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The Dynamics of Rice Price in Cipinang Market Due to Shock of Pakistani Export Prices

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Abstract – One form of bilateral cooperation between Indonesia and Pakistan is the entry of Pakistan as a general category of rice exporter to Indonesia in 2018. This condition will affect the price of rice traded in a traditional market in this case the Cipinang wholesale market. This study aims to examine changes in rice price in the wholesale market due to price shock in the Pakistani market. The data used were monthly data from January 2001-May 2018. Data were analyzed using VAR and VECM. The analysis results show that between the Indonesian and Pakistani rice markets, there is no integration. However, if they are integrated with rice in the Cipinang wholesale market, rice in the Pakistani market occurs integration with Cianjur kepala, Cianjur slyp, Muncul I, Muncul II, Muncul III and IR 42. The IR 42 rice price changes due to the changes on Pakistani rice price which does not cause any changes on other rice prices in the Cipinang Market. Based on this research, Indonesia could import rice from Pakistan by paying attention to farmers who grow varieties of rice that are integrated with Pakistani rice.

Keywords – Rice, Integration, Cointegration.

I. INTRODUCTION

Trade cooperation between Indonesia and Pakistan began with the signing of the Framework on Comprehensive Economic Partnership (FACEP) in November 2005, as the first step to initiating Preferential Trade Area (PTA) negotiations with the ultimate goal of reaching a Free Trade Area (FTA) agreement. To implement FACEP, Indonesia offered to Pakistan a total of 216 special prices, but rice was not included as a special offer. Since 2019, through the Minister of Finance Regulation No. 14/PMK.010/2019 concerning the determination of import duty rates in the framework of a preferential trade agreement between the Indonesian government and Pakistan, stipulating changes in rice import prices with the HS code 1006 to zero rupiah. Previously, the import price for rice was IDR 450/kg. Of the four largest rice exporting countries to Indonesia, Pakistan is a country that has bilateral cooperation with Indonesia. Thailand, Vietnam, and India cooperate with Indonesia in a multilateral form. In 2018, Pakistan first exported general category rice to Indonesia, which previously only exported a special category of rice, namely basmati rice (Sa'diyah & Aini, 2018). The Pakistani rice imported to Indonesia was 310,990 tons or 13.80% of the total rice imported in 2018. In 2019, there was an increase in the share of Indonesia's rice import quota by 41.07% (182,565 tons) of total rice imported in 2019 (BPS, 2019).

Sawit (2006) states that world rice trade is classified as a thin market due to the small volume of world rice trade. In addition, rice has an expenditure elasticity value of less than one (inelastic) indicating that rice is a basic necessity and has an absolute value of its own price elasticity of less than 1 (one), which indicates that rice is an inelastic good. This implies that the sensitivity of households to changes in total expenditure and own prices in rice consumption is quite low. This results in reduced resource allocation for non-rice due to increased rice prices (Yuliana et al., 2019; Abidin, 2015).

Indonesia is a country with a population of 265 million people in 2018 (BPS, 2019). With a very large population, the government is obliged to maintain food availability and price stability. As stated in the Food Law No. 18 of 2012 explaining the conditions for the fulfillment of food in Indonesia for each individual with the indicators of sufficient food namely quantity, quality, diversity, nutritious, equitable and affordable.

Indonesia's rice production in 2018 was 37.3 million tons per year, while the average rice consumption was 38.2 million tons (IRRI, 2019). The amount of consumption that is above the amount of production causes a shortage of rice supply to meet the consumption of its citizens. This condition causes the government to meet the shortfall by importing 2.25 million tons of rice (BPS, 2019). Rice imports are carried out by Indonesia to maintain rice availability. This maintenance is important because rice products that are discontinuous in nature cannot meet the needs of continuous rice consumption. If the availability of rice cannot be maintained, price instability will occur. Ilham & Siregar (2007) states that food expenditure for most people will significantly affect inflation, where inflation and its fluctuations can affect macroeconomic stability. Increasing food prices, especially grains, will be a burden for poor people in developing countries who spend more than the average family income for food needs (Busnita, 2016; Miranti et al., 2016). In addition, rice is the main food commodity for Indonesian society that affects welfare (Septiadi, 2016).

