

THE EFFECT OF SUBSIDY POLICY ON FOOD SECURITY OF RICE IN INDONESIA

Azwardi, Abdul Bashir, Mohamad Adam & Taufiq Marwa

Abstract: *The aim of this research is to investigate the effect of non-energy subsidy on the food security of rice in Indonesia. The data used in this study is secondary data from 1990-2014. The analysis used in this study is simultaneously equation model approach estimated using Two Stage Least Squares (2 SLS) method. The findings show that the subsidy policy determines the rice consumption in Indonesia and the subsidy is affected by the price of rice. These conditions indicate that government is trying to maintain price stability through subsidy and also attempt to establish good food security from both demand and supply side.*

Keywords: *Subsidy Policy, Rice, Food Security, price stability*

INTRODUCTION

Food security is the essential need that determines the quality of human resource and social political stabilization as a requirement of the development. According to Haryadi *et al.* (2009), food security is increasingly becoming crucial, as it does not only represent basic need but also basic right that needs to be fulfilled. Therefore, a nation is obliged to ensure that individuals receive their right on food.

According Hanafie (2010) the role of government is essential to influence decisions of producers, consumers and the perpetrators of the marketing in order to ensure the development of agriculture as planned. The role of government is usually called as agricultural policy. The role of government is needed to break the vicious circle of poverty, which is a description of a reciprocal relationship of the characteristic of developing countries (such as Indonesia). These characteristics are usually in form of lack of management of the existing resources, unproductive agricultural activities, the existence of dualism economy between modern sector (that follows market economy) and traditional sector (that follows subsistent economy), and also the high level of population with low human resource quality.

Furthermore, government policy related to domestic production of a commodity in terms of price policy and input and output trade are intended to increase the competitiveness of the commodity in domestic market. This is intended

* Economics Faculty, Sriwijaya University, Palembang, Indonesia, E-mail: mr_adam2406@yahoo.com; taufiqmarwa@yahoo.com

to induce domestic producer to utilize domestic resources intensively to increase the added value.

According to Taufiq (2001) the current agricultural policy focuses only on increasing rice production and maintaining self-supporting rice production as well as implementing cheap rice policy. However, these policies are causing food problem, such as: (1) from producer point of view; farmers are less passionate to produce, (2) from consumer point of view; the society are very dependent on rice.

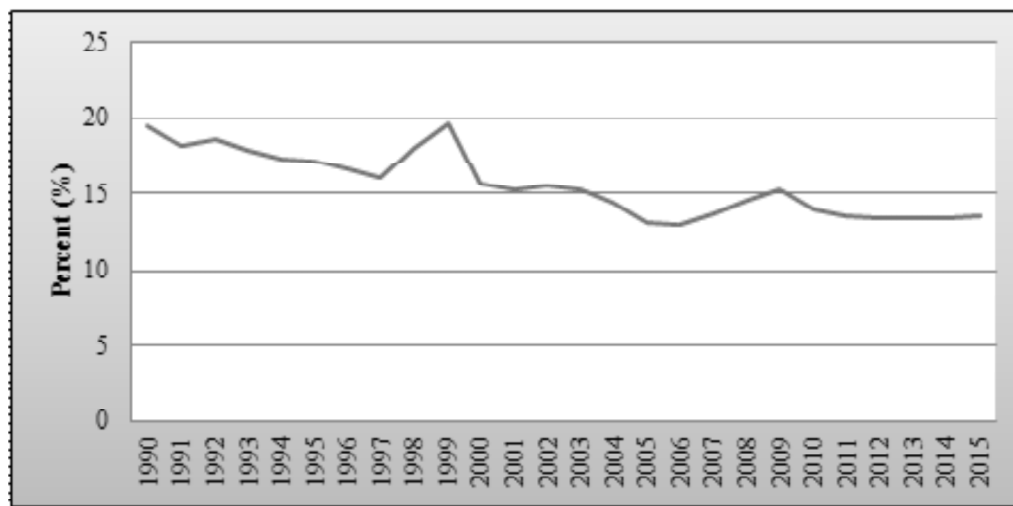


Figure 1: Value Added in Agricultural Sector on Gross Domestic Product in Indonesia 1990-2015 (Percentage)

