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Integration of Rice Prices at Producer, Wholesaler, and Urban and Rural Consumer Markets with Paddy Prices at the Farm Gate

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ABSTRACT

In this study, we analyzed the integration of rice prices at the producer, wholesaler, and urban and rural consumer markets with paddy prices at the farm gate, which has important implications for rice pricing policy. A high price policy can lead to high paddy prices, and thereby increase the profits of paddy farms. Although this policy can generally ensure food security, it may have the effect of decreasing rice consumption. A high-price rice policy can, nevertheless, be beneficial if rice prices are sufficiently well integrated with paddy prices, which can simultaneously enhance paddy farm profits and ensure domestic food security. For the purposes of this study, we examined monthly price data obtained from the Central Bureau of Statistics of Indonesia for the period from January 2013 to December 2016. Using this data, we applied an error correction model (ECM) to integrate the rice prices at the producer, wholesaler, and urban and rural consumer markets with paddy prices at the farm gate. The results showed that producer, wholesaler, and rural consumer market rice prices were significantly integrated with paddy prices at the farm gate. Moreover, if necessary, the government can intervene in these markets to stabilize paddy prices to maintain food security.

Keywords: rice price; paddy price; food security; government policy

INTRODUCTION

Increasing the price of paddy rice can encourage farmers to increase production, as this enhances farm profitability (Yu & Fan, 2011), and increasing paddy production is one element of the rice policy in Indonesia (Robinson, et al., 1997). In order to maintain food security in Indonesia, it is important that farmers are guaranteed sufficiently high prices for their products in order to stimulate production (Timmer, 2002), and, indeed, many studies have concluded that high rice prices can significantly increase the supply of rice (Farooq, Young, Russell, & Iqbal, 2001); (Seck, Tollens, Marco, Diagne, & Bamba, 2010); (Zohir, Shahabuddin, & Hossain, 2002).

Given that paddies are the primary source of rice, it is logical that the price of paddy rice is determined by traded rice prices. If the price of rice continues to increase, merchants will find it desirable to sell more rice in order to obtain profits, which in turn increases the demand for paddy rice, and thereby leads to an increase in the price of paddy rice. Rice is influenced by the

demand for paddies if increases in paddy prices lead to improvements in rice prices. Thus, rice and paddy prices can stimulate each other. In this study, we consider the transmission channel from rice to paddy prices.

The concept of increasing the price of one product to stimulate a price increase in another product is referred to as price transmission, which can be either symmetric or asymmetric. Symmetric price transmission indicates the situation whereby increasing the price of one product can stimulate an increase in the price of another product and vice versa, whereas asymmetric price transmission implies that raising the price of one product does not promote an increase the price of another product (Meyer & Cramon-Taubadel, 2002). The law of one price (LOP) is a theory relating to the price transmission from one product to another (Conforti, 2004), and defines market integration. Researchers first used the LOP to analyze spatial price transmission, in which the price of a product in one location affects that of the same product in another market location. Goodwin (Goodwin, 2006) modified this theory for application to the study of vertical price transmission, which encompasses the linkages between farms, wholesale markets, and retail markets. Many studies have subsequently used LOP to assess vertical price transmission, including those of Ahn and Lee (Ahn & Lee, 2015), Asche *et al.* (Asche, Jaffry, & Hartman, 2007), and Cramon-Taubadel *et al.* (Cramon-Taubadel, Loy, & Meyer, 2006).

The LOP is a measure of market integration, indicating that if a single price exists in several markets, these markets are considered to be integrated (Yang, Bessler, & Leatham, 2000). To assess market integration, researchers can use error correction models (ECM), because such analysis can provide evidence of long-term relationships. Many studies have demonstrated that the LOP is valid in the context of market integration, including those of Mohanty *et al.* (Mohanty, Meyers, & Smith, 1999), Muwanga and Snyder (Muwanga & Snyder, 1997), Katrakilidis (Katrakilidis, 2008), Elberg (Elberg, 2015), Baquedano and Liefert (Baquedano & Liefert, 2014), Ravallion (Ravallion, 1985), Sekhar (Sekhar, 2012), Zhou and Koemle (Zhou & Koemle, 2015), and Xu *et al.* (Xu, Dong, LI, & LI, 2011). In the rice market, price integration is supported by many studies, such as those of Emokaro and Ayantoyinbo (Emokaro & Ayantoyinbo, 2014), and Ohen and Abang (Ohen & Abang, 2011).