The export and import trade mechanism will cause price changes in both exporting and importing countries. For importing countries, the entry of rice will cause the number of domestic rice supplies to increase, so that the domestic rice price will be cheaper than the previous price. This condition will benefit consumers because consumers get cheaper prices. On the other hand, it will harm farmers if there is no support for rice policy at the farmer level. The loss received by farmers is low selling price of rice. When the production cost is assumed to be fixed, the profit margin obtained by farmers will decrease. In this condition, the government plays a role in regulating policy in rice price and must make sure the import mechanism is implemented appropriately. According to Ilham & Siregar (2007), the food price policy implemented by the government in the long and short term will cause a contraction in Gross Domestic Product and inflation, but it will not cause an increase in unemployment and instability in the macro economy. Kannapiran (2000) states that the commodity price stability scheme causes macroeconomic instability to decline. Lloyd et al. (2015) argued that food inflation is caused by economic openness and exchange rates. Meanwhile, Cachia (2014) states that the factors that determine food prices are imported commodities, market forces, transportation costs, transaction costs, exchange rates and government intervention. Septiadi et al. (2016) states that the amount of poverty in Indonesia is positively influenced by the amount of rice imports and the rice price at the retail level. Timmer (1991) states countries that have succeeded in maintaining price stabilization are the countries with the most developed economies in the world. If food prices are not maintained stable, political stability and economic growth will be threatened.

Brooks et al. (2013) states one example of intervention in food procurement is the procurement of food from areas that is surplus in production as long as the two regions (exporters and importers) do not have market integration. Greenville (2018) states that the integration of the ASEAN rice market will reduce domestic rice prices in importing countries by 39% in Indonesia, 26% in Malaysia and 45% in the Philippines. In addition, Greenville (2018) states the integration of the rice market will have an impact on producers in importing countries and poor consumers in exporting countries. The increase in rice prices in importing countries will encourage rice exports from exporting countries to importing countries, so that there will be a decrease in rice supply in exporting countries. This condition causes the rice price in exporting countries to increase. Increasing rice prices will decrease the purchasing power of rice for poor consumers in exporting countries. In rice importing countries, there will be an increase in rice supply obtained from imports, which will cause a decrease in the rice price. This decrease can harm rice producers in the importing country because it will reduce the profit margins obtained by producers.

Indonesia, which is still a rice importing country, requires the government to protect domestic rice prices by preventing the Indonesian rice market from integrating with the rice markets of exporting countries. If there is a market integration, it will cause changes in rice prices in the export market which will be followed by price changes in the Indonesian market. This will make rice price stability in Indonesia difficult to control. The Cipinang market is a main market that functions to regulate the distribution of rice in Indonesia. Rice imported from Pakistan will affect the price of rice traded in the Cipinang market. Based on data from the Jakarta Provincial BPS regarding rice traded in the Cipinang market, there are 11 types of rice besides glutinous rice. The eleven types of rice are Cianjur Kepala, Cianjur Slyp, Sentra, Saigon, Muncul I, Muncul II, Muncul III, IR I, IR II, IR III dan IR 42. The price can be affected by rice imports from Pakistan if there is market integration between the rice in Cipinang Market and in Pakistan. Therefore, it is necessary to test the integration of each rice type traded in the Cipinang Market with Pakistani rice. The

type of rice that is integrated with Pakistani rice must be given price protection by the government because changes in rice prices in Pakistan will be followed by changes in prices of this integrated type.

II. RESEARCH METHODS

Types and Sources of Data

The data used in this study were monthly time series data in January 2001 – May 2018. Data were obtained from the Central Statistics Agency (BPS) of DKI Jakarta Province and the International Rice Research Institute (IRRI). The data were the average rice price in Cipinang Market (PGC) in USD/ton, 25% broken rice price in Pakistan (PPI) in USD/ton, the dollar exchange rate against the rupiah, the Indonesia Pakistan Preferential Trade Agreement (IPPTA) collaboration dummy and 11 rice prices based on the rice type traded in Cipinang Market.

Data analysis method

The Johansen market integration model was used in this study to see price changes in the reference market (exporting countries) which will cause price changes in the domestic market (importing countries). The market integration model in this study is made into two models. Model 1 is market integration between the Indonesian rice market and the Pakistani rice market, while Model 2 is the integration of prices between the 11 rice types traded in the Cipinang Market and the Pakistani rice market. Models 1 and 2 can be written as follows:

$$\Delta X_t = \mu_t + \phi_k \Delta X_{t-k} + \cdots + \phi_k \Delta X_{t-k} + NDR + D\_IPPTA + e_t \quad \text{.....(1)}$$

$$\Delta X_t = \mu_t + \Gamma_1 \Delta X_{t-1} + \cdots + \Gamma_k \Delta X_{t-k} + \Pi X_{t-1} + e_t \quad \text{.....(2)}$$

Where: μ_t = intercept vector, Π = long-run coefficient matrix ($\Pi = \alpha\beta'$), α = loading matrix, β' = co-integration vector, Γ = short-term to long-term adjustment coefficient matrix, ϕ = parameter matrix, X = endogenous variable vector (PPI, PGC and the price of 11 types of rice), NDR = dollar/rupiah exchange rate, *D_IPPTA* = dummy of IPPTA cooperation and ε_t = error term.

