POLITICAL ECONOMIC ANALYSIS OF RICE SELF-SUFFICIENCY IN INDONESIA

Analis...y of Rice Self-Sufficiency in Indonesia

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ABSTRACT

Rice self-sufficiency is an important programme in Indonesia. The programme has four major targets, i.e. increasing production, stabilizing prices and reserve stocks, and minimizing import. For that purpose, the government gave a mandate to a parastatal, namely National Logistic Agency (Bulog) in implementing the rice policies. Some studies found that involvement of such a parastatal could lead to government failure in budget allocation. The study aimed to estimate social cost of rice self-sufficiency programme based on the implementation of rice instrument policies by Bulog. The study used the national annual data of 2002–2014 period. The method used was the political preference function model to estimate economic rent and dead-weight loss using rice price elasticity of demand and supply. The result showed that in terms of percentage of food security budget, the average of economic rent reached IDR 6.37 trillion per annum (18.54%), while the average of dead-weight loss amounted at IDR 0.90 trillion per annum (2.34%). It proved that rice self-sufficiency programme along with the involvement of Bulog was economically inefficient. The government should provide better agricultural infrastructure, review governmental procurement prices, and stop rice import policy to remedy market failure.

[Keywords: budget, policy, rice, self-sufficiency]

INTRODUCTION

Rice self-sufficiency policy is an important part of agricultural development programme in Indonesia (Baharsjah et al. 2014). Therefore, the government implements policy instruments to achieve self-sufficiency targets, i.e. to increase the national production, to stabilize the domestic prices and reserve stocks, and to minimize the import. For that reasons, the government intervenes the domestic rice market by implementing rice policy instruments. In addition, the government involves a parastatal, namely National Logistic Agency or Bulog to execute the rice policy instruments along with the implementation of rice-self sufficiency programme.

From the economic perspectives, self-sufficiency policy is inefficient (Barker and Hayami 1976), and being burden to the economy (Hutagaol 2017). The objective of such policy to increase rice production will imply on budget allocation. Therefore, some criticisms appeared assessing the programme. Involvement of Bulog in implementation of the rice policy instruments lead to the government failure, especially in budget allocation (Wambua et al. 2005; Zvavahera and Ndoda 2014) because operational activities of the parastatal is funded by the government (McCulloch and Timmer 2008). Hence, involvement of Bulog to accomplish the price stabilization and import policy received criticisms.
Bulog conducts buying and selling activities likewise the general rice traders, but Bulog uses the governmental prices. Moreover, Bulog manages the government reserve-stocks that come from domestic procurement and import of medium-quality rice. The general rice traders are not allowed to import medium-quality rice. Therefore, both instrument policies are concerned as privilege for Bulog because those are not given to the others. Such policy may trigger rent-seeking activities of the related one that have an impact on inefficiency of the programme and is concerned as the social cost of the policy. In addition, Bulog distributes rice for the poor (Raskin) as a subsidy to the poor family and this is concerned as the distribution activity. Moreover, during Susilo Bambang Yudhoyono administration, the distribution of Raskin tended to increase. Therefore, it is crucially necessary to investigate the effectiveness of the pro-poor policy.

Because of the reason above, the criticisms come regarding the inefficiency issue and rent-seeking activities in accordance with the implementation of rice self-sufficiency programme and involvement of Bulog in the programme. However, none of the criticisms come with quantitative data to prove their arguments. Many studies related to rice self-sufficiency programme have been conducted, but there was no empirical one that could provide quantitative data to support the criticisms on self-sufficiency programme and involvement of Bulog. A political economic study was then conducted to prove the criticisms. The study aimed to estimate social cost of rice self-sufficiency programme along with the implementation of price instrument policies and import policy by Bulog.

