

ANALYSIS OF MARKET INTEGRATION AND GRAIN RICE PRICE TRANSMISSION IN LAMPUNG PROVINCE, INDONESIA (A CASE STUDY)

Adi Destriadi Sutisna^{1*}, Wan Abbas Zakaria², Raden Hanung Ismono², Fembriati Ery Prasmatiw², Dyah Aring Hepiana Lestari²

¹Agricultural Science Doctoral Program, Faculty of Agriculture, Universitas Lampung, Bandar Lampung 35145, Indonesia

²Department of Agribusiness, Faculty of Agriculture, Universitas Lampung, Bandar Lampung 35145, Indonesia

*For correspondence: adid.sutisna@gmail.com

ABSTRACT: This study aims to analyze market integration and price transmission of grain in Lampung Province. The research analysis method used is price integration analysis through a vertical approach with the use of price transmission analysis. The research was conducted in Lampung Province. The type of data used is primary data including rice price data at the farmer level and at the milling level as many as 47 in 2018-2019. The results showed that there was a relatively high short-term and long-term integration between the price of grain at the mill level in Central Lampung Regency (consumers) and the price of grain received by rice farmers (producers). There is a short-term price integration between farmers in Central Lampung and East Lampung. The absence of price integration in the short term in South Lampung Regency. However, there is a coherence in the price of grain for farmers in South Lampung and Central Lampung farmers in the long term. There are short and long-term integration/linkages between farmers in Metro and Tanggamus and farmers in Lampung Tengah both short and long term. The resulting transmission elasticity value is 7.39 more than 1. So in this case it can be concluded that the marketing of grain prices in Lampung Province is not yet efficient and is included in the type of imperfect competition market. There are short and long-term integration/linkages between farmers in Metro and Tanggamus and farmers in Lampung Tengah both short and long term. The resulting transmission elasticity value is 7.39 more than 1. So in this case it can be concluded that the marketing of grain prices in Lampung Province is not yet efficient and is included in the type of imperfect competition market. There are short and long-term integration/linkages between farmers in Metro and Tanggamus and farmers in Lampung Tengah both short and long term. The resulting transmission elasticity value is 7.39 more than 1. So in this case it can be concluded that the marketing of grain prices in Lampung Province is not yet efficient and is included in the type of imperfect competition market.

Keywords: Grain rice, market integration, and price transmission.

INTRODUCTION

Rice is a staple food source for Indonesians. Sudaryanto shows that more than 95% of Indonesia's population depends on rice [1]. In addition, Nuryanti states that rice has created an industry that has links from the upstream to downstream sectors [2], and many parties have an interest in it so that self-sufficiency is something that is considered important by whoever the government is in power. The strategic value of rice has made rice a political commodity, especially for the government. Bahasjah *et al.* added that the rice self-sufficiency policy has been and will still be implemented in line with the increase in Indonesia's population [3]. Referring to the theory put forward by Thomas Robert Malthus (1766-1834) states that population growth grows sequentially while the food supply grows arithmetic. This means that the population growth rate is faster than the rate of food growth, which in the long run will have an impact on the crisis of natural resources and people will scramble to get food to meet their needs. The government's efforts to achieve rice self-sufficiency continue to be made considering that Indonesia is a large country with a population of 255 million [4].

The government's efforts through various programs to increase production have been carried out since the New Order era until today. In the current administration, the government's efforts to achieve self-sufficiency are carried out through the special effort program policy (SEPP/ in Indonesia known as UPSUS) for rice, corn, and soybean [5]. Ponto *et al.* show that in 2015 the government through the Ministry of Agriculture has disbursed funds from the State Expenditure Development Budget (APBN)

amounting to IDR 16.9 trillion [6]. The number of funds will certainly have a relatively large impact on increasing production. This condition has been confirmed by Wijaya *et al.* [7] who reports that there has been an increase in rice production in various regions in Indonesia.

