9077	1,454	1333	1,761,841	1	0
Q3 2002	2,707	8956	1,437	1341	1,813,238	1	0
Q4 2002	2,777	9055	1,440	1369	1,737,608	1	0
Q1 2003	2,862	8906	1,452	1391	1,796,285	1	0
Q2 2003	2,771	8479	2,862	1256	1,827,081	1	0
Q3 2003	2,731	8441	2,771	1227	1,872,036	1	0
Q4 2003	2,779	8482	2,731	1287	1,795,258	1	0
Q1 2004	2,832	8470	2,779	1358	1,846,490	1	0
Q2 2004	2,827	9001	1,670	1719	1,883,412	1	0
Q3 2004	2,818	9156	1,654	1969	1,931,868	1	0
Q4 2004	2,852	9128	1,589	1917	1,899,908	1	0
Q1 2005	3,065	9274	1,534	1979	1,934,271	1	0

Year	Retail Rice Price (Rp/Kg)	Exchange Rate (Rp/$)	Rice Price of Farmer (Rp/Kg)	World Rice Price (Rp/Kg)	Income Percapita (Rp)	Dummy Import Tariff Policy	Dummy Crisis
Q2 2005	3,309	9551	1,782	2208	1,969,510	1	0
Q3 2005	3,373	9995	1,866	2191	2,019,285	1	0
Q4 2005	3,592	10000	1,733	2131	1,970,781	1	0
Q1 2006	4,022	9275	1,898	1970	2,006,077	1	0
Q2 2006	4,338	9115	2,405	1933	2,042,125	1	0
Q3 2006	4,456	9123	2,318	1954	2,111,852	1	0
Q4 2006	4,582	9125	2,422	2006	2,065,790	1	0

Source : Retail Rice Price (Ministry of Trade), Exchange Rate (IFS), Rice Price of Farmer (BPS), World Rice Price (UNCTAD), Income Percapita (BPS)