**METHODOLOGY**

**Time, Location and Data Collection**

This study was conducted in 2016 using secondary data on the national level of Indonesia. The average of annual data started from 2002 to 2014 consisting of rice market data and macroeconomic indicators. The data comprised of domestic rice production (kg), national rice consumption (kg), nominal consumer rice price, nominal consumer price of rice substitute, i.e. maize (kg), consumer price index, nominal producer rice price (IDR kg⁻¹), producer price index, milling cost of medium rice (IDR kg⁻¹), CIF import price (IDR kg⁻¹), import tariff of rice (IDR/kg), governmental procurement price (IDR kg⁻¹), sale price of rice (IDR kg⁻¹), tonage of Bulog’s rice procurement and distribution (kg), and tonage of imported rice (kg).

The macroeconomic indicators comprised of real national income per capita (IDR), exchange rate of rupiah to US dollar (IDR/USD), and import tariff of rice. Besides, the budget of food security (IDR) was used as the approach of the budget of rice self-sufficiency programme. The sources of the data were the BPS-Statistics Indonesia, the Central Bank of Indonesia (BI), the Ministry of Agriculture and the Ministry of Finance, Republic of Indonesia.

**Political Weight Estimation**

The role of the government in agricultural sector is being the regulator, subsidy provider and tax collector (Ortiz 1999). The government intervenes the commodity market to allocate the resources by implementing policy instruments to achieve the targets of the policy. In which, political preference of the government is very important in formulating the policy (Swinnen and Zee 1993), because in a commodity market there are many vested interest groups involved in the market (Barret 1999). Political preference of the government to the vested interest groups is indicated by the political weight. Furthermore, political weight indicates the lobbying power of vested interest groups. During policy formulating process, the vested interest groups compete each other to influence the policy maker in order to get benefit from the policy (Rausser and Roland 2009).

By hypothesis that the government as the policy maker has a welfare function with subject to a certain political weight of each vested interest group, for example the producer, consumer, and tax payer, comprising a simple political preferential function is as follows (Johnson 1995):

\[
W = w_pG_p + w_cG_c - w_tL_t
\]

Where \(w_p\), \(w_c\) and \(w_t\) are political weights of the producer, consumer and tax payer, while \(G_p\), \(G_c\), and \(L_t\) are the welfare resulted from the policy. To stabilize the domestic price, the government applies price support policy. This policy will give benefit to the producer and consumer, while the tax payer will get loss (Figure 1). The loss of the tax payer is showed by ABE area and known as dead-weight loss (DWL). The welfare function of the price support policy related to the self-sufficiency programme can be defined as follows:

\[
W = (w_p - w_t)G_p + (w_c - w_p)G_c - w_tDWL_t
\]

where,

\[
P_{EAP, p} = G_p
\]

the change of producer surplus.
Political economic analysis of rice self-sufficiency... (Sri Nuryanti et al.)  

The dynamic-oligopoly model of demand (Equation 3) and supply relation (equation 4) was then used to estimate the elasticity of demand (equation 5 and 6) and supply (equation 8 and 9). Afterwards, the generated economic rent and dead-weight loss based on the implementation of the price policy and import policy were calculated using equation 10 and 11. The value of the economic rent and DWL were then transformed into percentage of the budget and concerned as the social cost of the programme.

\[
\Delta Q_d = \alpha_0 + \alpha_{Pd} \Delta P_d + \alpha_{\gamma} \Delta Y + \alpha_{\alpha} \Delta Z + \alpha_{\gamma} \Delta P_d + \gamma \{Q_d, Y, Z, \} + \beta_d D + \theta_{\gamma} Y + \theta_{\alpha} Z + \theta_{\gamma} P_d + \omega Z + \upsilon + \xi P_d + \lambda Q_d + \Delta W + \lambda Q_d^* + \beta_{Pd} \Delta P_d + \psi \{Q_d, Y, Z, \} + \beta_d D + \upsilon + \xi P_d + \lambda Q_d^* \quad (3)
\]