Farmers are the main actors in producing food production in farming. However, the condition of farmers in Indonesia is currently not able to optimally perform their farming performance. This is reflected in the rice productivity trend in Lampung Province in 2017-2018 which continues to decline and the productivity of rice produced is still below the average national productivity [5]. In addition, most farmers have not been able to create added value from their farming, have not been able to establish partners related to their farming.

The problem of unhulled rice farmers as producers is always faced with low bargaining conditions on the sale of their agricultural products. This is because agricultural products are perishable and seasonal, which causes prices to fluctuate. In addition, the dependence of farmers to buyers, in this case, is milling middlemen. The marketing chain for unhulled rice is so long that farmers receive relatively low prices. Based on the description above, an in-depth study is needed regarding the integration of the grain market at the producer (farmer) level with the price of grain received by consumers (milling) through price elasticity in Lampung Province. This analysis aims to determine how much integration is between producer and consumer markets. The results of this study can be used as input and consideration in determining future government pricing policies.

EXPERIMENTAL SECTION

The analysis of grain market integration in this study used secondary data from time series of weekly grain prices during the 2018 period totaling 47-grain price data at the producer (farmer) level and prices at the consumer level (milling). Data were collected using documentation methods, namely by collecting data, objective notes, and data reports obtained from the source. Data collection was carried out on the month of September to October 2019 at National Logistical Supply Organization which was held in Lampung Province.

Guidon in this research is to analyze price coherence through a vertical approach using price transmission analysis. Price transmission analysis is used to describe the extent of the impact of changes in the price of goods at the consumer or retailer level on price changes at the producer or producer level [8]. This study analyzes the integration of the grain rice market at the consumer level against changes in the price of grain at the producer (farmer) level in Lampung Province.

The analytical tool used to integrate the price of grain is the Index of Market Connection (IMC). IMC is an index that is limited as the ratio of the secondary market coefficient in the previous period (t-1) to the primary market (reference) in the previous period [9]. This analysis is to measure how the integration between the price of grain rice at the central rice farmer (Central Lampung Regency) whether it affects the price of grain rice in several districts (East Lampung, South Lampung, Metro, and Tanggamus districts) by considering past prices and current prices. The econometric model is estimated using the Ordinary Least Square Method.

$$HJ_t = b_1 (HJ_{t-1}) + b_2 (HA_t - HA_{t-1}) + b_3 (HA_{t-1}) + et \tag{1}$$

where

- HJ_t = Average price of grain at the farmer level
- HJ_{t-1} = The difference in the price of MT I grain at the farmer level with the MT I grain price at the milling level
- HA_t = Average price of grain at farmer level
- HA_{t-1} = The difference between the MT II grain price at the farmer level and the MT II grain price at the milling level
- bi = Estimated parameter
- et = Model error

Index of Market Connection (IMC), is defined as:

$$IMC = b_1 / b_3 \tag{2}$$

A market is called integrated in the short run, if $b = -1$ and $IMC = 0$. If the market is not integrated into the short run, the value of $IMC = \infty$ (the values of d and b are the same). If $IMC < 1$, it can be concluded that the reference market has a strong relationship, on the contrary, if $IMC > 1$, the reference market does not exist.

Long-run integration is indicated by the coefficient c (b₂), that is, if the value of c (b₂) is equal to 1, there will be integration in the long run (prices from the reference market are transmitted proportionally to the secondary market). Long-term market integration is also called market linkage in explaining how marketers succeed in linking geographically separated markets through information and commodities. Meanwhile, short-term integration can be seen from the value of b₂, the closer to one the value of b₂, the higher the degree of association. Price transmission is

measured by simple regression between two prices at two market levels, and then it is calculated. The stages of analysis are as follows: (i) calculating the correlation value (r); (ii) determine the value of the equation; (iii) statistical model test; and (iv) calculating the value of price transmission elasticity (et). The first step is to calculate the correlation value (r) first.