Although evidence of the existence of price transmission from rice to paddy is essential to support a high rice price policy in Indonesia, price transmission is only one of the many factors that potentially influence such a policy. However, a high rice price policy represents a significant burden for the Indonesian population, particularly those in poverty.

Although many factors can influence price transmission, including market forces, transport and transaction costs, the scale of production, homogeneity, and differentiation of products, exchange rates, and domestic policies (Conforti, 2004), the aim of the present study was not to identify such factors but to establish the existence of price transmission from rice to paddy prices. Such a finding would be essential to support the rice pricing policy in Indonesia.

Agricultural pricing policy involves a high level of government intervention (Tsakok, 1990). The mechanism of agricultural pricing policy can be used to extract and transfer agricultural surpluses, and a range of agricultural pricing policies have been examined using macroeconomic (exchange rates and interest rates), trade (exports and imports), and sectoral indicators. A simple example of agricultural pricing policy is that related to rice imports. If a government makes it easy to import rice, the domestic price of rice may decrease. Although such a policy is beneficial for consumers, it may harm producers because it provides a

disincentive for increasing paddy production. In this regard, the current rice pricing policy approach adopted in Indonesia is to stimulate productivity growth through the imposition of high tariffs on imported rice (Timmer, 2004). These policies are implemented by drafting rules to impose high import tariffs on rice, such as the Ministry of Finance Rule No. 93 in 2007 (Menteri Keuangan, 2016). In 2013, Indonesia imported no rice (Kementerian Pertanian, 2015), even though the price of domestic rice in Indonesia was 64.88% higher than that of imported rice (Kementerian Perdagangan, 2015). If the government does not regulate rice imports, the price of rice in Indonesia could decline, and those in poverty would be able to buy more rice.

A high price rice policy could be supported by evidence wherein high rice prices can be transmitted to high paddy prices. Evidence of this transmission is relevant because many people in Indonesia have suffered as a result of the high rice price policy. Rice is an important staple food in Indonesia (Bulog, 2015), and thus a high rice pricing policy causes hardship for most Indonesian people, particularly those in poverty. Those who live under conditions of poverty spend 70% of their income on rice (Zeigler, 2005), and it has been estimated that increasing rice prices in Indonesia by 10% would increase poverty by 4%, whereas a 30% increase would increase poverty by 14% (Peiffer, 2013). Warr and Yusuf (Warr & Yusuf, 2013) and McCulloch (McCulloch, 2008) concluded that an increase in the price of rice would lead to a rise in both urban and rural poverty, and even increase the level of poverty among small rice farmers. Although in the present study, we do not assess the impact of rice prices on poverty, we do to some extent explain that most of the impoverished population have made sacrifices as a consequence the high rice pricing policy. Thus, it is important to understand whether paddy prices will remain high if rice prices are high. Given that the high rice price policy is supported by the existence of price integration between rice and paddies, if there is no price integration, a high rice price policy will not be beneficial because it means that those in poverty will suffer without an increase in paddy production and food security.

To ensure that rice prices can have an impact on paddy prices, it is necessary to analyze the transmission from rice to paddy prices. Accordingly, in this study, we aimed to provide evidence in support of the high rice price policy. Although such a policy inevitably represents a potential burden to rice consumers, this can be considered a necessary cost if paddy farmers are to earn profits, which in the long run will be conducive to the maintenance of food security in Indonesia. Hence, the question we sought to answer in this study is whether there is a price transmission from rice to paddy rice.

METHODS

In the analyses performed in this study, we used paddy prices at the farm gate as the dependent variable, with rice prices at the local producer, wholesaler, and urban and rural consumer markets being used as independent variables. In these analyses, we applied an error correction model (ECM), in which the dependent variable Y represents data for paddy prices at the farm gate, and the independent variables X_1, X_2, X_3, and X_4 represent rice prices at local producer, wholesaler, urban consumer, and rural consumer markets, respectively. All the data represent a change in price between time t and t_{-1}, which is necessary for determining stationary data.

The analytic model employed in this study involves several steps. The first step was a descriptive analysis to derive descriptive statistics (average, maximum, minimum, and standard deviation) for rice and paddy prices. The second step was a visual analysis of these prices to determine price fluctuations. The third step involved an analysis of stationary data. If the results indicated stationary data, we then continued to the fourth step, an analysis of

cointegration, which was used to assess the long-term relationships of the variables. Any significant long-term relationship found was analyzed using the ECM to determine the effect on short-term and long-term paddy prices. These analyses were performed using the eviews software program.