Equation 3 is the dynamic-oligopoly rice demand model, where

- Qd = rice demand (kg),
- Pd = consumer price (IDR kg⁻¹),
- Y = national income per capita (IDR),
- Z = consumer price of rice substitute (IDR kg⁻¹),
- PY = multiplication between Pd and Y, the shifting variable of demand,
- PZ = multiplication between Pd and Z, the rotation variable of demand,
- D = dummy variable of the governmental period, D = 0 for 2001-2003; D = 1 for 2004-2014,
- α0 = intercept,
- α_{Pd}, α_{\gamma}, α_{\alpha}, α_{\gamma}, α_{\upsilon}, α_{\theta} = estimated coefficients of the long-run parameters,
- U_t = error term,
- θ_{Pd}, θ_{\gamma}, θ_{\alpha}, θ_{\gamma}, θ_{\upsilon}, θ_{\theta} = estimated coefficients of the short-run parameters,
- γ = adjusted parameter from short-run to long-run, the estimated coefficient of the autoregressive distributed lag (ADL) model.

\[
\Delta P_s = \beta_0 + \beta_{Pd} \Delta P_d + \beta_{\gamma} \Delta Y + \beta_{\alpha} \Delta Z + \beta_{\gamma} \Delta P_d + \gamma \{Q_s, Y, Z, \} + \beta_{Pd} \Delta P_d + \psi \{Q_s, Y, Z, \} + \beta_d D + \upsilon + \xi P_d + \lambda Q_s^* \quad (4)
\]

Equation 4 is the dynamic-oligopoly rice supply model, while equation 5 is reflecting the relation between demand and supply response in the oligopolistic market, where:

- Ps = producer price (IDR kg⁻¹),
- Qs = rice supply (kg),
- W = rice milling cost (IDR kg⁻¹),
- D = dummy variable representing the governmental period.

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**Price Elasticity Estimation**

This study was conducted using a political preferential function model to illustrate the objective of the government of Indonesia to maximize social welfare of the producer, consumer and government in the rice market. The analysis was started by testing the variables integration order. It used the Augmented Dickey-Fuller’s unit root test. The only stationary and free ones from unit root were then used in the following step, i.e. estimation of rice demand and supply relation.

Since the analysis focused on the involvement of Bulog in rice procurement and distribution in the domestic market, hence the other traders were assumed as another group as non-Bulog. As a result, the market structure of domestic rice was assumed as an oligopoly market. For that reason, a dynamic-oligopoly model adopted from Bresnahan (1982) and Lau (1982) that had been modified by Steen and Salvanes (1999) was then utilized to estimate the rice demand and supply relation. Since Bulog only conducted procurement and distribution of medium-quality rice, therefore, this study focused on this rice category and excluded the premium rice imported by the registered importers that might come from the general rice traders.
V_t = error term,
β_0 = intercept,
β_{QS}, β_{W}, β_{PS}, β_{D} = estimated coefficients of long-run parameters,
ξ_{QS}, ξ_{W}, Λ = estimated coefficients of short-run parameters,
ψ = adjusted parameter from short-run to long-run, the estimated coefficient of the autoregressive distributed lag (ADL) model,
λ = long-run market power,
𝛬 = short-run market power.

Following the estimation of rice demand and supply relation, price elasticity of rice demand was calculated using the formula developed by Steen and Salvanes (1999), while price elasticity of supply was computed using the equation developed by Zaini (2011) since Steen and Salvanes' model did not provide it.

\[(\eta_{SP}) = \frac{P_{W} - P_{D}}{Q_{D}} \] (6)
\[(\eta_{LS}) = \frac{\Theta_{S} + \Theta_{PS} + \Theta_{PS}}{P_{D}} \] (7)
\[(\epsilon_{SR}) = \frac{\alpha_{S} + \alpha_{PS} + \alpha_{PS} + \lambda}{P_{D}} \] (8)
\[(\epsilon_{LR}) = \frac{\Theta_{S} + \Theta_{PS} + \Theta_{PS} + \lambda}{P_{S}} \] (9)

Equation (6) is the short-run price elasticity demand of rice and equation (7) is the long-run price elasticity of demand. Meanwhile, equation (8) is the long-run price elasticity of supply and equation (9) is the long-run price elasticity of supply.