$$r = \frac{[n\sum XiYi - \sum Xi \sum Yi]}{\sqrt{[n\sum Xi^2 - (\sum Xi)^2] [n\sum Yi^2 - (\sum Yi)^2]}} \tag{3}$$

where:

r = The correlation of grain prices in market X (consumer) and market Y (producer)

n = Number of samples

Xi = price of grain rice at market X (consumer) (Rp/Kg)

Yi = Price of grain rice at market Y (producer) (Rp / Kg)

The classification of r values is greater than [0.80], it can be concluded that the relationship between variable X and variable Y is strong or perfect, while the r-value is less than [0.80], it can be concluded that the relationship between variable X and variable Y is weak [10]. Furthermore, the correlation value (r) is used in the second step. The parameter of the correlation value (r) is used in estimating the simple linear regression equation model with the following formula:

$$Pf = b_0 + b_1 Pr \dots\dots$$

The regression coefficients b₁ and b₀ are found using the formula:

$$b_1 = \frac{n\sum PrPf - \sum Pr \sum Pf}{n\sum Pr^2 - (\sum Pr)^2} \tag{4}$$

$$b_0 = \overline{PF} - bPr \tag{5}$$

where:

n = Number of pairs of observations

b₀, b₁ = Regression coefficient

Model testing is used to determine the accuracy of the sample regression function in estimating the actual value. According to Ghozali [11], the accuracy of the regression function can be measured by the goodness of fit. Statistically, model testing is done using the coefficient of determination (R²) test, t-test, and statistical test multicollinearity. The final step is to calculate the value of the price transmission elasticity (et). Price transmission elasticity (et) is calculated by looking at the relationship between prices at the farm level and prices at the consumer level (milling). Price transmission elasticity is calculated as the ratio of the relative change in price at the producer level (Pf) to the relative change in price at the consumer level (Pr). The calculation of the value of price transmission elasticity uses the following formula:

$$et = \frac{\partial Pf}{\partial Pr} \times \frac{Pr}{Pf} \tag{6}$$

where:

et = Price transmission elasticity

∂Pr = Change in price at the consumer level

∂Pf = Change in price at the producer level

P_r = average price at the consumer level

P_f = average price at the producer level

The et value criteria are as follows:

If et = 1, a 1 percent change in price at the consumer level will result in a 1 percent change in price at the producer level, a perfectly competitive market, and an efficient trading system.

If et > 1, a 1 percent change in price at the consumer level will result in a price change of greater than 1 percent at the

producer level, a competitive market is imperfect, and the market is not yet efficient.

If $\epsilon < 1$, a price change of 1 percent at the consumer level will result in a price change of less than 1 percent at the producer level, a competitive market is imperfect and the market is not yet efficient.

Table 1. The results of market integration analysis between the price of grain at the producer (farmer) level and the price of grain at the consumer level (milling) in Lampung Province

Farming integration with PP	Coeff	t	Sig.	IMC	b2
(Constant)	,000	1,213E-07	1,000		
X1	-,500	-1,052E+08	0,000	,500	,500
X2	-,500	-9,187E+07	0,000		
X3	1,000	8,268E+07	0,000		
R Square	1,000				
Adjusted R Square	1,000				

Source: processed data, 2020.

RESULTS AND DISCUSSION

Different market conditions are said to be integrated if price changes in one market are manifested in the same price response in other markets [9]. Meyer & Von Cramon-Taubadel [12] and Yustiningsih [13] state that neo-classical economists believe that price is the main indicator that can reflect the level of efficiency of a market. Price transmission and the level of market integration can be used as an indication of the efficiency formed between two interacting markets, both vertically and spatially. Vertical market integration is used to see the level of closeness of).