The first step is the stationary Augmented Dickey-Fuller (ADF) test at the same degree until stationary data is obtained. Model 3 was used as ADF test.

$$\Delta X_t = \alpha_0 + \gamma X_{t-1} + \sum_{i=1}^{p} \beta_i \Delta X_{t-i} + \varepsilon_t \quad \text{.....(3)}$$

Where X_t = variable price of rice PPI, PGC and 11 rice types in Cipinang Market in period t, X_{t-1} = variable price of rice in the previous period, X_{t-i} = variable price of rice in period t minus lag value and $\Delta X = X_t - X_{t-1}$. The decision making criteria are:

1. Prob value > 0.05 means X_t contains the unit root
2. Prob value < 0.05 means X_t does not contain the unit root

The second step was conducted to test the optimal leg determination using some information, namely the Akaike Information Criterion (AIC). Testing the optimal lag length is useful for eliminating autocorrelation problems in the VAR model. By using the optimal lag to estimate the VAR model, it is expected that autocorrelation problems will not occur. Determination of the optimal lag by selecting the AIC criteria marked with an asterisk or the smallest value.

The third step was done to estimate the Johansen model using the Maximum likelihood Lmax (r) which is a function of the co-integration rank r. To test the existence of a long-term relationship between variables, two test methods were used, namely the trace test and the maximum eigenvalue test. Trace test was done to find the most co-integration vector r (rank matrix Π), by following equation 4, where T is the number of observations and λ_{trace} is the eigenvalue.

$$\lambda_{trace} = -T \sum ln(1 - \lambda_i) \quad \text{.....(4)}$$

While the maximum eigenvalue test was done by testing the relevance of r + 1 in β ($\Pi = \alpha\beta'$) with equation 5, where r is the number of co-integration vectors in the null hypothesis.

$$\lambda_{max}(r, r+1) = -T \sum ln(1 - \lambda_{r+1}) \quad \text{.....(5)}$$

The decision making criteria is as follow:

1. The trace statistic or maximum eigenvalue probability value is greater than 0.05, so *Ho* is accepted, which means there is no co-integration.
2. The trace statistic or maximum eigenvalue probability value is smaller than 0.05, so *Ho* is rejected, which means there is a co-integration.

The fourth step was conducted to estimate using VAR in different for model 1 because there was no co-integration and for model 2 it was estimated using the vector error correction model (VECM) because there was a co-integration. Furthermore, model 2 continued with the impulse response function (IRF) test and forecast error variance decomposition (FEVD).

III. Results And Discussion

In order to see the relationship between the Cipinang rice market and the Pakistani rice market, the movement of rice prices in Indonesia (the Cipinang market) with the rice price in the exporting country of Pakistan needs to be considered and compared. By observing the movement, the integration of rice market can be obtained in this study. Figure 1 shows the development of the average real price of rice traded in the Cipinang market and the real price of rice in Pakistan from 2003-2018. In general, from 2003-2018, the real price of rice in the Cipinang market was always above the real price in Pakistan. A fluctuation occurred in real rice price in Pakistan in 2008. As a result, the real rice price in Pakistan was above the real rice price in Indonesia.

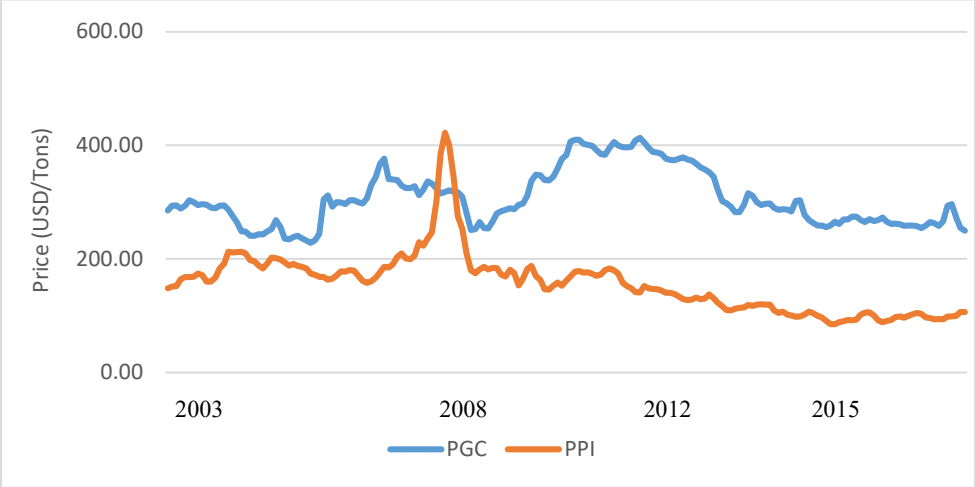

Figure 1. The average real price of rice in the Cipinang Market with the real price of rice in Pakistan in the period of 2003-2018

