ANALYSIS OF IMBALANCES IN RICE MARKET, NORTH SUMATRA PROVINCE

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ABSTRACT: *This study analyzes the imbalance between demand and supply of rice, as well as the influence of price and non-price variables to the demand, supply and stocks of rice in North Sumatra Province. This study uses secondary data of time series which comes from institutions, agencies or authorities, especially from Central Statistics Agency (BPS) of North Sumatra, North Sumatra Regional Division Bulog and other relevant institutions. The results shows that rice production is strongly influenced by expectations of the rice price and fertilizer prices. The rise in price expectations will increase the number of rice in the future, whereas the increase in the price of fertilizer will reduce the number of offers because fertilizer is input component which is relatively great, while the price of a substitute has no effect on rice deals. Variable price rice and the prices of substitute goods do not significantly influence the demand for rice. Rising and falling of these two variables will not cause a change in the number of requests, while revenue positive effect on demand for rice when views of both the price is elasticity and revenue both inelastic.*

KEYWORDS: Imbalance, Rice Market, Supply and Demand, Commodity, Price

INTRODUCTION

Rice has always been as an interesting issue to be considered and discussed because it is needed by many people in Indonesia as well as in the perspective of the world market. Rice is the main food of the majority in Indonesia, and low-income groups spend approximately one-third of their income to buy rice. Rice is still considered as a strategic commodity and a shortage of rice production will easily become a social problem of politics, economics and security. Consequently, the government must be responsive to the parameters relating to supply, demand and stocks of rice.

By knowing the amount of supply (production plus imports and stock last year), the amount of demand (consumption) and the amount of stock available, the government can monitor, maintain the availability of rice in order to guarantee price stability. Given the serious attention of the three parameters, it should not be happening in the market price fluctuations which would disturb society, good for farmers as producers and society as a consumer. The emphasis is to know how much production produced by farmers, absorbed by the market, purchased by consumers, eventually the government may take policy whether purchases rice from farmers in order to avoid excess supply or the government issues a stock when there is a shortage of rice in the market in order to avoid excess demand.

Issues concerning the rice is now a very complex, since the government raises fuel prices, which have an impact on rising prices of commodities including rice, while purchasing power of people, especially low-income people who are the majority of the people in Indonesia decreases sharply. The role of the government to the buffer institute such as Bulog/Dolog, aims to monitor, maintain and stabilize the price and supply of rice in the market. But infact,

this institute cannot give a significant contribution though this institution which has changed the status from non-departmental institution to a public company. In this case, one of the facilities that had been enjoyed by Bulog is revoked, that Bulog has no longer obtained funding in the form of credit liquidation from Bank Indonesia to carry out their duties but must use expensive funds in the form of commercial loans. To undertake the management of rice, Bulog needs funds very much.

A classic problem of rice commodities stems from the existence of two goals to be achieved and sometimes both tend to the contrary. The first goal is to preserve good prices at the producer level, but at the same time, it must be not too burdensome to consumers. As consumer goods produced by involving farmers, rice commodity policy should include the two sides at once. The interest of farmers should receive greater concern than the interests of consumer, even though statistically the population of consumer is greater. But so far, it has shown that the rice policy undertaken by the government is always oriented to the consumer. In this case, the policy is aimed at ensuring inadequate supplies at an affordable price level of consumer.

One of the development goals of food is the realization of food security. Food security can be characterized by the availability of adequate food for the population, and there are also food commodities other than rice. In order to achieve food security firm, we can see the following indicators, namely; food availability, food accessibility, consumer acceptability, food safety and social welfare. The availability of adequate food, as set out above can be seen from three sides, namely the production, consumption and stock side (Palm, 2013).

The agricultural sector is a sector that can be relied upon in national economic recovery, given the agricultural sector proved they can contribute to the national economy despite the storm of the crisis which has hit our country. This is because the opening of employment in the agricultural sector and the contribution of foreign exchange generated from this sector. When viewed in economic conditions in North Sumatra Province, the agricultural sector has a strategic role in supporting the economic development of this region. Contribution of the agricultural sector still remains as the largest contributor to GDP, 24.94 percent in 2012 and the main employer in this sector according to the results of *Sakerda* (A regional working unit) in North Sumatra Province in 2012 amounted to 46.03 percent. The objectives in the agricultural sector, is not only to increase production but also to improve the welfare of farm households.