Source: Central Bureau of Statistics (BPS) and World Bank

The role of the agricultural sector has contributed to the establishment of the Gross Domestic Product (GDP) with an average of 15.68% in the period 1990 to 2014 based on current prices. Contribution of the agricultural sector is still relatively higher than in other sectors as it places third as the largest sector after industrial and trading sector, even though during 2001-2014 the average growth is only 3.5% compared to other sectors that are significantly declining. Inline with such fact, one of government policies to establish food security is through non-energy subsidy in agricultural sector in order to increase food production and the access to food. Therefore, government should be sensitive on the development of agricultural sector as it is the basic needs of most Indonesians that must be met.

The subsidy given by the government in recent years the number has increased quite large, the budget provision of such subsidies must still consider the financial capacity of the state. However, based on Figure 2, the development of non-energy

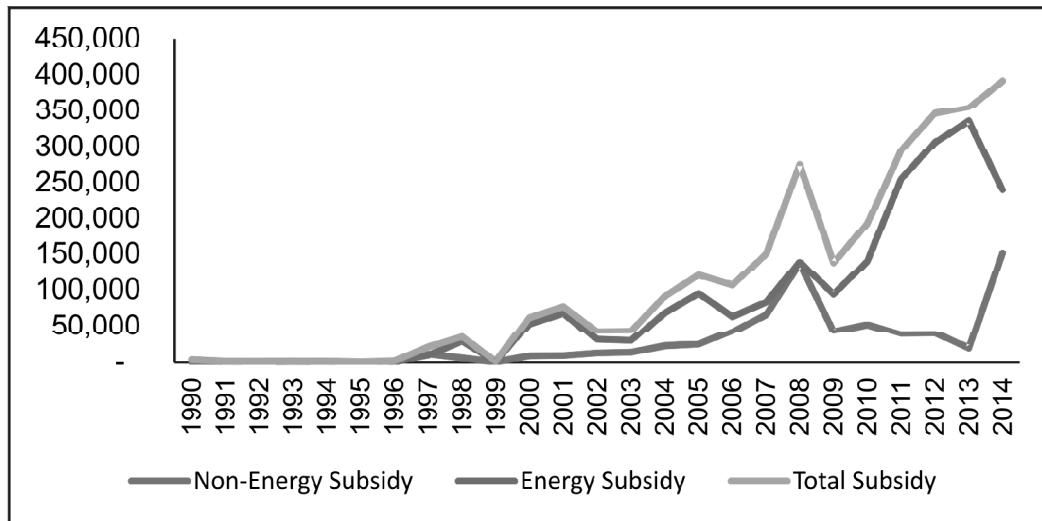


Figure 2: The Development of Subsidy in Indonesia (in Billion) 1990-2014

Source: Ministry of Finance and Bank Indonesia 2015

subsidies in the last few years is contrary to the policy of energy subsidies. The government in the period of 2009-2013 has been less instrumental in fostering food security policy. However, in the early 2014, government is inflated the budget of non-energy subsidy with the growth of 683.87% and decreasing the energy subsidy of -28.5% from the previous year.

Based on the above explanation, the government should be able to achieve food security to improve national resilience. Such situation will be favorable to food security, the national economy, and even national security. Thus the policy of non-energy subsidies are intended to assist farmers so that farms can be run continuously and be able to achieve national food security. Therefore, there is a need to investigate the impact of non-energy subsidies to food security, as it will affect the productivity, the price of rice and rice consumption in Indonesia.

LITERATURE REVIEW

The Concept of Food Security

Map of Food Insecurity is a thematic map showing the existence of food insecurity in a region that indicated by 10 indicators and grouped into three aspects / dimensions of food security, namely Dimension Food Availability, Food Access, and Food Consumption, Health, and Nutrition. These three dimensions have an enormous influence on the occurrence of chronic food insecurity that requires long-term treatment.