Social Cost Estimation

Along with the implementation of price instrument policies, the government conducts import policy to fulfill the reserve stock. When the government does not apply import tariff, the domestic price will be similar to the world price \((P_w = P_d)\), the national consumption is \(ac\), and the import volume is \(df\) (Figure 2b) or \(bc\) (Figure 2a). In terms of rice self-sufficiency policy, the government applies import tariff \((t)\) and import quota to provide price incentive to farmers to cultivate rice. Therefore, the domestic price increases from \(P_u\) to \(P' u\).

Since the import tariff \((t)\) and import quota applied, the national demand for imported rice shifts to the left from \(ES\) to \(ES^*\), crossing the supply curve \((ES)\) at \(e\) (Figure 2b). Hence, the volume of imported rice decreases from \(df\) to \(de\) and the \(P_d\) (Fig. 2a). The increasing domestic price will increase domestic production from \(ab\) to \(gh\) (Figure 2a), decrease consumption from \(ac\) to \(gj\), and decrease import volume from \(bc\) to \(hj\). On the other hand, the government receives revenue from the import tariff. It is represented by the \(dekl\) area (Figure 2b). Since the import quota is binding, therefore, the import volume is \(ES^*\). Seeing that the import policy is such a privilege for Bulog, thus the government will not receive more revenue from the import quota (Houck 1986). As a result of the two rice policies, the economic rent generates in the rice market, starting from the production side to the import side as follows (Jula and Buneci 2013):

\[\text{TER} = \{(P_S - P_w) Q_s\} + \{(P_S - P_w) M\} + \text{DWL}\] (10)
\[\text{DWL} = \frac{\eta_{SP}(P_S - P_w)^2}{2P_s} Q_d\] (11)
Where \( TER \) is the total economic-rent or the value of social cost, \( P_p \) is the producer price, \( P_w \) is the import price, \( Q_s \) is the rice supply, \( M \) is the volume of imported rice, \( DWL \) is the welfare loss represented by the value of dead-weight loss, \( \eta_{SR} \) is the elasticity of demand in the short-run, and \( Q_d \) is the rice demand.

### RESULTS AND DISCUSSION

#### Political Weight

The political weight of the vested-interest group in Indonesia rice market was calculated using Johnson (1995). The result showed that the government received the highest political weight, followed by the rice producer, then the rice consumer (Table 1). This result indicates that the implemented rice policy instruments are biased to the government rather than to the rice producer and consumer. It means that political preference of the government to Bulog is high. It proves that Bulog as the representative of the government received the highest political preference.

#### Price Elasticity

Based on the stationary test, the variable data were stationary in the first different. These data were then tested in the integration order. Afterward, estimation of rice demand and supply relation was conducted to compute price elasticity of rice demand and supply using a dynamic-oligopoly model. Estimation of dynamic-oligopoly model of demand showed that the rice demand was inelastic (Table 2) indicated by the price elasticity of demand \( \eta_{SR} = -0.1122; \eta_{LR} = -0.1415 \). It emphasized that rice is the main staple food in Indonesia and could not be substituted by maize \( (\alpha Z = -9.46E+08) \). Maize was being complement to rice. When the maize price increased, the rice demand decreased. This finding implied that food diversification programme from rice to non-rice did not work well in the implementation.

Estimation of dynamic-oligopoly model of supply relation revealed that rice price was the only factor affecting farmers to cultivate rice. It was indicated by the short-run price supply elasticity, i.e. \( \varepsilon_{SR} = 1.4310 \) (Table 3). Hence, rice production could increase and rice price might be profitable for the producer and payable for the consumer. The implemented rice policies in the rice market could be a mechanism of income transfer from the producers to the consumers through the price mechanism.

### Social Cost Estimation

In accordance with the implementation of rice self-sufficiency programme, the Government of Indonesia allocated budget for food security programme. In the budget data, there was no specific closure mentioning rice self-sufficiency programme. However, most of expenditure was provided to support the achievement of rice self-sufficiency. Therefore, the budget of food security was then used for the approximation of budget of rice self-sufficiency programme.