According to data published by BPS (Central Bereau Statistics) in 2015, the number of rice produced by farmers in North Sumatra as many as 598.700 households, with a total production of paddy rice and fields of 3,007,636 tons, comprising rice production as much as 2,870,944 tons and as much as 136.692 tonnes of paddy fields , with total area of 705.023 ha of agricultural land comprising of 652.531 ha of paddy fields and vast fields of 52.492 hectares spread across 26 districts/cities. Average area of agricultural land holdings is 1.18 ha per farm household, with the average amount of production per hectare as much as 42.66 kw/ha or amounted to 4,266 kg/ha.

Table 1: Harvested Area, Production and Average Production of Paddy   and Fields in North Sumatra, 2005-2014

Year	Harvested Area (Ha)	Production (Ton)	Average Production (Kg/Ha)
2005	797.545	3.212.208	4.028
2006	823.749	3.219.434	3.908
2007	838.626	3.354.730	4.000
2008	847.610	3.514253	4.146
2009	801.948	3.291.515	4.104
2010	765.161	3.153.305	4.121
2011	825.188	3.403.075	4.124
2004	826.091	3.418.782	4.139
2013	822.073	3.447.393	4.194
2014	705.023	3.007.636	4.266

Source: BPS, North Sumatra in Some Publishings

The development of harvested area and its production in North Sumatra during 2005 to 2014 can be shown on Table 1. Production of paddy in North Sumatra during that period increases of 0.38 percent per year. This increasing is contributed by rice production which grew an average of 0.29 percent per year, while the production of paddy fields has increased of 1.24 percent. If specified according to the district/city, Labuhanbatu regency and Simalungun a rice production center in North Sumatra, in 2010 reaches 385 179 tons or 11.17 percent of the total rice production. While rice production in Simalungun in the same year reaches 381 858 tonnes, or 11.08 percent of the total rice production in North Sumatra.

Meanwhile, based on data from the Central Bureau of Statistics and Bulog in North Sumatra, it is known that the number of North Sumatra rice needs are varied. This can be seen in Table 2. In the period 2004 to 2014, the amount of rice plus a stock of the previous year reduces and consumption in general is still in deficit. The deficit occurres in 2006 which amounted to 445 003 tonnes followed in 2007 amounted to 219 267 tonnes. The surplus only happens at a couple years in which the greatest surplus in 2013 amounted to 127 148 tonnes of rice. So in general,it can be said that there is still a shortage of rice in North Sumatra, which will lead to a price increase from time to time.

Table 2: Production, Stock, Movement, Consumption and Advantage/Disadvantage of Rice offers in North Sumatra, 2004-2014 (in tons)

Year	Production	Stock t-1	Number of offer	Movement	Consumption	Advantage/ Disadvantage
2004	3.214.782	68.971	3.283.753	140.427	3.109.918	33.408
2005	3.240.209	65.879	3.306.088	140.527	3.180.699	-15.138
2006	2.870.944	14.474	2.885.418	144.550	3.185.871	-445.003
2007	3.107.570	13.257	3.120.827	149.447	3.190.647	-219.267
2008	3.189.758	12.587	3.202.345	155.314	3.195.985	-148.954
2009	3.382.066	12.458	3.394.524	158.141	3.247.060	-10.677
2010	3.422.264	12.589	3.434.853	149.141	3.253.596	32.116
2011	3.440.262	10.631	3.450.893	148.118	3.287.988	14.787
2012	3.552.373	10.526	3.562.899	153.138	3.293.000	116.761
2013	3.571.141	10.258	3.581.399	153.845	3.300.406	127.148
2014	3.490.516	12.541	3.503.057	155.134	3.317.007	30.916

Source: BPS, Sumatera Utara, in Some Publishings

Farmers always mourn repetitive, and the government still has difficulties in solving it. Where the price of agricultural commodities is always law at harvest season and if there is a rise, but it is in time of scarcity. They do not have stock of money and automatically their role change from producers into consumers. Bargaining power of farmer is low, because they have very limited access to markets and information, poorly supported access to capital, and credit risks are high. On this condition, farmers need fresh capital so they have to sell their crops to *pengijon*, wholesalers and collectors, because this people is able to provide fresh funds and zero bureaucracy.