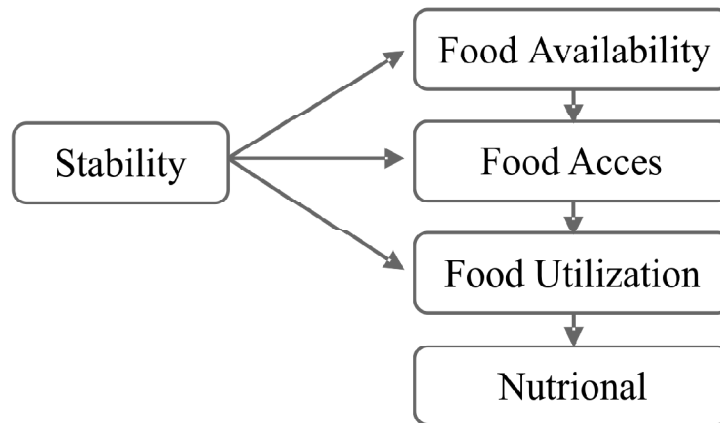


Figure 3: Food Security Scheme

Correspondingly, transient food insecurity is the result of natural disasters, namely the potential areas / vulnerable to natural disasters and require short-term treatment. Food vulnerability, which resulted in the occurrence of food insecurity transient is included in the dimensions of food security and influenced by the percentage of areas without trees, the percentage of the area affected by *puso*, the percentage of areas prone to floods and landslides, as well as fluctuations in rainfall (Ariani, 2006).

Subsidy Policy

The role of government is needed to influence decisions of producers, consumers and the perpetrators of the marketing order to ensure agricultural development as planned, it can be called as well as agricultural policy or agricultural policy (Hanafie, 2010). One of the goals of the government's role is to break the vicious circle of poverty. Correspondingly, the problem that occurred in Indonesia is a resource that is not managed properly. On one hand, most of Indonesian are working mainly in agricultural sector that is unproductive. The existence of dualism economy between modern sector (that follows market economy) and traditional sector (that follows subsistent economy), as well as the high level of population growth is accompanied by low human resource quality.

Furthermore, government policy related to domestic production of a commodity in terms of price policy and input and output trade are intended to increase the competitiveness of the commodity in domestic market. This is intended to induce domestic producer to utilize domestic resources intensively to increase the added value. In addition, price policy concerning agricultural products and the increase farmers' income can be achieved by subsidizing the means of production such as fertilizers or pesticides. These subsidies have the effect of

lowering production costs as in economic theory there is a shift of the supply curve to the right. Subsidy is the provision of government to producers to reduce production costs that were borne by the manufacturer. The subsidies can lower the price to the extent to which the amount of profits earned by their buyers with subsidy is dependent on the magnitude of price reductions (Sukirno, 2005).

In line with this, a subsidy is defined as partial payment of the price by the government so that domestic prices are lower than the average cost of making a commodity or international prices. According to Hanafie (2010), there are two kinds of subsidies, namely the price subsidy of production and price subsidy of production factors, namely: (1) price subsidy of production; where the goal is to protect consumers in the country, meaning that domestic consumers can buy items that cost less than the average cost of making commodities or international prices. To increase the production of agricultural products, especially rice, governments subsidize the prices of factors of production, such as fertilizers, pesticides and seeds. Subsidies for rice farming which is borne by the government is very large, such as the costs incurred by the government to import or manufacture of fertilizers in the country; (2) Price subsidy of production factors; the goal is to help farmers to purchase fertilizer that is relatively expensive, therefore, farmers can get loans with relatively low interest. The difference between the actual bank interest with the interest that should be borne by farmers is paid by the government in the form of subsidies to farmers.

Procurement of subsidized fertilizer will increase the efficiency of farming, which has implications for the improvement of land use and the use of seeds that have synergistic effect on increasing agricultural production. Furthermore, the increase in production cost is subsidized and stable output prices causes the increase in farmers' income. Both of these will affect the availability and accessibility aspects, so it will affect the food security status.