The government distributed the budget through two ministries, i.e. the Ministry of Public Work and Public Residence and the Ministry of Agriculture. The budget was grouped into three types, i.e. subsidy, government expenditure and transfer to the regional governments. The subsidy was provided in terms of food subsidies, fertilizer, seeds and credit interest. The government expenditure was provided in kind of government rice-reserve stock, food stabilization reserve, national seed reserve and food security reserve. On the regional level, the budget was allocated for irrigation and other agricultural activities through the transfer mechanism.

During the analysis period, the budget tended to increase from IDR 10.26 trillion in 2002 to more than IDR 67.78 trillion in 2014 (Appendix 1). It showed a positive growth rate of 18.36% per annum. On the other hand, the level of rice self-sufficiency ratio achieved 0.99 (99%) on average and tended to decrease by 0.02% per annum (Table 4). This findings showed that Indonesia faced an on-trend self-sufficiency. It indicated that import was taken place to fulfill the reserve stock and to meet the domestic demand.

In the mean time, estimation of political economic function model showed that during the implementation of the price instrument policies and import policy, the economic rent and DWL generated considerably. The economic rent fluctuated between IDR 1.89 trillion and IDR 14.49 trillion, reached IDR 6.37 trillion on average, and tended to increase by 12.94% per annum during 2002–2014 (Table 1). The economic rent reached 18.54% of the budget, but the proportion tended to decrease by 5.41% per annum during 2002–2014. In addition, the DWL fluctuated between IDR 0.09 trillion

| Vested interest group | Political weight |
|-----------------------|-----------------|
| Producer \( W_p \)    | 0.5375 \( (17.67\%) \) |
| Consumer \( W_c \)    | 0.2324 \( (7.67\%) \) |
| Government \( W_g \)  | 2.2401 \( (74.67\%) \) |
and IDR 2.72 trillion, reached IDR 0.90 trillion on average, and tended to increase by 16.94% per annum during 2002–2014 (Table 1). The DWL achieved 2.34% of the budget, though the proportion tended to decrease by 1.42% per annum during the analysis period.

Based on the summing up between the economic rent and the DWL, from 2002 to 2014, on average 20.88% of the budget was lost and being the welfare lost and could not benefit neither the producers, the consumers, nor the tax payers in the rice market. It became the social cost of the rice-sufficiency programme. Nonetheless, throughout the analysis period the magnitude of the social cost tended to decrease by 4.84% per annum (Table 4).

Table 2. Estimation result of dynamic-oligopoly demand function.

| Variable | Parameter Coefficient | St. Dev. | t-Statistic | Prob. |
|----------|-----------------------|----------|------------|-------|
| C        | $\alpha_c$            | 1.36E+10 | 2.78E+09   | 4.8957* | 0.0163 |
| $\Delta P_d$ | $\alpha_{Pd}$        | -6.10E+08| 85245803   | -7.1530** | 0.0056 |
| $\Delta Y$ | $\alpha_Y$            | 722.0440 | 151.5221   | 4.7653*  | 0.0176 |
| $\Delta Z$ | $\alpha_Z$            | -9.46E+08| 9.16E+08   | -4.8225* | 0.0170 |
| $\Delta P_Y$ | $\alpha_{P_Y}$       | -20.7517 | 3.218325   | -6.4480** | 0.0076 |
| $\Delta P_Z$ | $\alpha_{P_Z}$       | 26162996 | 5172820.   | 5.0578*  | 0.0149 |
| $\Delta Q_d$ | $\alpha_{Q_d}$        | -1.7735  | 0.300563   | -5.9066** | 0.0097 |
| D        | $\alpha_D$            | -2.30E+09| 4.32E+08   | -5.3178* | 0.0130 |
| $U_{o-t}$ | $\gamma$              | -0.322197| 0.094080   | -3.4247* | 0.0417 |