DATA

Data Source

The data used in the aforementioned analyses were derived from the *Badan Pusat Statistik* (Central Bureau of Statistics) of Indonesia. Paddy price data were the monthly averages of paddy prices at the farm gate after the draining harvest, known in Indonesia as *Gabah Kering Panen.* We considered price data covering the period from January 2013 and December 2016 taken from the BPS website (BPS, 2016a). The rice prices at local producer markets were the monthly average prices of medium-quality rice at rice mill stores, which were taken from the BPS website (BPS, 2016b). Rice prices at wholesaler markets were the monthly average prices of medium-quality rice at a wholesale store, which were also taken from the BPS website (BPS, 2017). The prices of rice in urban consumer markets were the monthly average prices of IR, a brand of rice sold in Jakarta. We selected this brand because it is the first listed and most popular rice brand sold in Jakarta, the latter of which was selected as it is the capital of Indonesia. These data were taken from publications on the BPS website at 6-month intervals (BPS, 2013a); (BPS, 2013b); (BPS, 2014a); (BPS, 2015a); (BPS, 2015b); (BPS, 2016d); (BPS, 2016e). The prices of rice at rural consumer markets were the monthly average rice prices of rural markets in Indonesia, which were taken from annual publications on the BPS website (BPS, 2013c); (BPS, 2014c); (BPS, 2015c); (BPS, 2016f).

RESULTS

Descriptive Statistics

Descriptive statistics of the data used in this study are presented in Table 1.

Table 1. Constant monthly rice and paddy prices (IDR/kg) 2013–2016

	Minimum	Maximum	Mean	Standard deviation
Paddy price at the farm gate	3535.336	4335.631	3881.446	233.5940
Rice price at producer markets	7042.018	8326.926	7449.362	301.6466
Rice price at wholesalers	8476.472	9720.292	9013.014	386.1790
Rice price at urban consumer markets	9307.449	10603.45	9843.428	399.1952
Rice price at rural consumer markets	7983.542	8554.099	8207.528	142.3741

The table shows constant rice and paddy prices. The constant price was based on the price in January 2013. Thereafter, the price was adjusted based on inflation in Indonesia, as per the BPS data (BPS, 2016). The prices quoted in this study are presented in units of rupiahs (IDR) per kilogram. The average rice price at local producer markets has nearly doubled because paddy price has decreased by 65% (Erwindodo & Pribadi, 2004), and traders must earn a marginal profit. The price of rice sold at rural consumer markets is lower than that at wholesale markets in the city because the channel marketing of rice often comes directly from the rice producer markets. In contrast, the price of rice sold at urban consumer markets is the highest among all the markets because of the long rice marketing channel in Indonesia.

Price Fluctuation Patterns

The patterns of fluctuation in paddy prices at the farm gate and rice prices in producer, wholesaler, and urban and rural consumer markets are shown in Figure 1. These price fluctuations show a similar pattern, indicating price integration.