METHODOLOGY

This research uses secondary data in the period 1990-2014 that were obtained from official agencies, namely the Central Bureau of Statistics and the Food Security. The technical analysis in this study uses econometric approach by developing a simultaneous equation model to see the impact of non-energy subsidies (agriculture) to food security, while the model specification are as follows:

Production Model

$$\text{LNQR}_t = a_0 + a_1 \text{LNPRR}_t + a_2 \text{LNCR}_t + a_3 \text{LNSNE}_t + a_4 \text{LNWF}_t + a_5 \text{LNPRM}_t + a_6 \text{LNLA}_t + e_{1t} \quad (1)$$

Price of Rice Model

$$\text{LNPRR}_t = b_7 + b_8 \text{LNQR}_t + b_9 \text{LNCR}_t + b_{10} \text{LNSNE}_t + b_{11} \text{WF}_t + e_{2t} \quad (2)$$

Consumption Model

$$\text{LNCR}_t = c_{12} + c_{13} \text{LNSNE}_t + c_{14} \text{LNPRR}_t + c_{15} \text{LNPOP}_t + c_{16} \text{LNGDP}_t + e_{3t} \quad (3)$$

Non-Energy Subsidy Model

$$\text{LNSNE}_t = d_{17} + d_{18} \text{LNPRR}_t + d_{19} \text{LNCR}_t + d_{20} \text{LNQR}_t + d_{21} \text{LNLA}_t + e_{4t} \quad (4)$$

Where :

- SNE_t : Non Energy Subsidy
 QR_t : Production of Rice
 PRR_t : Price of Rice
 PRM_t : Price of Fertilizer
 LA_t : Land Area
 CR_t : Consumption of Rice
 WF_t : Wage of Farmer
 GDP_t : Gross Domestic Product
 POP_t : Population

RESULTS AND ANALYSIS

Indonesia is one of the world's largest rice producing country in 2014, in which the first rank is occupied by the China, the second is India. In terms of rice production (paddy production), Indonesia is only able to produce 11.73% out of the total of five biggest nations of rice production, followed by Bangladesh and Vietnam. Production of rice in China is almost dominating the world market, which is amounted up to 46.39 percent. Currently, the rice market orientation in China has encouraged a shift towards the production of high quality rice, which is

Table 1
Five Biggest Paddy (Rice) Producers in the World 2014

<i>Country</i>	<i>Paddy Production (ton)</i>	<i>Share</i>
China	280,100,000	46.39
India	155,500,000	25.76
Indonesia	70,847,000	11.73
Bangladesh	52,400,000	8.68
Vietnam	44,900,000	7.44
Total of Production	603,747,000	100

Source: FAOSTAT, December 2014

different to Vietnam that follow liberal policy system of rice sector. Minot and Gulotti (2000) see a decline in the overall poverty rate significantly following the liberalization policy of the rice sector.

There is an interesting fact that the rice market is actually very little among international trade. According to research conducted by World Bank (2011), only 5 percent of global rice production is traded on the international market and it implies that the price of rice is vulnerable to changes in supply and demand. Moreover, the international rice supply comes from only three countries of rice exporters, namely Thailand, India and Vietnam. Changes in trade policy in the three exporting countries could lead to hoarding and speculation by importing countries rice, and because it can significantly raise the price of rice with dangerous risks for worsening poverty in Asian countries (where rice is the staple food for poor people).

This situation occurred in 2008 when the price of rice increased significantly and therefore the level of poverty in Asia is also increased. In response to this situation, many countries in Asia have signed agreements of ASEAN Plus Three Emergency Rice Reserve (APTERR) which provides that a total of 0.78 million tons of rice will be kept together by the participating countries (ASEAN countries plus Chinese People's Republic, Japan and the Republic of South Korea) to be used as a response to the international rice price volatility or when needed due to natural disasters or other humanitarian assistance. The most significant contribution of rice in this agreement come from China, Japan and South Korea.