The difference of price between the two countries can lead to trade between Indonesia and Pakistan. The hope is this trade will not lead to market integration between the two countries. By importing food from countries where market integration does not occur, Indonesia could protect its farmers (Brooks et al, 2013).

Integration of the Indonesian rice market with Pakistani rice market

The initial step of test was the ADF test on endogenous variables with the results of stationary data on the first difference. Furthermore, the lag order section test was carried out with the optimal lag length for model 1 is lag 3. The results of the Johansen co-integration test on model 1 can be seen in Table 1. The test results can be explained from the trace static value and maximum eigen statistic or can also be seen from the probability value. In the model used can be seen that the prob trace statistic value and maximum eigen statistic are above 0.05. Based on Enders (1995) and Varva & Goodwin (2005) if the prob trace and maximum eigen statistic above 0.05, it means that there is no long-term co-integration between two markets. So there is no long co-integration between the Indonesian and Pakistani rice markets.

Table 1. Johansen Co-integration Test Results for Model 1

	Trace Statistic	Prob**	Max-Eigen Statistic	Prob**
Cointegrasi PGC and PPI				
None	10.0269	0.2787	5.6879	0.6535
At most 1*	4.3393	0.0372	4.3390	0.0372

Source: analyzed data (2020)

Based on the results of co-integration test, so the next test that is carried out was VAR with the data used is the first different data. The results of the VAR in different test can be seen in Table 2. The results of the VAR in different test in model 1 show that prices in the Indonesian rice market are integrated in the short term with the Indonesian rice market itself in the previous one and two months. Meanwhile, changes in rice prices in Pakistan in any period were not followed by price changes in the Indonesian rice market in any period. The dollar exchange rate against the rupiah affects changes in the rice price in the Indonesian market, while the dummy of trade cooperation between Indonesia and Pakistan that has existed so far has no effect on short-term integration between the Indonesian rice market and the Pakistani rice market.

Table 2. The Estimation Results of Model 1 Using Vector Auto-regression in Different

	Changes in rice price in Cipinang
Changes in rice price in Cipinang (-1)	0.2709**
Changes in rice price in Cipinang (-2)	-0.2658**
Changes in rice price in Cipinang (-3)	0.0235
Changes in rice price in Pakistan (-1)	0.0277
Changes in rice price in Pakistan (-2)	0.0120
Changes in rice price in Pakistan (-3)	-0.1070
Constant	1.0012
Changes in exchange rate of dollars to rupiah	-0.0223**
Dummy of IPPTA	-1.6209
R-squared	0.4091

Source: analyzed data (2020)

Apart from Pakistan, Indonesia imports rice from Vietnam, Thailand and India. There are some research that looks at the integration of the rice market between countries that export rice to Indonesia. Cahyaningsih et al. (2012) states the Indonesian rice market is not integrated with the Vietnam and Thailand rice markets in the long term. Meanwhile, in the short term, the Indonesian rice market is integrated with Vietnam. Aryani et al. (2019) stated that the rice market in Thailand and the Indonesian rice market have been integrated with a very weak level of integration. Meanwhile, there are differences with Harmini et al. (2011) stating that there is long-term co-integration between the Indonesian, Thai and Vietnamese rice markets. Edi et al. (2014) states that the Vietnamese rice market is integrated with the Indonesian market. The differences in the results obtained from several researchers were due to differences in pricing for the types of rice used.

The import-export trade mechanism is part of international trade. Brook et al. (2013) stated international trade can affect prices and response to signals transmitted. The difference in price between markets becomes a signal for traders to trade from a lower priced market to a higher priced market. This will affect the integration between the two markets. Feckler & Goodwin (2001) stated that in order to run the international trade market, trade barriers are needed. Trade barriers are an effort to maintain food stocks in areas with insufficient production. Indonesia as an importing country needs to carry out trade barriers in its import

mechanism. The first obstacle is trade barriers in the form of import prices which are imposed at Rp. 450,-/kg for rice imported goods with HS code 1006. This regulation is contained in the Regulation of the Minister of Finance of the Republic of Indonesia No.6/PMK010/2017 concerning the application of the good classification system and the imposition of import duties on imported goods. Abidin (2015) states that the rice import duty policy protects the competitiveness of domestic rice, maintains price stability and absorption of domestic rice production and encourages the price of harvested dry grain at the farmer level above the Government Purchase Price so that it is more profitable for rice farmers. Hadi & Wiryono (2016) state that the protection policy carried out by the government with a combination policy of prices and non-price has succeeded in increasing producer prices, producer surpluses, total production, farmers' income and reducing the amount of imports. Meanwhile, Hoang (2015) stated that trade liberalization must be accompanied by policies that can distribute welfare to rice producers and consumers.