R-squared 0.9569

Long-run parameter

| Parameter Coefficient | St. Dev. | t-Statistic | Prob. |
|-----------------------|----------|------------|-------|
| $P_{d,t}$ | $\Theta_{Pd}$ | 7.14E+08 |
| Y          | $\Theta_Y$  | 246.1786   |
| Z          | $\Theta_Z$  | 8.18E+08   |
| $P_{Y,t}$ | $\Theta_{P_Y}$ | 0.9033 |
| $P_{Z,t}$ | $\Theta_{P_Z}$ | -1.7776 |

Elasticity

| Short-run | Long-run |
|-----------|----------|
| $\eta_{SR}$ | -0.1122  |
| $\eta_{LR}$ | -0.1415  |

*) Prob. < 0.90%; **) Prob. < 0.95%.

Table 3. Estimation result of dynamic-oligopoly supply function.

| Variable | Parameter Coefficient | St. Dev. | t-Statistic | Prob. |
|----------|-----------------------|----------|------------|-------|
| $\Delta Q_s$ | $\beta_{Q_s}$        | 9.42E-10 | 1.39E-09   | 0.6753 | 0.5247 |
| $\Delta W$   | $\beta_{W}$           | -0.9351  | 0.9033     | -1.0352 | 0.3405 |
| $\Delta Q^*$ | $\lambda$             | -0.0003  | 0.0003     | -0.9855 | 0.3624 |
| $\Delta P_s$ | $\beta_{P_s,t}$       | 0.0657   | 0.3800     | 0.1729  | 0.8684 |
| D        | $\beta_D$             | 17.4824  | 10.9106    | 1.6023* | 0.1602 |
| $V_{t}$  | $\Psi$                | -0.3040  | 0.1816     | -1.6742* | 0.1451 |

R-squared 0.4245

Long-run parameter

| Parameter Coefficient | St. Dev. |
|-----------------------|----------|
| $Q_{s,t}$ | $\varepsilon_{Q_s}$ | 1.82E-09 |
| $W_{s,t}$ | $\varepsilon_{W}$  | -0.5341  |
| $Q^*_{s,t}$ | $\Lambda$ | -0.0003  |

Elasticity

| Short-run | Long-run |
|-----------|----------|
| $\varepsilon_{SR}$ | 1.4310  |
| $\varepsilon_{LR}$ | 0.7406  |

*) Prob. < 90%. 

and IDR 2.72 trillion, reached IDR 0.90 trillion on average, and tended to increase by 16.94% per annum during 2002–2014 (Table 1). The DWL achieved 2.34% of the budget, though the proportion tended to decrease by 1.42% per annum during the analysis period.

Based on the summing up between the economic rent and the DWL, from 2002 to 2014, on average 20.88% of the budget was lost and being the welfare lost and could not benefit neither the producers, the consumers, nor the tax payers in the rice market. It became the social cost of the rice-sufficiency programme. Nonetheless, throughout the analysis period the magnitude of the social cost tended to decrease by 4.84% per annum (Table 4).
This findings gave the proof of the aforementioned criticisms that Bulog involvement in the implementation of rice policies has distorted the rice market. The evidence of both economic rent and DWL proved the existing rent-seeking activities in the domestic rice market. Intervention of the government by involving Bulog to stabilize rice price and reserve stock, and to import rice resulted in market failure. It was indicated by the generation of economic rent and DWL. It proved that rice self-sufficiency programme is obviously a high-cost policy.

In view of the fact, the privilege of Bulog has transformed economic structure of rice market. It changed rice market structure systematically from a perfect competition to an oligopoly competition. The actual market structure of rice market in Indonesia seemed like a competitive market. It was indicated by the free-entry to and the free-exit from the market, many market players and homogenous products. Nonetheless, intervention of the government through the implementation of price policy and import policy distorted the domestic market. The market distortion might relate to the protection level, intensity of political activity of the vested interest groups in the market, and influencing capability of those groups to the government (Masters and Garcia 2009; Swinnen and Zee 1993).