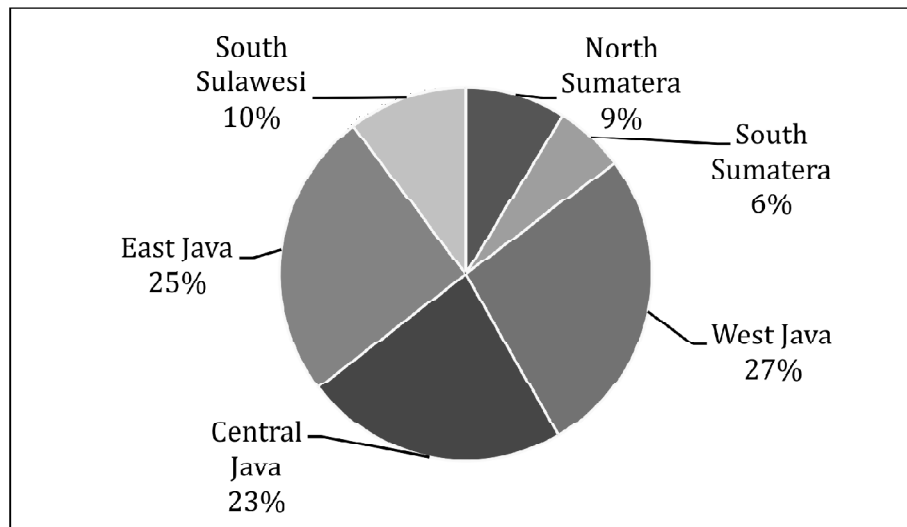


Figure 4. Average Share in Six Biggest Provinces on Rice Production in Indonesia 1990-2014

Source: Central Bureau of Statistics (BPS Indonesia)

Although Indonesia is the third largest country in the world of rice production, Indonesia still remains a rice importing countries. This situation is caused by farmers that are using less optimal agricultural techniques and there is a high consumption of rice per capita (by a large population). In fact, Indonesia has the highest per capita consumption of rice in the world. Everyone in Indonesia consumes about 140 kilograms of rice per year. Small farmers contributed about 90% of the total rice production in Indonesia; each farmer only owns land less than 0.8 hectares on average.

Rice production in Indonesia is quite large compared to other countries in the world, but when compared with the total population is still very little, almost every year Indonesian rice production is deficit. This indicates that the productivity of farmers in Indonesia is still very low. Many factors cause the low productivity, among others such as grain prices and wages are quite low, and vast rice fields that have not been productive. Besides rice production can also be affected by other factors such as seeds used and the structure of dry land.

Figure 4 above shows that there are 6 (six) largest province which produces rice in Indonesia, an area that has the highest production is the provinces of West Java with a contribution of 27 percent, and followed by East Java (25%), Central Java (23%) and South Sulawesi (10%). Furthermore, in Sumatera, South Sumatera and North Sumatera has the highest rice contribution of 9% and 6%, respectively. But such production is not comparable to requests from the demand of the community to rice. It needs to become a serious concern for the government because the demand for rice in Indonesia continues to increase, but on the other side of rice production grew slower than consumption. Government policy in Indonesia is only focused on the production side and in another hand, the price of grain at the level of farm is low.

Estimation Results of Rice Production Model

The estimation results of rice production (the effect of rice price, consumption, non-energy subsidy, wage, fertilizer price and the size area on rice production) is briefly presented in Table 2, as follows:

Table 2 shows that, simultaneously, the rice price, consumption, non-energy subsidy, wage, fertilizer price and the size area have significantly effect the rice production in Indonesia. Partially, variable that is significant on $\alpha=10\%$ in affecting rice production in Indonesia are price of rice (LNPRR), price of fertilizer (LNPRM), and consumption (LNCR), meanwhile, subsidy (LNSNE), the level of wage (LNWF) and the size area (LNLA) are not significant in affecting rice production in Indonesia.