Since the 2015 Indonesia-Pakistan trade cooperation, the import price of rice to Indonesia were not included in special price. Only in 2019, Indonesia eliminated the import price from Pakistan to zero percent. This elimination will cause the price of imported rice from Pakistan in Indonesia cheaper. With the entry of imported rice from Pakistan, it will cause an increase in the supply of rice in the country of Indonesia which causes the fall of rice price. Jamilah et al. (2016) states that the elimination of import price will increase import demand which has implications for lowering domestic prices. Such conditions benefit consumers, while producers (farmers) will suffer losses. Assuming that production costs are fixed, if prices fall, the profits obtained by farmers will decrease.

The second obstacle is in the form of import provisions based on the Decree of the Minister of Industry and Trade No. 9/MPP/Kep/1/2004 concerning rice import provisions in the form of regulating rice imports one month before the main harvest and two months after the main harvest, regulating the quantity (import quota), anchoring, quality and time. The import ban during the main harvest season is the government's effort to maintain the rice price during the main harvest season, so that the price during the harvest season does not fall due to excess supply. Hanjani et al. (2013) states that lowering the rice import quota will cause a decrease in import volume, thereby it will reduce rice stocks and increase domestic rice prices. This condition is expected to bind domestic rice production because Malian (2004) states that domestic rice prices and rice imports affect rice production.

The third obstacle is in the form of rice import regulations, based on the Regulation of the Minister of Trade of the Republic of Indonesia No. 01 of 2018 concerning the provisions for export and import of rice. The regulation states that rice imported for public purposes is carried out by the Bulog Public Company with the approval of the Minister of Trade based on the results of the coordination meeting at the Minister for Economic Affairs. Kusumah (2019) states that Bulog is a single agency that can import medium rice and has the authority to control rice prices. These trade barriers are a form of intervention by the Indonesian government to protect farmers so that rice prices can be maintained by preventing market integration. This concurs with Zheng et al. (2008) stated that economic globalization, which is marked by the reduction of trade barriers, can encourage integration between two or more markets in different locations. The condition of the rice policies are applied in Indonesia to rice imports by applying trade barriers to prevent market integration between the Indonesian market and the Pakistani market.

The results of the research show there is no market integration between Indonesia and Pakistan. It means that the rice trade between Indonesia and Pakistan is classified as a thin trade. This result is in accordance with the opinion of Zheng et al. (2008) stating that higher trade transactions are expected to create perfect integration so that prices in two markets move in the same direction and in the long run, one price condition can be created. When viewed from the bilateral cooperation agreement between Indonesia and Pakistan signed in 2005 until now, for the Pakistan-Indonesia rice trade, the cooperation agreement does not affect market integration between the two countries. This study differs from He (2019) which also shows trade openness affects trade integration.

Dynamics of rice prices in Cipinang Market

The results of the ADF test on the endogenous variables in model 2 show that the data is stationary at the first different. Then it was proceeded with the determination of the optimal lag length. The result of the optimal lag length for model 2 is lag 2.The results of the Johansen co-integration test on the integration model between the rice price in the Pakistani market and the price of rice in the Cipinang Market are shown in Table 3. Model 2 explains how prices change in Pakistan as an exporting country it can affect changes in the price of the rice type traded in the Cipinang Market. Based on the trace statistic value and the probability value, there are six equations that have a probability value below 0.05. Meanwhile, based on the maximum eigenvalue and probability, there is only one equation with a value below 0.05. Based on the results of the co-integration test, in this model,

there are one co-integration equations that show the price adjustment mechanism from the short term to the new equilibrium in the long term.