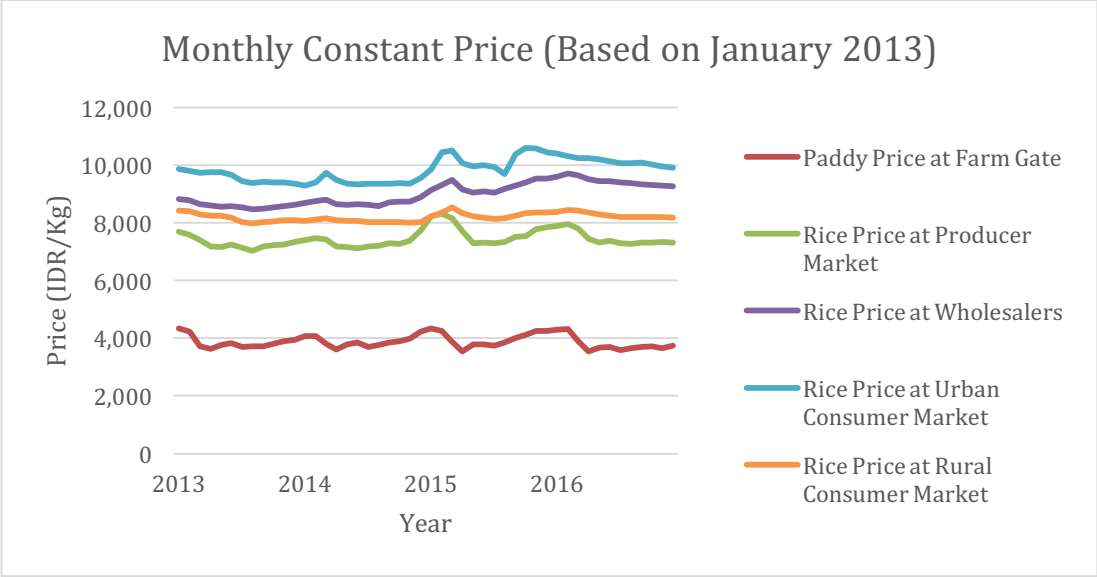

Figure 1. Fluctuation in rice and paddy prices.

Stationary Results

The initial analysis considered price integration using paddy prices at the farm gate as the Y (dependent) variable, and rice prices at producer markets as the X1 (independent) variable. The primary analysis indicated a stationary pattern for each variable based on the augmented Dickey-Fuller test, the results of which are presented in Table 2.

Table 2. Augmented Dickey-Fuller test

Variable	t-statistic	Prob
Y	-5.967073	0.0000
X_1	-4.567770	0.0006
X_2	-4.648217	0.0005
X_3	-5.446859	0.0000
X_4	-4.437941	0.0009

If $\alpha < 0.05$, the variable is significant. The results of this test indicate that all variables in this analysis were stationary, and thus the stationary test was passed.

Optimum Lag and Cointegration Analysis

To determine the optimum lag, we used the likelihood ratio (LR), the final prediction error (FPE), the Akaike information criterion (AIC), the Schwarz information criterion (SC), and the Hannan–Quinn information criterion (HQ). The optimum lags for these criteria are shown in Table 3.

Table 3. Optimum lag

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1280.081	NA	6.25e+19	59.77121	59.97600*	59.84673
1	-1235.744	76.30133	2.57e+19	58.87180	60.10055	59.32492*
2	-1205.026	45.71948	2.07e+19	58.60586	60.85856	59.43658
3	-1178.769	32.97326	2.22e+19	58.54742	61.82407	59.75575
4	-1136.865	42.87923*	1.32e+19*	57.76115*	62.06176	59.34708

The optimum lag test was used to determine how many lags to use in the next analysis. The optimum lag for this analysis was four because this value was best supported based on a number of criteria, namely, the LR, FPE, and AIC. Subsequent to the stationary and optimum lag tests, we conducted cointegration analysis, the results of which are shown in Table 4.

Table 4. Cointegration test

Hypothesized	Eigenvalue	Trace statistic	Critical value at 0.05	Prob.**
None *	0.649041	168.5305	69.81889	0.0000
At most 1 *	0.625953	121.4116	47.85613	0.0000
At most 2 *	0.546108	77.15977	29.79707	0.0000
At most 3 *	0.463318	41.61442	15.49471	0.0000
At most 4 *	0.260969	13.60872	3.841466	0.0002

The table shows that the null hypothesis of no cointegration is rejected, which indicates that all variables in this model are cointegrated. Thus, the model can be considered to have cointegration.

ECM Analysis

Next, we used ECM analysis to determine the influence of rice prices on paddy prices in the short and long terms. The initial ECM analysis assessed the influence of rice prices at producer markets on paddy prices at the farm gate, the results of which are shown in Table 5.

Table 5. The influence of rice prices at producer markets on paddy prices at the farm gate

Variable	Coefficient	Std. error	t-statistic	Prob.
Constant	-0.745986	19.84378	-0.037593	0.9702
Δ Rice prices at producer markets **	1.008314	0.146971	6.860629	0.0000
$U_{1(t-1)}$ **	-1.248155	0.167484	-7.452371	0.0000
Adjusted R-squared	0.585682			
Prob (F-statistic) **	0.000000			

* Significant at α = 0.05
** Significant at α = 0.01

The results of this analysis indicate that the model is significant, which means the variables have a highly significant effect on prices at the farm gate over both short and long terms.

We next analyzed the influence of rice prices at wholesale markets on paddy prices at the farm gate, the results of which are shown in Table 6.