The price of rice is partially affecting the rice production in positive way. The higher the price of rice encourages farmers to cultivate more intensively to their

Table 2
Estimation Results of Rice Production Model

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	16.05881	0.645192	24.88998	0.0000
LNPRR	0.175747	0.069271	2.537081	0.0220
LNPRM	-0.177733	0.085175	-2.086677	0.0533
LNCR	1.09E-05	5.91E-06	1.843311	0.0839
LNSNE	0.007416	0.017797	0.416711	0.6824
LNWF	0.140843	0.166720	0.844787	0.4107
LNLA	2.09E-06	4.01E-06	0.522503	0.6085
R-squared	0.848653	Mean dependent var		17.37174
Adjusted R-squared	0.791899	S.D. dependent var		0.134329
S.E. of regression	0.061278	Sum squared resid		0.060080
F-statistic	15.97288	Durbin-Watson stat		1.280091
Prob(F-statistic)	0.000006	Second-Stage SSR		0.037101

Source: Data Analysis Results

farm, but the elasticity is relatively inelastic. The price of fertilizer is significantly negative in affecting the rice production in Indonesia. This indicates that the higher the price of fertilizer, the lower the rice production and vice versa. The significance of rice price indicates that the role of fertilizers encourages the increase in productivity of rice fields in Indonesia. Moreover, the rice consumption is positively significant in affecting the rice production, meaning that the increase in consumption will increase the production of rice. This condition can be solved by rising the demand in order to induce producers in increasing their rice production.

The subsidy (LNSNE) at $\alpha=10\%$ partially is found to be insignificant in affecting the rice production in Indonesia. This condition indicates that rice subsidy given by the government is failed to induce rice production in Indonesia. Furthermore, the level of wage (LNWF) partially is also found to be insignificant in affecting rice production. This shows that most of the workforce in agricultural sector does not induce the change in the rice production in Indonesia. This may be due to the fact that most of the workforce is family workforce. Lastly, the size area (LNLA) also does not significantly influence the rice production in Indonesia. This may be caused by the small area of farm owned by the farmers or they are still managed traditionally.

Estimation Results of Rice Price Model

The estimation results of rice price model (the effect of rice price, consumption, non-energy subsidy, wage, fertilizer price and the size area on price of rice) is briefly presented in Table 3, as follows:

Table 3
Estimation Results of Rice Price Model

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	-46.74485	15.47465	-3.020737	0.0073
LNQR	2.546433	0.963343	2.643331	0.0165
LNWF	1.132920	0.273098	4.148402	0.0006
LNCR	3.52E-05	2.87E-05	1.224144	0.2367
LNSNE	-0.016828	0.065082	0.258559	0.7989
R-squared	0.960414	Mean dependent var		7.990652
Adjusted R-squared	0.951617	S.D. dependent var		1.002136
S.E. of regression	0.220432	Sum squared resid		0.874623
F-statistic	111.3251	Durbin-Watson stat		1.229522
Prob (F-statistic)	0.000000	Second-Stage SSR		0.456865

Source: Data Analysis Results

Partially, variables that are found to be significant at $\alpha=10\%$ in influencing the price of rice in Indonesia are rice production (LNQR) and the level of wage (LNWF), meanwhile, rice consumption (LNCR) and subsidy (LNSNE) are found to be insignificant in affecting the price of rice.

The production of rice, partially and positively, affects the price of rice. This is inconsistent with the general theory that believe the increase in production will lead to the decrease in price due to the excess supply. The effect of rice production on the price of rice is positive due to the success of government in intervening the price. When the production increases, the government buys production output at floor price, hence maintaining price stability. Furthermore, the level of wage is partially and significantly positive in affecting the price of rice in Indonesia. This is somewhat understandable since the wage is one of the elements of production costs in producing rice, therefore, by increasing the wage, the total cost production will also increase and is compensated as the price of rice.