Table 3. The Results of The Johansen Co-integration Test on The Dynamic Model of Rice Prices in The Cipinang Market Due to Price Changes in The Pakistani Rice Market

	Trace Statistic	Prob**	Max-Eigen Statistic	Prob**
None	425.0465	0.0000**	91.5263	0.0013**
At most 1	333.5202	0.0001**	64.6085	0.1591
At most 2	268.9117	0.0011**	50.9717	0.5036
At most 3	217.9400	0.0031**	46.7943	0.4239
At most 4	171.1457	0.0099**	42.4133	0.3552
At most 5	128.7324	0.0319**	37.2236	0.3282
At most 6	91.5088	0.0946	33.8110	0.2141
At most 7	57.6978	0.3128	27.7129	0.2271
At most 8	29.9849	0.7197	15.3125	0.7231
At most 9	14.6724	0.8009	8.4783	0.8721
At most 10	6.1942	0.6726	4.0236	0.8568
At most 11	2.1705	0.1407	2.1705	0.1407

Source: analyzed data (2020)

Tabel 4 shows the estimation of the dynamics model of rice prices in the Cipinang Market due to price changes in the Pakistani rice market using VECM with one co-integration equation. There is a long-term relationship between Cianjur Slyp, Sentra, Saigon, Muncul III and IR III with rice prices in Pakistan at a significant level of 0.05. Base on the Tabel 4, the ECT equition can be written as follows:

$$ECT = 2461.272 + PPI(-1) + 43.7116\ Cianjur\ slyp(-1) - 32.6041\ Sentra(-1)$$
$$-33.2931\ Saigon\ (-1) + 116.8587\ Muncul\ III(-1) - 23.0687\ IR\ III(-1)$$

The ECT equations formed that affect changes in the price of rice traded in the Cipinang Market are Cianjur Kepala, Cianjur Slyp, Muncul I, Muncul II, Muncul III, IR II and IR42.

Tabel 4. The VECM Estimation Result of The Estimation on Long-term Equation Parameters

	ECT
PPI (-1)	1.0000
Cianjur Kepala (-1)	-22.2813
Cianjur Slyp (-1)	43.7116**
Sentra (-1)	-32.6041**
Saigon (-1)	-33.2931**
Muncul I (-1)	8.4728
Muncul II (-1)	-31.9346

Muncul III (-1)	116.8587**
IR I (-1)	-7.4989
IR II (-1)	-6.8707
IR III (-1)	-23.0687**
IR 42 (-1)	-6.2099
C	2461.272

Source: analyzed data (2020)

Table 5 presents values of ECT coefficients. A value that is less than one indicating weak integration. There are some significant and negative ECT coefficients showing an adjustment from the short-term equation to the long-term equation. Cianjur Kepala. Cianjur Slyp, Muncul I, Muncul II, Muncul III, IR II, and IR 42 are rice traded in the Cipinang Market which has a significant ECT coefficient value at the 0.05 level and it is negative. The value of ECT coefficient is and error correction towards long-term equilibrium. ECT coefficient values of -0.0024, -0.0036, -0.0053, -0.0051, -0.0047, -0.0022 and -0.0037 can be interpreted when there is a deviation from the short-term equation to the long-term equation. The amount of corrections made is 0.0024, 0.0036, 0.0053, 0.0051, 0.0047, 0.0022 and -0.0037 percent for each month.

Table 5 shows changes in rice prices occurred in the Cipinang Market due to changes in rice prices in Pakistan. Changes in rice prices that occur in Pakistan in the short-term dynamics only affect rice IR 42 at a significant level of 0.05. A change in the price of rice in Pakistan one month earlier by one percent will increase the price of IR 42 rice by 0.2681 percent.

Table 5. The VECM Estimation Result of Estimation on The Short-term Equation Parameters of The Effect of Changes in Pakistani Rice Prices to Rice Prices in Cipinang Market

	DCianjur Kepala	**DCianjur Slyp**	**DSentra**	**DSaigon**
ECT	-0.0024**	-0.0036**	-0.0009	-0.0003
DPPI (-1)	0.0451	0.0377	0.0398	0.0472
DPPI (-2)	0.0498	0.0791	0.0682	0.0441
R-squared	0.3809	0.3494	0.2807	0.3537
	DMuncul I	**DMuncul II**	**DMuncul III**	**DIR I**
ECT	-0.0053**	-0.0051**	-0.0047**	-0.0016
DPPI (-1)	0.0958	0.0615	0.0438	0.0552
DPPI (-2)	0.0638	0.0384	0.0378	0.0086
R-squared	0.3799	0.3822	0.4080	0.2295
	DIR II	**DIR III**	**DIR 42**	
ECT	-0.0022**	-0.0013	-0.0037**	
DPPI (-1)	0.0633	0.6233	0.2681**	
DPPI (-2)	0.0031	-0.0127	-0.1456	
R-squared	0.2764	0.2271	0.3644	

Note: DPPI = Changes in rice price in Pakistan

Source: analyzed data (2020)

Based on data from the Indonesian Research Center (2015), the planting area for IR 42 rice is 181,884 hectares or 1.34% of the national planting area for rice. This condition is the smallest planting area in the distribution of rice varieties in Indonesia in 2014. IR 42 rice with a *pera* texture is easier to market because IR 42 can be used more as raw material for rice processing (vermicelli, noodles and rice flour). The processing industry likes IR 42 because it has an amylose content of more than 25% (Syamsiah, 2016). Meanwhile, Pakistani rice has the characteristics of a hot texture, is longer than normal rice and has a fairly high amylose content. The similarity in characteristics between IR 42 and Pakistani rice is thought to have cause the prices of these two kinds of rice to have short-term price integration.