The disparity in the price of grain and rice is widened since the fall of President Suharto. It becomes another problem for the rice economy. Reports from the Central Bureau of Statistics, December 1, 2014, shows that the average price of dried grain harvest at farm level is Rp 6.000, -/ kg. The average price of medium quality rice throughout Indonesia is Rp. 10.413,-/ kg, with a sharp variation, ranging between Rp 4.000,-/kg, or even higher in rural areas and isolated. Even if there is an increase in rice prices, it is not always profitable for farmers, because the price of rice is not directly correlated 'with the price of grain. Conversely, if the price of grain is down grain, it is always directly correlated with the price of rice. For example, in December 2014 the price of rice rises more than Rp 1.500,-/kilogram but it is not followed by the rise of grain. While farmers in Indonesia generally sell grain, because they do not have sufficient capital and resources to produce rice through rice mill.

Grain prices for farmers slumps on the harvest period and have increased since then, and the highest price in the period of famine. This is repeated with similar patterns from year to year. The price is different between seasons which has given incentives to private traders, millers, cooperatives and others to participate in trading, storage and millers. There are so many good small and large engage in economic activity. This means that if the price of this seasonal small margin is missing, then almost all of these activities will be halted, and will have a negative impact on employment, poverty, income and its distribution, and negatively affects food security for household (Palm, 2013).

Model market imbalances is originated from the nature of production in agriculture that requires a grace period between the time of planting and harvesting, as well as agricultural production season. An increase in market price cannot be immediately followed by an increase in supply when it is not the time of harvest. So the decision to establish the total area cultivated plants is not affected by the market prices at the time, but based on the expectations/price forecasts in the future. In other words, the market is not able to make adjustments quickly to achieve a balance in the short term. But in reality, the price expectations in the future cannot be known certainty. So we can use theories of partial adjustment dynamics in determining the function of the expected price such as: naïve expectation, weighted average, extrapolative, adaptive expectation and rational expectations (Masbar, 1990). The increase in rice prices in the market from year to year is shown in Table 1-2 above, indicating that there has been a shock on the supply side. Although it is known that the price of rice is always controlled by the government, but due to the limited ability in terms of procurement of rice stocks which can be used to stabilize prices, the government's lead role is not much meaningful. The price increases due to the high demand which cannot be followed by the increase in supply in an equal number. That is way, there is an imbalance between demand and supply.

Formulation of the Problem

Based on the research background mentioned above, the author tries to reveal the basic problems associated with rice problem, namely:

a) How changes in the price of rice, the price of substitute goods, people's incomes, and demand for rice at the previous year on the function of demand for rice?

b) How changes in the expected price of rice, the price of substitute goods, the price of fertilizer and rice offers at the previous year to the rice supply function?

c) Is the rice price fluctuations caused by an imbalance between demand and supply?

Research Purposes

Based on the problems mentioned above, the purpose of this research is to determine:

a) The effect of changes in the price of rice, the price of substitute goods, people's incomes, and demand for rice at the previous year on the function of demand for rice.

b) The effects of changes in the expected price of rice, the price of substitute goods, the price of fertilizer and rice offers at the previous year to the rice supply function.

c) To find out what is causing the imbalance between demand and supply of rice in the province of North Sumatra.

RESEARCH METHOD

Theory of Market Imbalances

The dynamic model is firstly developed by Ezekiel (1993). This model explains that the possibility of price in the future based on current price (naïve expectation), the unstable market. The instability can be investigated through a first-order linear difference equation that describes

the price development from time to time. This solution describes two terms: the first, to the balance system long-term price, the price will be fixed from time to time without interruption, and second stable conditions, and depends on the slope of the demand curve and the slope of the supply curve.

As a starting point for a model of the market imbalances, it is a dynamic adjustment of the partial skeleton of Nerlove. He begins his study of dynamic offers to explain the behavior of price of agricultural products in the market. The focus is on long-term response to price changes expected. Nerlove proposes that the adjustment is a fraction concerning the difference between the actual price in the period with price expected in the long term. This equation is described as the movement of the average price in previous days. According to Nerlove (1958), the price is expected to be formed based on the adaptive hypothesis which is more general than *cobweb model* from *Ezekiel*. Market imbalance theory is an extension of the theory of dynamic partial adjustment. There are some functions of the expected price such as: naïve expectation, weighted average, extrapolative, adaptive expectation and rational expectation (Masbar, 1990). All these shapes reflect the price adjustment process towards the equilibrium price. The same formula can be used to explain how the quantity of demand or supply to adjust to equilibrium.