Table 6. The influence of rice prices at wholesale markets on paddy prices at the farm gate

Variable	Coefficient	Std. error	t-statistic	Prob.
Constant	0.445736	21.68462	0.020555	0.9837
Δ Rice prices at wholesale markets **	1.245804	0.215422	5.783073	0.0000
$U_{2(t-1)}$ **	-0.972854	0.159299	-6.107094	0.0000
Adjusted R-squared	0.505103			
Prob (F-statistic) **	0.000000			

* Significant at α = 0.05
** Significant at α = 0.01

The table shows that, in this model, rice prices at wholesale markets and $U_{2(t-1)}$ are significant at the 0.01 probability level, which indicates that rice prices at wholesale markets have a highly significant effect on paddy prices.

In the subsequent analysis, we examined the influence of rice prices at urban consumer markets on paddy prices at the farm gate, the results of which are shown in Table 7.

Table 7. The influence of rice prices at urban consumer markets on paddy prices at the farm gate

Variable	Coefficient	Std. error	t-statistic	Prob.
Constant	2.278920	26.11201	0.087275	0.9309
Δ Rice prices at urban consumer markets *	0.027317	0.147335	0.185406	0.8538
$U_{3(t-1)}$ **	-0.697256	0.164128	-4.248240	0.0001
Adjusted R-squared	0.282381			
Prob (F-statistic) **	0.000300			

* Significant at α = 0.05
** Significant at α = 0.01

The table shows that, in this model, the prices of rice at urban consumer markets have a significant long-term effect on the price of paddy rice, whereas, over the short term, the effect is non-significant, which contrasts with the findings for rice prices at producer and wholesaler market. These finding accordingly indicate that there are certain characteristics of urban rice markets that differ from those of producer and wholesale markets, which warrant further investigation in future studies. In the final ECM-based analysis, we examined the influence of rice prices at rural consumer markets on paddy prices at the farm gate, the results of which are shown in Table 8.

Table 8. The influence of rice prices at rural consumer markets on paddy prices at the farm gate

Variable	Coefficient	Std. error	t-statistic	Prob.
Constant	1.578152	23.05280	0.068458	0.9457
Δ Rice prices at rural consumer markets **	1.222569	0.302087	4.047071	0.0002
$U_{4(t-1)}$ **	-0.849994	0.148270	-5.732760	0.0000
Adjusted R-squared	0.440539			
Prob (F-statistic) **	0.000001			

* Significant at α=0.05
** Significant at α=0.01

Table 8 shows that the price of rice in the rural consumer market has a significant bearing on paddy prices at the farm gate over both the short and long terms. In Table 9, we present a summary of our ECM analyses of the influence of rice prices at the producer, wholesaler, and urban and rural markets on paddy prices at the farm gate.

Table 9. A summary of the results of ECM analyses

Variable	Short term	Long-term
Δ Rice prices at producer markets	significant	significant
Δ Rice prices at wholesaler markets	significant	significant
Δ Rice prices at urban consumer markets	not significant	significant
Δ Rice prices at rural consumer markets	significant	significant

From Table 9, it can be seen that, in the short term, the prices of rice at the producer, wholesaler, and rural markets have a significant influence on the price of paddy rice at the farm gate, whereas the effect of rice prices at urban markets are not significant. Over the long term, however, the prices of rice at all markets have a significant influence on paddy prices at the farm gate.

DISCUSSION

The results of our ECM analyses show that the price of rice at producer markets has a significant influence on paddy price at the farm gate over both the short and long terms. This finding indicates that the government can intervene to change rice prices at producer markets to increase paddy prices at the farm gate. The government institution with such intervention powers is the "*Badan Urusan Logistik (Bulog)*" or Agency for Logistics Affairs, the aims of which are maintenance of the underlying price of paddy, rice price stabilization, distribution of rice to the poor, and food stock management (Bulog, 2015).

Intervention by the Bulog to change rice prices at producer markets can be a useful measure, given that producer market rice prices have a significant influence on paddy prices at the farm gate. Bulog can achieve this effect by purchasing rice at producer markets to drive up rice prices.