The consumption of rice partially is found to be insignificant in affecting the price of rice. This is caused by the growth of rice consumption that is still less than on the growth of rice availability on average in Indonesia, hence, the fluctuation of rice consumption does not affect on the price of rice. Another determining factor is the success of government policy in maintaining price stability by implementing buffer stocks. Moreover, subsidy (LNSNE) at $\alpha=10\%$ partially does not have affect the price of rice significantly. This indicates that subsidy given by the government is fail to influencing the fluctuation of price of rice directly. This is understandable due to the indirect price subsidy given by the government.

Estimation Results of Rice Consumption Model

The estimation result of rice consumption model (the effect of rice price, non-energy subsidy, population and gross domestic product (GDP) on rice consumption) is

briefly presented in Table 4. Simultaneously, the price of rice, subsidy, population and gross domestic product are significant in affecting rice consumption in Indonesia.

Table 4
Estimation Results of Rice Consumption Model

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	19.07637	17.56617	1.085972	0.2911
LNPRR	-2.414183	1.113578	-2.167951	0.0431
LNSNE	0.063204	0.021314	2.965433	0.0079
LNPOP	0.092759	0.089590	1.035380	0.3135
LNGDP	3.08E-12	1.05E-12	2.924940	0.0087
R-squared	0.446282	Mean dependent var		75.20632
Adjusted R-squared	0.329709	S.D. dependent var		35.99032
S.E. of regression	2946.574	Sum squared resid		1.65E+08
F-statistic	6.100422	Durbin-Watson stat		2.276611
Prob (F-statistic)	0.002478	Second-Stage SSR		86.05711

Source: Data Analysis Results

Partially, the price of rice is significantly negative in affecting rice consumption in Indonesia. This indicates that the higher the price of rice, there is a tendency of rice consumption to decrease. Moreover, the government subsidy is significantly positive in rice consumption indicating that the higher the subsidy the higher the rice consumption in Indonesia. This is understandable because due to the subsidy from the demand side causes the increase in customer's purchasing power and also from the supply side, the availability of rice in price occurred.

The population partially and significantly (although relatively low) affects the rice consumption. The relatively low effect of population in influencing rice consumption in Indonesia is caused by the tendency of rice consumption per capita to decrease per year. Even though the number of population is growing, the consumption of rice growth is relatively not as high as the population growth. Moreover, the GDP is partially and significantly positive in influencing the rice consumption in Indonesia. This indicates that rice is a normal (staple) food in Indonesia.

Estimation Results of Subsidy Model

The estimation result of subsidy model (the effect of rice price, rice consumption, rice production and size area on the non-energy of subsidy) is briefly presented in Table 5. Simultaneously, the price of rice, consumption of rice, rice production and size area affect the number of subsidy given by the government.

Table 5
Estimation Results of Subsidy Model

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	12.08732	11.31706	1.068062	0.2996
LNPRR	2.435037	0.673013	3.618113	0.0020
LNCR	6.167085	8.122446	0.759264	0.4575
LNQR	0.185786	5.077658	0.036589	0.9712
LNLA	3.97E-05	7.98E-05	0.496820	0.6253
R-squared	0.752742	Mean dependent var		29.74435
Adjusted R-squared	0.697796	S.D. dependent var		2.209975
S.E. of regression	1.214892	Sum squared resid		26.56734
F-statistic	13.69960	Durbin-Watson stat		2.235190
Prob (F-statistic)	0.000027	Second-Stage SSR		26.56734

Source: Data Analysis Results

Partially, the price of rice is positively significant in affecting the number or subsidy given by the government. This indicates that the higher the price of rice, the higher subsidy will be given by the government. This condition shows that government is paying attention especially in maintaining price stability; therefore, government establishes policy in giving subsidy to maintain the stability of rice price. Moreover, rice consumption, rice production, the size area, its significance is relatively low indicating that the main reason in government subsidy is to maintain price stability.

CONCLUSIONS

1. The rice production in Indonesia is determined by the price of rice, the price of fertilizer and rice consumption.
2. The price of rice is very much dependent to the rice production and the level of wage in agricultural sector.
3. The rice consumption is determined by the price of rice, subsidy and gross domestic product.
4. Government subsidy is affected by the price of rice.

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