Table 3: Chart of the Supply and Demand at the Imbalance Condition
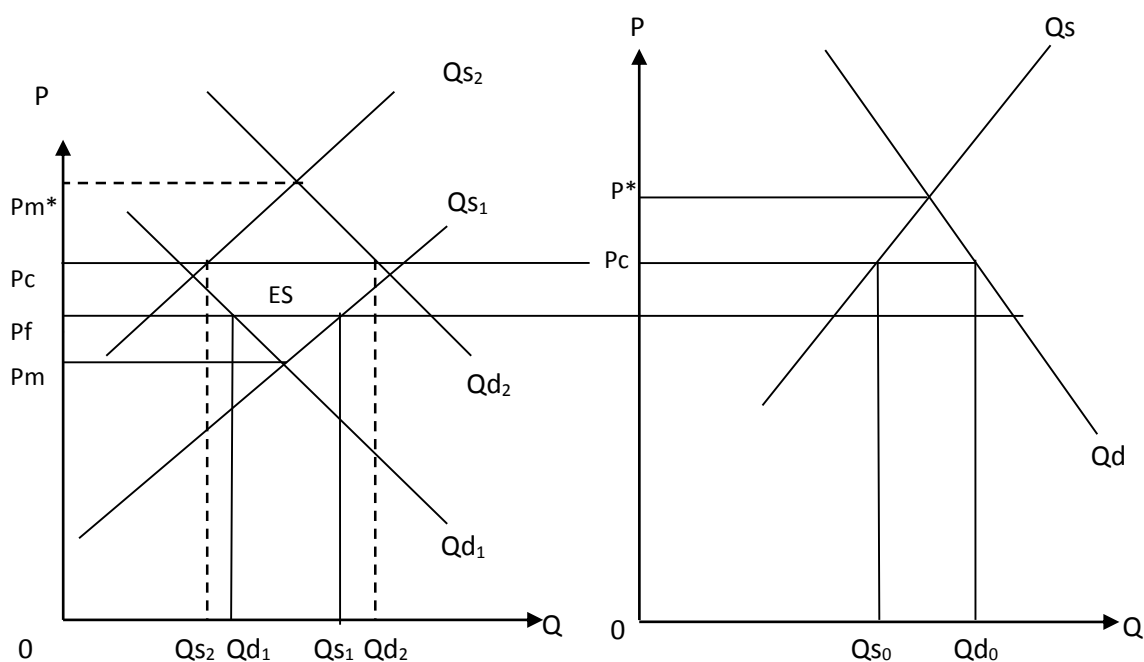
Note: Pf is basic price, Pm is market price, and Pc is 'roof price'.

The imbalance market is a situation where the market cannot do faster action to achieve a short-term equilibrium. A short-term (minimum condition) cannot bring differences in the characteristic of the imbalance market in demand and supply into balance. Laffont (1977) formulates a new sample that provides a different interpretation concerning the price adjustment equation. In Figure 1, $\Delta P = \theta(QS - QD)$ if the price is above the equilibrium, there will be excess supply. Conversely, when the price is below, then there is excess demand.

This study analyzes the rice issue concerning the imbalance between demand and supply of rice, managing stocks of rice in North Sumatra Province, and see the impact of price and non-price variables to the demand for rice, maize, and rice stock offers. This research is done in North Sumatra Province. The study period is 24 years, since 1983 to 2006. The data used in this research is secondary data time series , which comes from the Bureau Statistics Agency (BPS) of North Sumatra and North Sumatra Regional Division Bulog and equipped with the study of literature. Data collected includes data on the amount of rice production, the amount of rice consumption, stocks of rice, imported rice, milled rice price, the retail price of medium grade rice, the population, the price of substitutes (corn), fertilizer prices and the GDP of North Sumatra Province.

In analyzing the data, it uses commodity model of agriculture that is; ***Nerlove dynamic demand theory, Nerlove supply models*** and the stock model using ***accelerator models,*** while the estimation method using ***simultaneous equations methods***.

Rice supply function here is a function of the desired rice, the mathematical formulation is:

$$QS_t^* = a_o + a_1 P_t^* + a_2 PS_t + a_3 PP_t \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 1$$

Adjustment:

$$QS_t - QS_{t-1} = \alpha(QS_t^* - QS_{t-1}) \quad 0 < \alpha \leq 1 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 2$$

Rice demand function is defined as demand for desired rice, the mathematical formulation is:

$$QD_t^* = b_o + b_1 P_t + b_2 PS_t + b_3 Y_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 3$$

Adjustment:

$$QD_t - QD_{t-1} = \beta(QD_t^* - QD_{t-1}) \qquad 0 < \beta \leq 1 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 4$$