Similar to the influence of rice prices at producer markets, wholesaler market rice prices have a significant impact on stimulating paddy prices at the farm gate. The government can intervene in this market through changes in rice pricing policy and can also impose high tariff barriers to curb imports from international rice markets (Tsakok, 1990). Although this policy is not applicable to the global market, it is necessary to protect rice prices on the domestic market. Lower rice prices on the international rice market can lead to decreasing rice prices at wholesale markets, which in turn can be integrated with paddy prices at the farm gate. The resulting decrease in paddy prices could result in a reduction in rice production, which in the long term could threaten food security in Indonesia.

Over the short term, we found that urban market rice prices are not significantly integrated with paddy prices at the farm gate. In this case, however, government intervention would not be necessary, although such intervention may be warranted over the long term.

Rural market rice prices provide a significant stimulus to paddy prices at the farm gate, and in this regard, the Bulog can intervene by purchasing rice. In Indonesia, there is a high level (14.7%) of rural poverty (BPS, 2017). Among the rural poor, food accounts for 70% of

household expenditure (Zeigler, 2005), and consequently a high rice price policy would represent a considerable burden on poor people in rural communities. Under this circumstance, the Bulog can distribute rice to the rural poor, in line with its mission to minimize the detrimental impacts of high rice prices on rural society.

CONCLUSION

In Indonesia, high paddy prices at the farm gate are necessary to maintain food security. The price of rice traded on the producer, wholesaler, and rural consumer markets provide a significant stimulus for paddy prices at the farm gate over both short and long terms. In contrast, urban consumer market rice prices are not significantly integrated with farm gate paddy prices over the short term. In order to prevent a decrease in paddy rice prices, the government can, when necessary, intervene to adjust rice pricing at the levels of producer, wholesaler, and rural consumer markets. Such price intervention can stimulate an increase in paddy prices at the farm gate, thereby contributing to enhanced food security in Indonesia.

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References

B. Yu and S. Fan, "Rice Production Response in Cambodia," *Agricultural Economics,* vol. 42, no. 3, pp. 437-450, 2011.

S. Robinson, N. N. San, A. Suryana, Hermanto, D. Swastika and S. Bhari, "Rice Price Policies in Indonesia: A Computable General Equilibrium (CGE) Analysis," International Food Policy Research Institut, Washington, D.C. 20006, U.S.A., 1997.

P. C. Timmer, "Food Security and Rice Price Policy in Indonesia: The Economics and Politics of the Food Price Dilemma," Bappenas, Indonesia, 2002.

U. Farooq, T. Young, N. Russell and M. Iqbal, "The supply response of basmati rice growers in Punjab, Pakistan: Price and non-price determinants," *Journal of International Development,* vol. 13, no. 2, pp. 227-237, 2001.

P. A. Seck, E. Tollens, C. Marco, A. Diagne and I. Bamba, "Rising trends and variability of rice prices: Threats and opportunities for sub-Saharan Africa," *Food Policy,* vol. 35, no. 5, pp. 403-411, 2010.

S. Zohir, Q. Shahabuddin and M. Hossain, "Determinants of rice supply and demand in Bangladesh: recent trends and projections," in *Developments in the Asian Rice Economy*, Los Banos, IRRI, 2002, pp. 127-152.

J. Meyer and S. V. Cramon-Taubadel, "Asymmetric Price Transmission: A Survey," 2002.

P. Conforti, "Price Transmission in Selected Agricultural Markets," FAO, 2004.

B. K. Goodwin, "Spatial and Vertical Price Transmission in Meat Markets," in Market Integration and Vertical And Spatial Price Transmission In Agricultural Markets Workshop April 21, 2006 at the University of Kentucky, Lexington, 2006.

B.-i. Ahn and H. Lee, "Vertical Price Transmission of Perishable Products. The Case of Fresh Fruits in the Western United States," Journal of Agricultural and Resource Economics, vol. 40, no. 3, p. 405–424, 2015.

F. Asche, S. Jaffry and J. Hartman, "Price transmission and market integration: vertical and horizontal price linkages for salmon," Applied Economics, vol. 39, no. 19, pp. 2535-2545, 2007.

S. v. Cramon-Taubadel, J.-P. Loy and J. Meyer, "The impact of cross-sectional data aggregation on the measurement of vertical price transmission: An experiment with German food prices," Agribusiness, vol. 22, no. 4, p. 505–522, 2006.

J. Yang, D. A. Bessler and D. J. Leatham, "The Law of One Price: Developed and Developing Country Market Integration," Journal of Agricultural and Applied Economics, pp. 430-440, 2000.