From the national point of view, rice market was being the mean to achieve the government objectives. The government implemented such policies to protect either the producers or the consumers. The government established the market intervention to maintain the affordable price in the domestic market (Timmer 1986). Nonetheless, import was carried out to remedy the increasing price because of the decreasing supply in the domestic market. On the other hand, execution of the price instrument policy and import policy distorted the domestic market. The increasing income of the producers would be lost because the consumer had to pay the higher price (Timmer 2004). It showed that the price stabilization policy had an impact on the income distribution among the vested interest groups in the rice market. Rashid et al. (2007) revealed that involvement of parastatal in food grain market intervention was no longer convincing. The cost of parastatal-led price stabilization was staggering and the price policies were being dictated by special interests. Reduction of the intervention could promote competition, reduce subsidies and release funds for development and anti-poverty programs - all without jeopardizing price stability.

From the governmental point of view, price stabilization is crucially important. The hiking price might lead to high inflation and triggered the occurrence of social, economic and political issues. For that reason, the government countered the hiking price by conducting an ad hoc import policy to remedy the inflation. The quantification of price instrument policy and import policy in the political preferential function model could describe the result of the market intervention. Generation of social cost occurred at the equilibrium of political economy that involved relevant vested interest groups in the market.

| Year | Food security budget (IDR trillion) | Rice self-sufficiency ratio | Economic rent (IDR trillion) | Dead weight loss (IDR trillion) |
|------|-----------------------------------|----------------------------|-----------------------------|-----------------------------|
| 2002 | 10.26                             | 0.97                       | 3.69                        | 35.95                       |
| 2003 | 13.47                             | 0.98                       | 3.71                        | 27.55                       |
| 2004 | 12.32                             | 1.00                       | 3.46                        | 28.05                       |
| 2005 | 13.17                             | 1.00                       | 1.89                        | 14.33                       |
| 2006 | 20.19                             | 0.99                       | 2.81                        | 13.94                       |
| 2007 | 27.75                             | 0.97                       | 6.22                        | 22.42                       |
| 2008 | 45.54                             | 1.00                       | 4.48                        | 9.84                        |
| 2009 | 52.74                             | 1.00                       | 4.29                        | 8.13                        |
| 2010 | 52.83                             | 0.99                       | 5.38                        | 10.19                       |
| 2011 | 60.76                             | 0.95                       | 9.82                        | 16.16                       |
| 2012 | 67.36                             | 0.97                       | 14.49                       | 21.52                       |
| 2013 | 68.62                             | 1.00                       | 12.97                       | 18.90                       |
| 2014 | 67.79                             | 1.00                       | 9.54                        | 14.07                       |
| Average | 39.44                           | 0.99                       | 6.37                        | 18.54                       |
| % per annum | 18.36                           | 0.02                       | 12.94                       | -5.41                       |

Table 4. The budget of food security, rice self-sufficiency ratio, economic rent and dead-weight loss, 2002–2014.
Rice producer, the government and Bulog received the generated economic rent. Rice producers received economic rent in terms of financial profit of trading activity. The government received revenue from the import tariff. While Bulog received economic rent from the existing price gaps between producer price and governmental procurement price and between consumer price and import price. Nonetheless, most of the rice producers were smallholders (Masyhuri and Novia 2014), which their number was equivalent to around 15 million households (Anggoro 2014). They worked on a hectare or less of holding size (Masyhuri and Novia 2014; Suryana et al. 2001). Makbul et al. (2015) found that the market for small farmers was not a free and competitive market, but a monopsony, in which increases in rice prices would not increase their income. Moreover, around 70% of farmers were landless (Suryana et al. 2001) and being the net consumer of rice that counted for 60% of total population of Indonesia (Hariyadi and Yamin 2014).

From the discussion above, it showed that the rice market failure was obviously caused by the nature of the market and the atomistic decision making, i.e. top-down rice policy from the central government to the regional governments. Hai and Talbot (2013) showed that food price policies also distorted market prices in any countries. In some cases, distortionary policies were defensible on the grounds of equity or food security; in others, those created opportunities for rent extraction. The rice price stabilization was good when the price movements could motivate the producers to cultivate rice and improve purchasing power of the consumers. One way to increase producers’ incomes was to increase rice price. This was based on the assumption that increase in rice price would subsequently increase paddy price, which, in turn, improve farmers’ income (Makbul et al. 2015). The more available rice in the market would provide more affordable price to the consumer.