Imbalance Model

Demand:

$$Q_t = \alpha_2 + \beta_2 P_t + \gamma_2 PS_t + \phi_2 Y_t - \frac{1}{\lambda} \Delta DI + v_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad 5$$

Offer: $Q_t = S_t + \dfrac{1}{\lambda} DD$ $\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$ 6

Where $DD = \begin{cases} 0 \, jika \Delta P_t > 0 \\ \Delta P_t \, jika \Delta P_t < 0 \end{cases}$

Variable Operational Definition

a. Special rice, the amount of rice for one year, plus imports and stock last year.

b. Demand for rice, is a proxy of the number of residents per capita rice consumption for a year.

c. The price of rice, the average retail price of medium grade rice prevailing in the market.

d. Fertilizer prices, the average price of urea is determined by the government.

e. The price of substitute goods, the prices of goods that can replace the function of rice, in this study used the commodity price of corn.

f. Income population, in this study it is represented by the regional gross domestic product

(GDP) per capita in North Sumatra Province.

DISCUSSION AND RESULT

Special Function of Rice

The estimation results of the function of supply of rice can be seen in Table 3. It can be seen that simultaneous independent variables (the expected price of rice, the price of substitute goods, the price of fertilizer and lag one year deals rice), partially significant effect on the variation of deals rice. It is marked with R^2 values of 0.8227 means, that amounted to 82.27 per cent the proportion of independent variables that is used to explain the variation of rice offer variables in the model, while the rest are only for 17.73 percent explained by other variables. It not used in this study.

Table. 4: Estimated Special Function of Rice

Variabel	Coefficient Estimation	t-ratio Value	P-value	Elasticity	Significance
LPE	2.7311	5.511	0.000	0.3553	S
PS	-0.000146	-0.970	0.344	-0.0053	TS
PP	-0.000307	-2.539	0.020	-0.0125	S
QSL	0.017811	2.373	0.028	0.0171	S
CONSTANT	9.5968	11.24	0.000	0.6455	
R-SQUARE = 0.8227					

Source: Result of The Analysis from Data in Appendix 1

Partial test against the significance of the influence from the independent variables is done by looking at t-ratio value based on an agreement econometrics experts if the t-ratio is greater than one, then it can be said to have been significant. Based on Table 4, we can see the four variables observed in this study. It is known that there are three explanatory variables which have a significant relationship to the variables described. These variables include the expected price of rice (PE), the price of fertilizer (PP) and variable lag one year deals rice (QSL). While the variable price of a substitute (PS) is not significantly related to the variables described. Variable expected price of rice (PE) is positively related to the quantities of rice offered. This means that the higher the expected price of rice, the quantities of rice offered is increasing. The response to the expected price offer can also be found on the size of the elasticity. In table 4, it appears that the value of elasticity is 0.3553 with the elasticity less than one. It means that

elasticity is relatively inelastic, which shows the percentage change in price is greater than the percentage change offers in other words. If the increase in price is expected by 10 percent, the increase in the supply of rice is only increased by 3.51 percent.

The expected price of the rice offer inelastic   is understandable because farmers in North Sumatera experienced constraints in expanding the farming operation. The obstacles faced by farmers are relatively   area of paddy fields cultivated and there is even a tendency to dwindle as described in the previous section, in addition to the limitations of the production facilities used by the farmers, so that the increase in price expectation cannot be followed by an increasing number of production proportional to the increase in the rice price expectation.

Based on the research results by Nurhayati (2005), it is known that the increase in the number by 1 percent in the short term will lead to price increase of 0.56 per cent, or an increase in supply of rice by 10 percent would increase the price of rice by 5.6 percent. By contrast, the increase in rice price by 1 percent would increase the supply of 1.33 percent, or a rise in the price of rice by 10 percent would increase the supply of rice by 13.3 percent.

On the other hand, it should be observed that the price variable is a variable that is difficult to control by farmers as producers caused by frequently weak position of farmers in a bargaining position. The farmer only receives the amount of the price. To stimulate farmers to increase production, it is government policy , for example in the form of rural infrastructure such as roads, transport infrastructure crops, irrigation development, and increase outreach to farmers in a sustainable manner. Besides, no less important, in order to protect agricultural producers, the government can issue a policy in the institutional trade with emphasis on changes in the marketing chain from producers to consumers, with the main objective to strengthen the competitiveness of farmers.

The variable price of a substitute corn (PS) is not significantly associated with rice. It is marked with P-value of 0.344 with t-ratio is smaller than one that is -0.970. This suggests that the rise and fall of the price of corn will not affect the rice offer. The results of this analysis indicates that people in North Sumatra do not consume corn as a food staple for rice substitute.