Table 6. The VECM Estimation Results of Estimation on the Short-term Equation Parameters of The Effect of Changes in IR 42 Rice Price to Other Rice Prices in Cipinang Market

	DCianjur Kepala	**DCianjur Slyp**	**DSentra**	**DSaigon**
DIR 42 (-1)	-0.0479	-0.0706	-0.0432	-0.0018
DIR 42 (-2)	0.0648	0.1120	0.0617	0.0113
	DMuncul I	**DMuncul II**	**DMuncul III**	**DIR I**
DIR 42 (-1)	-0.0096	0.0007	-0.0175	-0.0086
DIR 42 (-2)	0.0549	0.0742	0.0531	-0.3890
	DIR II	**DIR III**		
DIR 42 (-1)	-0.0233	-0.0606		
DIR 42 (-2)	-0.0998	-0.0624		

Note: DIR 42 = Changes in rice price of rice type IR 42 in Cipinang

Source: analyzed data (2020)

Changes that occur in IR 42 rice will cause changes in the price of other rice types traded in Cipinang Market. In Table 7, it can be seen that the change of rice price of IR 42 which was one month earlier did not cause changes in the price of other rice traded in Cipinang Market. Likewise, the change in the price of IR 42 rice which was two months earlier did not cause a change in the price of other rice traded at Cipinang Market. Based on the results of the VECM estimation, it can be seen that changes in rice prices that occur in the Pakistani market will cause only IR 42 rice to follow these changes. On the other hand, changes that occur in IR 42 do not cause changes in other rice traded in the Cipinang Market.

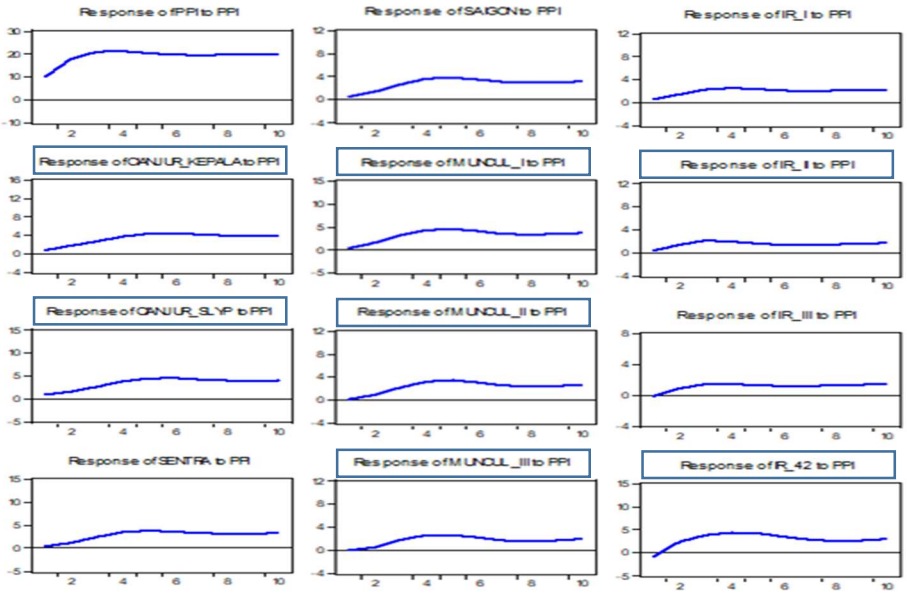

Figure 2. Price response of rice traded in the Cipinang Market due to Pakistan rice price shocks

Figure 2 shows the results of the IRF analysis for the next 10 months to see how the response of the 11 types of rice traded in the Cipinang Market to rice price shocks that occurred in Pakistan. Only seven types are negative and have significant ECT

values. The seven types of rice responded to the rice price shocks that occurred in Pakistan in the first period in a positive direction. Only IR 42 responds negatively to price shocks in Pakistan in the first period. The response to the rice price traded in the Cipinang Market will peak in the fifth period for Cianjur Kepala, Muncul I, Muncul II, and Muncul III. IR 42 responds peaked in the third period. After that period, the response to the rice price traded in the Cipinang Market will be stable until the end of the period.