The import policy could increase producers’ distress, especially among the marginal and smallholders. Along with the economic liberalization, farm mechanization, increased share of purchased inputs, price fluctuation and higher wage rate would increase vulnerability of the smallholders than the large farmers (Reddy and Amarender 2015). Therefore, in case of regionality, the government should consider disparities in profitability of rice production. On the other hand, the role of rice as the staple food of most of the population of Indonesia urged the government to determine the affordable rice price for the consumer. The expensive price was seemingly associated with the more important off-farm food sector in particular, milling, retailing and branding (Minten et al. 2013). Those implied that improvement of income distribution between rice producers and consumer should be conducted from on-farm to off-farm.

CONCLUSION

Implementation of price instrument policy and import policy by Bulog had an impact on the market failure, evidenced by the generation of economic rent and dead-weight loss. Bulog involvement in rice self-sufficiency programme obviously distorted rice market and caused welfare lost. This evidence proved the criticisms that rice self-sufficiency is economically inefficient related to the social cost generation.

The government should review the price and import policies to remedy market failure. It is crucially necessary to reduce social cost due to the implementation of price policy and import policy by Bulog. The government is suggested to orientate income distribution rather than price stabilization. It is urgently required to provide and improve irrigation facilities, agricultural roads, postharvest technologies and marketing infrastructure. Those operational policies may not only reduce income risk of the producers, but also improve purchasing power of the consumers. Since import was the one of economic-rent sources, hence, it is suggested to be stopped.

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### Appendix 1. The budget of food security, 2002–2014.

| Year | Ministry budget (IDR billion) | Non-Ministry budget (IDR billion) | Total (IDR billion) |
|------|-------------------------------|-----------------------------------|---------------------|
|      | MPWPR\(^1\)                  | MOA\(^2\)                        |                     |
|      | Subsidy                       | Other expenditures               | Transfer            |
|      | Food                          | Fertilizer                       | Seed                | Interest rate | Reserve stock | Stabilization | Seed | Food security | Irrigation | Other |
| 2002 | 2,703.90                      | 2,815.50                         | 4,696.90            | -              | 45.00         | -             | -    | -             | -          | -     |
|      | 2,601.71                      | 4,595.23                         | 4,880.80            | 1,050.00        | 52.00         | -             | -    | -             | -          | -     |
| 2003 | 2,534.16                      | 2,923.91                         | 4,830.80            | 1,171.40        | 76.20         | 357.20        | 116.24| 12,324.60     |
| 2004 | 2,659.93                      | 1,775.10                         | 4,965.88            | 2,527.30        | 147.80        | 380.93        | 305.50| 13,174.70     |
| 2005 | 6,532.29                      | 2,541.60                         | 6,284.33            | 815.87          | 1,417.45      | 27,745.69     |
| 2006 | 7,203.91                      | 3,509.60                         | 11,795.90           | 1,467.91        | 1,463.01      | 45,537.95     |
| 2007 | 7,676.47                      | 5,094.40                         | 12,987.00           | 518.30          | 1,289.48      | 52,739.05     |
| 2008 | 8,106.69                      | 3,094.20                         | 15,153.81           | 1,565.96        | 2,466.55      | 68,615.91     |
| 2009 | 18,246.62                     | 5,082.62                         | 19,117.00           | 1,339.49        | 1,867.05      | 67,355.83     |
| 2010 | 15,931.27                     | 6,276.71                         | 20,310.11           | 1,530.30        | 52,833.19     |
| 2011 | 13,202.50                     | 5,650.60                         | 18,164.70           | 67,785.30       |

\(^1\) Ministry of Public Work and Public Residence.  
\(^2\) Ministry of Agriculture.  
Source: Ministry of Finance (2016).