Variable fertilizer prices (PP) is negatively related to the quantities of rice offered, meaning that the lower the price of fertilizer, the quantities of rice offered increases, and vice versa. This finding is consistent with the theory that the lower price of fertilizer, the use of fertilizers will increase and lead to the production of rice will increase as well. It is consistent with the results of the estimation that the fertilizer price fluctuations will affect to supply rice in North Sumatra. It is characterized by t-value ratio greater than 1 that is -2539 and   p-value is -0020. When viewed from the elasticity value indicates less elastic, where the value is -0.0125, which means that the percentage change in the price of fertilizer is relatively larger than the percentage of the number of rice offer.

The small response to change the prices of fertilizer rice offers indicates that a reduction in fertilizer is subsidied   by the government gradually during this having an impact on the reduction of rice offers, but in relatively small quantities. It is caused by the attitude of farmers who tend to avoid risk. Several studies have been carried out in Java showed that the fertilizer price increase does not give a geat impact on the reduced use of fertilizers. Farmers do not reduce the dose of fertilizer in large quantities which is "fear of declining production" (Swastika, 1999). Because the wisdom of the rise in prices of fertilizers and basic grain prices do not reduce fertilizers optimally, then the optimal production is also relatively unchanged,

so the advantages of farming could be improved. *Variable lag 1 year rice offer* (QSL) has a positive relationship with the offer of rice, that if offers high rice last year, the current year is estimated rice offers will also increase.

Function of Rice Demand

The results of estimating the function of rice demand can be seen in Table 4. The table can be analyzed partially independent variables (the price of rice, the price of substitute goods, people's incomes, demand for rice last year and taste) significantly affected the variation of the value of the dependent variable, with R^2 value of 0.9331. This means, that amounted to 93.31 per cent the proportion of independent variables used to explain the variation of the variable demand for rice in the model, while the rest is only at 6.69 percent which is explained by other variables not used in this study. R^2 high value shows the estimated models generated from this study showing enough actual state (goodness of fit) or strong enough to be trusted.

Tabel. 5: Estimated Function of Rice Demand

Variabel	Coeficient Estimation	t-ratio Value	P-value	Elasticity	Significance
P	-0.008821	-0.227	0.823	-0.0043	TS
PS	0.02042	0.403	0.692	0.0086	TS
Y	0.09230	2.046	0.055	0.0945	S
QDL	0.007637	2.864	0.010	0.0073	S
CONSTANT	12.778	42.14	0.000	0.8939	
R-SQUARE = 0.9331					

Source : Result of The Analysis from Data in Appendix 1

Partial test of significance level influence of the independent variables is done by looking at t-ratio value. If t-ratio value is greater than one, then it is said to have been significant. Based on table 5, we can see the four variables observed in this study consisting of two explanatory variables which have a significant relationship to the variables explaining the variable income (Y) and variable lag 1 year demand for rice (QDL). Meanwhile, two other variables are variables in rice prices (P), and the price of a substitute (PS) which are not significantly related to the variables described.

Variable rice prices (P) is not related to rice quantities requested, with the estimated coefficient of -0.0088 and t value ratio is smaller than -0.227 which means that the rise and fall of the price of rice is not followed by an increase or decrease in the demand.

The variable price of a substitute corn (PS) does not correlate significantly with demand for rice. It is marked with a p-value of 0.692 with a t-ratio is smaller than one that is 0.403 with the elasticity is relatively inelastic. This suggests that the rise and fall of the price of corn will not affect the domestic consumption of rice, because in general people in North Sumatra is not accustomed to eating maize as a staple food, although North Sumatra is one corn producing regions in Sumatra.

Variable income (Y) in this case represented by the GDP statistically significant influence on the variation of quantities of rice is requested. It is marked with a t-ratio of 2.046 (greater than 1) and the p-value 0.055. This means, increasing the amount of income will affect significantly to the increasing demand for rice in North Sumatra. When viewed from the value of its elasticity, the income elasticity of demand for rice is equal to 0.0945 which means it is very inelastic. It is clear that the rice in North Sumatra is the essential goods, namely basic goods or goods that are very important in everyday life. An increase in income will not affect much to the increase in demand, as long as the assumptions for their daily needs. Even if there is a change only in the quality of rice, it is not the quantity, that originally people consume rice with low quality, with a rise in earnings then that person will switch to consume rice with better quality. variable "lag" 1 year request (QDL) positive, which means that if demand for rice last year increased by the consumer, the estimated demand for rice will increase for the current year.