S. Mohanty, W. Meyers and D. Smith, "A Reexamination of Price Dynamics in the International Wheat Market,"

Canadian Journal of Agricultural Economics, vol. 47, pp. 21-29, 1999.

G. S. Muwanga and D. Snyder, "Market Integration and The Law of One Price: Case Study of Selected Feeder Cattle Markets," Utah State University, Utah, 1997.

C. Katrakilidis, "Testing for Market Integration and The Law of One Price: An Application to Selected European Milk Market," International Journal of Economic Research, vol. 5, no. 1, pp. 93-104, 2008.

A. Elberg, "Sticky prices and deviations from the Law of One Price: Evidence from Mexican micro-price data," *Journal of International Economics,* vol. 98, pp. 191-203, 10 10 2015.

F. G. Baquedano and W. Liefert, "Market Integration and Price Transmission in Consumer Markets of Developing Countries," *Food Policy,* vol. 44, pp. 103-114, 2014.

M. Ravallion, "Testing Market Integration," *American Journal of Agricultural Economics,* vol. 68, no. 1, pp. 102-109, 1985.

C. Sekhar, "Agricultural market integration in India: An analysis of select commodities," *Food Policy,* vol. 37, pp. 309-322, 2012.

D. Zhou and D. Koemle, "Price transmission in hog and feed markets of China," *Journal of Integrative Agriculture,* vol. 14, no. 6, pp. 1122-1129, 2015.

S.-W. Xu, X.-x. Dong, Z. M. LI and G. Q. LI, "Vertical Price Transmission in the China's Layer Industry Chain: an Application of FDL Approach," *Agricultural Sciences in China,* vol. 10, no. 11, pp. 11812-11823, 2011.

C. O. Emokaro and A. Ayantoyinbo, "Analysis of Market Integration and Price Variation in Rice Marketing in Osun State, Nigeria," *American Journal of Experimental Agriculture,* vol. 4, no. 5, pp. 601-618, 2014.

S. B. Ohen and S. O. Abang, "Evaluation of Price Linkages Within the Supply Chain of Rice Markets in Cross River State, Nigeria," *Journal of Agriculture and Social Research,* vol. 11, no. 1, pp. 156-163, 2011.

I. Tsakok, Agricultural Price Policy, New York: Cornell University Press, 1990.

P. C. Timmer, "Food Security in Indonesia: Current Challenges and the Long-Run Outlook," Center For Global Development, 2004.

Menteri Keuangan, “Peraturan Menteri Keuangan No. 9 3 / PMK.011 / 2007 Penetapan Tarif atas Impor Beras,” 2016. [Online]. Available: http://www.sjdih.depkeu.go.id/fulltext/2007/93~PMK.011~2007Per.htm. [Diakses 6 12 2016].

Kementerian Pertanian, "Kinerja Satu Tahun Kementerian Pertanian," 2015. [Online]. Available: http://www.pertanian.go.id/assets/upload/doc/kinerja%20kementan%202015.pdf. [Accessed 23 11 2016].

Kementerian Perdagangan, "Analisis Perkembangan Harga Bahan Pangan Pokok di Pasar Domestik dan Internasional," 11 2015. [Online]. Available: http://www.kemendag.go.id/files/pdf/2015/12/17/analisis-perkembangan-harga-1450334941.pdf. [Accessed 24 11 2016].

Bulog, "Ketahanan Pangan [Food security]," 2015. [Online]. Available: http://www.bulog.co.id/ketahananpangan.php. [Accessed 8 9 2015].

R. Zeigler, "Rice Research Development: Supply- Demand, Water, Climate, and Reasearch Capacity," in *Revitalisasi Pertanian dan Tarian Peradaban [Revitalization of Agriculture and dance Civilization]*, Jakarta, Kompas, 2005.

K. Peiffer, "Volatile Rice Price. Influence on Indonesia's Domestic Market," Humblot-Universitat Zu Berlin, Berlin, 2013.

P. Warr and A. A. Yusuf, "World food prices and poverty in Indonesia," *Australian Journal of Agricultural and Resource Economics,* vol. 58, no. 1, pp. 1-21, 2013.

N. McCulloch, "Rice Prices and Poverty in Indonesia," *Bulletin of Indonesian Economic Studies,* vol. 44, no. 1, pp. 45-63, 2008.