The analysis of variance decomposition in Figure 3 shows the contribution of Pakistani prices to the rice prices traded in the Cipinang Market for the next 10 months. It also shows the contribution of Pakistani rice prices to the rice price traded in the Cipunang Market is small. The biggest contribution to the rice price is the rice price itself. Based on this analysis, the rice price traded in the Cipinang Market is determined by the rice price itself

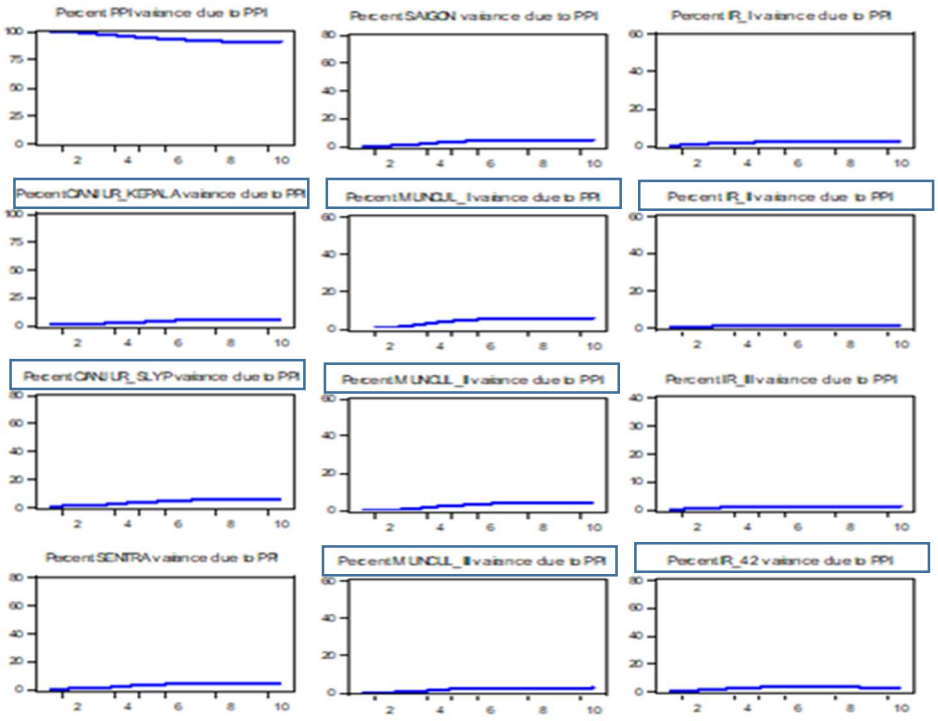

Figure 3. Variance decomposition of various rice price traded in the Cipinang Market due to shocks in Pakistani rice prices

Pakistani rice prices based on variance decomposition analysis do not seem to contribute much to the seven types of rice that have negative and significant ECT values in the Cipinang Market. The largest contribution to Pakistani rice prices during the 10 periods was 3.98 percent for Muncul I, 3.73 percent for Cianjur Kepala, and 3.68 percent for Cianjur Kepala. The contribution of Vietnamese rice prices to other types of rice is below the price of Cianjur Kepala.

IV. Conclusion And Recommendation

The results showed that between the Indonesian rice market and the Pakistani rice market, there was no co-integration in short-term market integration. The bilateral cooperation agreement between Indonesia and Pakistan cannot affect the integration of the rice markets of the two countries. This is due to import trade barriers imposed by Indonesia. The absence of market integration between Indonesia and Pakistan shows that the rice trade between the two countries is classified as a thin trade. Another result shows that although there is no co-integration between the Indonesian and Pakistani rice markets, if we look deeper into the types of rice traded in the Cipinang Market, the rice price in the Cipinang market and the rice price in Pakistan is co-integrated. In the long-term integration equation, there is a long-term relationship between rice prices in Pakistan and Cianjur Slyp, Sentra, Saigon, Muncul III and IR III. In the short term integration, the Pakistani rice price is integrated with Cianjur kepala, Cianjur slyp, Muncul I, Muncul II, Muncul III and IR 42 in the short term. The IR 42 rice price changes due to the changes on Pakistani rice price which does not cause any changes on other rice prices in the Cipinang Market. The suggestion that can be given based on this research is that Pakistan can be used as a rice exporting country to Indonesia by implementing price and non-

price policies as well as providing protection for farmers of Cianjur kepala, Cianjur slyp, Muncul I, Muncul II, Muncul III and IR 42 rice.

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