Estimation of Imbalance Model

Based on data from market price of rice obtained from the Central Statistics Agency (BPS) of North Sumatra, it appears that the price of rice from year to year is always an increase, at least in the period of observation for twenty-four years (1983-2006), this means that the price change is positive ($\Delta P > 0$) from time to time. This indicates that there has been an imbalance between demand and supply. Because $\Delta P > 0$. This means there has been excess demand (excess demand), caused by shocks from the supply side. In the model of market imbalances in the event of excess demand, it was identified as the supply function. Based on the model specification of imbalance which had been built earlier as follows:

$$Q_t = \alpha_1 + \beta_1 P_t^* + \gamma_1 PS_t + \phi_1 PP_t - \frac{1}{\lambda}\Delta P_t + \varepsilon_1$$

Based on the results of model estimation imbalances as presented in Table 4, the obtained results that simultaneously independent variables (the expected price of rice, the price of substitute goods, the prices of fertilizers and changes in prices), partially significant effect on the variation of offers of rice, it is marked with R2 values of 0.8314 means, that amounted to 83.14 per cent the proportion of independent variables that is used to explain the variation of the dependent variable in the model, while the rest are only for 16.86 percent again explained by other variables that are not used in this study.

Table. 6: Estimation of the Special Function of Imbalance

Variabel	Coeficient Estimation	t-ratio value	P-value	Elasticity	Significance
LPE	2.9343	5.6653	0.000	0.3817	S
PS	-0.000160	-1.062	0.302	-0.0058	S
PP	-0.000367	-2.848	0.011	-0.0150	S
DP	0.0000671	1.372	0.187	0.0010	S
QSL	0.018066	2.401	0.027	0.0173	S
CONSTANT	9.2296	10.30	0.000	0.6208	
R-SQUARE = 0.8314					

Source: Result of The Analysis from Data in Appendix 1

Partial test of significant level influence of the independent variables is done by looking at t-ratio value, which if the t-ratio is greater than one, then said to have been significant. Based on table 6, we can see that the four variables were observed in this study note that the overall explanatory variables have a significant relationship to the variables described. These variables include the price of the rational expectations (LPE), the price of substitute goods, the price of fertilizer (PP), and variable changes in the price of rice (DP).Variable price rational expectations (LPE) is positively related to the quantity of rice offered, indicating that higher rice price expectations, it will increase the production of rice. It is characterized by the t-value ratio of 5.663 and p-value of 0.000. Response bidding against expected price can also be seen from the amount of value of elasticity, based on the estimated value of elasticity is relatively inelastic, which showed that the percentage change in price is greater than the percentage changes in supply, in other words, if an increase in price expectations rice by 1 percent, the increase in deals rice only increased by 0.38 percent.

Its elasticity is the expected price of the rice offers is understandable because farmers in North Sumaterea experienced constraints in expanding the farming operation. The obstacles in the form of relatively fixed area of paddy fields cultivated and there is even a tendency to dwindle as described in the previous section in addition to the limitations of the production facilities used by the farmers, so that the increase in price expectations cannot be followed by an increasing number of production proportional to the increase in the rice price expectations. The variable price of a substitute in this corn is negatively related to rice quantities offered, where the rise in prices of substitutes will cause a decrease in the amount of goods offered, which are marked with a t-value ratio of -1 062 and p-value of 0.302. This suggests that the rise and fall of the price of corn will affect the rice offers. However, it should be underlined that although corn prices significantly related to the quantities of rice offered, but based on observations made by residents of North Sumatra did not make corn as a staple food for rice substitute.

Variable fertilizer prices (PP) is negatively related to the quantity of rice offered, if fertilizer prices rise, it will cause production to decline, due to high fertilizer prices will cause some farmers to reduce the dose of fertilizer, which in turn will have an impact on reducing production. Meanwhile variable price changes influence significantly the quantity of rice offered, where a positive price changes indicate that the price tends to rise, the price increase indicates that the stretcher has been oversubscribed indicating imbalancing has occurred between demand and supply. It is characterized by the t-value ratio of 1,372 and a p-value of 0.187. The estimated coefficient value 0.00006712 price changes, because the model in the form of logs becomes anti-log be 1,254879, that is $\frac{1}{\lambda}\Delta P_t$, so the price adjustment (λ) is

$$\frac{1}{1,254879} = 0,79689 \, .$$

It shows that the market is not able to make adjustments in real time to bring supply and demand reach an equilibrium in the short term . While variable lag one year deals rice (QSL) has a positive relationship with the offer of rice, that if rice offers is high last year, the current year is estimated rice deals will also increase.