BPS, "Harga Gabah Kering Panen di Indonesia," 2016a. [Online]. Available: https://www.bps.go.id/linkTabelStatis/view/id/158.. [Accessed 31 6 2017].

BPS, "Harga Beras Medium di Tigkat Produsen," 2016b. [Online]. Available: https://www.bps.go.id/linkTableDinamis/view/id/1102. [Accessed 31 6 2017].

BPS, "Statistik Harga Produsen Beras di Penggilingan 2013-2016 [Rice Producer Price Statistics in Milling 2013-2016]," BPS, Jakarta, 2017.

BPS, "Perkembangan Mingguan Harga Eceran Beberapa Jenis Bahan Pokok Januari-Juni 2013 [Weekly Progress of Retail Price of Some Kinds of Staple from January to June 2013]," BPS, Jakarta, 2013a.

BPS, "Perkembangan Mingguan Harga Eceran Beberapa Jenis Bahan Pokok Juli-Desember 2013 [Weekly Progress of Retail Price of Some Types of Staple Materials July-December 2013]," BPS, Jakarta, 2013b.

BPS, "Perkembangan Mingguan Harga Eceran Beberapa Jenis Bahan Pokok di Ibukota Provinsi seluruh Indonesia Januari-Juni 2014 [Weekly Progress of Retail Price of Several Basic Goods in the Provincial Capital throughout Indonesia from January to June 2014]," BPS, Jakarta, 2014a.

BPS, "Perkembangan Mingguan Harga Eceran Beberapa Bahan Pokok di Ibukota Provinsi Seluruh Indonesia Januari-Juni 2015 [Weekly Progress of Retail Price of Some Basic Goods in the Capital of the Province of Indonesia from January to June 2015]," BPS, Jakarta, 2015a.

BPS, "Perkembangan Mingguan Harga Eceran Beberapa Bahan Pokok di Ibukota Provinsi Seluruh Indonesia Juli-Desember 2015 [Weekly Progress of Retail Price of Some Basic Goods in the Capital of the Province of Indonesia from July to December 2015]," BPS, Jakarta, 2015b.

BPS, "Perkembangan Mingguan Harga Eceran Beberapa Jenis Bahan Pokok di Ibukota Provinsi Seluruh Indonesia 2016 Januari-Juni [Weekly Progress of Retail Price of Some Kinds of Basic Goods in the Capital of the Province of Indonesia 2016 January-June]," BPS, Jakarta, 2016d.

BPS, "Perkembangan Mingguan Harga Eceran Beberapa Jenis Bahan Pokok di Ibukota Provinsi Seluruh Indonesia 2016 Juli-Desember [Weekly Development of Retail Price of Several Kinds of Basic Goods in the Capital of the Province of Indonesia 2016 July-December]," BPS, Jakarta, 2016e.

BPS, "Statistik Harga Konsumen Perdesaan Kelompok Makanan Data 2013 [Rural Consumer Price Statistics Food Group Data 2013]," BPS, Jakarta, 2013c.

BPS, "Statistik Harga Konsumen Perdesaan Kelompok Makanan 2014 [Rural Food Consumer Price Statistics 2014]," BPS, Jakarta, 2014c.

BPS, "Statistik Harga Konsumen Perdesaan Kelompok Makanan [Rural Consumer Price Statistics Food Group]," BPS, Jakarta, 2015c.

BPS, "Statistik Harga Konsumen Perdesaan Kelompok Nonmakanan 2016 [Rural Consumer Price Statistics In Rural Food Group 2016]," BPS, Jakarta, 2016f.

BPS, "Indeks Harga Konsumen dan Inflasi Bulanan Indonesia [Indonesia Consumer Price Index and Monthly Inflation]," 2016. [Online]. Available: https://www.bps.go.id/statictable/2009/06/15/907/indeks-harga-konsumen-dan-inflasi-bulanan-indonesia-2005-2018.html. [Accessed 14 6 2016].

E. Erwindodo and N. Pribadi, "Permintaan dan Produksi Beras Nasional : Surplus atau Defisit," in *Ekonomi Padi dan Beras di Indonesia*, F. Kasryono and E. Pasandaran, Eds., Jakarta, Badan Litbang Pertanian Indonesia, 2004, pp. 559-572.

BPS, "Data dan Informasi Kemiskinan Kabupaten/Kota 2016 [District / City Poverty Data and Information 2016]," BPS, Jakarta, 2017.