Model market imbalance is a reflection of the natural production in agriculture that requires a grace period between the time of planting and harvesting, as well as agricultural production is seasonal. Increasing in market prices can not be immediately followed by the increasing in supply when it is not the time of harvest. So the decision to establish the total area

cultivated plants is not affected by the market prices at the time, but based on the expectations / price forecasts in the future. In other words, the market is not able to make adjustments quickly to achieve a balance in the short term. From the description, it can be concluded that the market imbalance is a situation where the market can not adjust fast enough to achieve a balance in the short term, and it is a characteristic of the market imbalance which could not bring demand and supply into balance. But in reality, the price expectations in the future cannot be known with certainty, that used the theories of dynamic partial adjustment in determining the function of the expected price. If the farmer estimates that this price increase will continue, there will be next period then the farmer changes the composition of its input on the upcoming planting season. So the effect of this price increases can be seen in the next planting period.

CONCLUSION

Based on the discussion of the results in this study supported by the opinion of the experts and the findings of both quantitative and qualitative, it can be summed up as follows:

1. Changes in prices and the number of rice offers in a year earlier give a positive effect. While the price of fertilizer negatively affect the amount of rice offered. These findings are statistically significant. On the other hand, the price of substitutes is not correlated to the offer of rice. This condition reflects the people in North Sumatra which are uncommon to consume corn as a staple food substitute. In the short term deals to rice inelastic, so the results of agricultural products including rice is seasonal, and require a grace period (gestation period) between planting and the harvest. A price increase in the market can not be immediately followed by an increase in bids if that harvest has not arrived.

2. Changes in income and changes in the amount of rice at the previous yearwill give a positive effect on rice demand.These findings are statistically significant. While the price of rice and the prices of substitutes is not correlated to the demand for rice. Changes in income and price is inelastic to the demand of rice. It means changes in income and the price of rice is less influence to changes in demand of rice.

3. Based on the estimated imbalance, it is known that there is an excess demand which is characterized by changes in prices which are generally positive and significant on rice offers caused by shocks from the supply side, and in the short term the market is not able to make adjustments instantly to bring supply and demand reach an equilibrium. Based on the search results of previous studies conducted by several previous investigators, generally the discussion is more focused on the balance between demand and supply of rice, whereas in this study in addition to the discussion of demand, supply and stocks of rice, also discusses the imbalance between demand and supply of rice. This is what distinguishes this research with other research- in the previous studies.

Recommendations

In connection with the conflict of interest between consumers and producers in the context of the price of rice, where the lower price for consumers has a positive meaning for increasing purchasing power, while the manufacturer has a negative meaning because of lower revenues

and at the same purchasing power. And vice versa,   if the high price will have negative meaning for consumers and positive for producers. So it requires good management of stocks which can create price stability characteristics, on the one hand not to burden the consumers but it still gives profitable for manufacturers. The instrument can be used by the government in this case, that is a combination of stock management with basic pricing of grain (floor price) and the price fixing roof (ceiling price) reasonable both for the benefit of producers and consumers' interests.

Implications

In terms of price stability, the choice of alternative strategies in order to improve the effectiveness of policy instruments price stability is to maintain the application of HDPP (base price of government purchases) but must be accompanied by a revaluation step of the entire planning to support programs in an integrated manner, especially for dry grain harvest (GKP), and make GKP as a base instrument of stabilization policy in the future.

Suggestions

a. From the supply side of rice, because of the response rates, good rice prices as well as prices of inputs to the offer of rice which is inelastic, and as the price variable which is difficult to control by farmers as producers caused by frequently weak position of farmers in a bargaining position, the farmer only receives the amount price, then to stimulate farmers to increase production, it is necessary wisdom not to focus to control the   price by government, but there are some other ways   in the form of rural infrastructure such as roads, transport infrastructure crops, irrigation development, and increase outreach to farmers in a sustainable manner.

b. On the demand side, because the response of rice demand is inelastic, and the price change will not have much effect on the size of rice consumption, the government is expected to control the well disparity in the price of grain with rice prices that had been too broad, as well as the interval between the base price with the price of the roof must be continuously updated in accordance with the development of the price of other commodities.

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