Table 2. Results of market integration analysis between grain prices at producer (farmer) level between districts in Lampung Province

	Ket	Coeff	T	Sig.	IMC	b2	Note	
							Short-term	Long-term
East Lampung	(Constant)	2937,668	7,682	,000	-0.47906	,252	✓	
	x1	-,140	-1,189	,249				
	x2	,252	2,632	,016				
	x3	,292	3,188	,005				
	R Square	,347						
	Adj R2	,249						
South Lampung	(Constant)	,000	1,808E-07	1,0000	1.4400	,500		✓
	x1	,500	6,576E+07	0.0000				
	x2	,500	7,365E+07	0.0000				
	x3	1,000	9,356E+07	0.0000				
	R Square	1,000						
	Adj R2	1,000						
Metro	(Constant)	,000	1,307E-07	1,0000	0.5000	,500	✓	✓
	x1	,500	1,475E+06	0.0000				
	x2	,500	1,271E+05	0.0000				
	x3	1,000	1,383E+04	0.0000				
	R Square	1,000						
	Adj R2	1,000						
Tanggamus	(Constant)	,000	1,040E-07	1,0000	0.5000	,500	✓	✓
	x1	,500	1,385E+08	0.0000				
	x2	,500	1,244E+08	0.0000				
	x3	1,000	1,604E+08	0.0000				
	R Square	1,000						
	Adj R2	1,000						

Source: Processed data, 2020.

the relationship between the two markets in a marketing chain. Vertical market integration is influenced by the even distribution of price information to all marketing institutions (producers-middlemen-consumers).

Changes in prices in one market are partially or totally transmitted to prices that occur in other markets, either in the short or long term. The transmission and utilization of information in various markets can result in the prices of certain commodities moving simultaneously in these various markets [14].

The research results analysis of market integration between the price of grain at the producer (farmer) level and the price of grain at the consumer level (milling) in Lampung Province can be seen in Table 1.

The IMC value obtained was 0.500 (IMC <1) indicating a relatively high short-term integration/integration between the price of grain at the mill level (consumers) against the price of grain received by rice farmers (producers). Grain mills (consumers) and rice farmers (producers) are said to have a perfectly integrated relationship in the short term if the correlation coefficient (b2) is more than 0.500.

The IMC value for farmers in East Lampung is 0.4790 which indicates that there is an integration/integration of short-term prices between farmers in Central Lampung and East Lampung, meaning that if there is a price change for farmers in Central Lampung it will affect the price of farmers in East Lampung in the short, while the b2 value of 0.252 means that the coefficient of b2 <0.5, which indicates that there is no long-term price integration/integration between farmers in Central Lampung and farmers in East Lampung (Table 2).

The results of the IMC calculation for farmers in South Lampung are different from those in East Lampung because the IMC value is > 1 which indicates the absence of price integration in the short term, but in the calculation of b_2 it is 0.50001 which means that there is an integrated price of grain for farmers in South Lampung Central Lampung farmers in the long term this is due to the productivity of rice farming in South Lampung currently in second place after Central Lampung, but in the long term, South Lampung Regency has the possibility to become a rice production center in Lampung Province so that it becomes a reference for rice grain prices in Lampung Province.

Furthermore, the IMC calculation for farmers in Metro and Tanggamus has the same value, which is 0.5000 and the calculation for b_2 is 0.5001, which means that farmers in Metro and Tanggamus have price integration with farmers in Central Lampung both in the short and long term. It is due to rice production in Metro and Tanggamus. In addition, the two regions have the same strategic and potential areas that can even take up production in Central Lampung, so that in the long run Metro and Tanggamus Regencies can become production centers and reference areas for grain prices in Lampung Province.

The results of the regression analysis of the model are used to calculate the elasticity of price transmission (et). The resulting transmission elasticity value is 7.39 more than 1. This means that a 1 percent change in the price of grain at the consumer level (milling) will have an impact on price changes greater than 1 percent at the producer (farmer) level. This condition shows that each rate of change in the price of grain at the consumer level (milling) will have a greater effect on the rate of change in grain prices at the producer (farmer) level. This is in line with the results of research by Weldegebrhel *et al.* [15] and Etienne *et al.* [16] stated that the relative price transmission rate under imperfect market competition can be greater or smaller under the assumption of variable market power behavior and depending on decreasing or increasing market behavior. So in this case it can be concluded that the marketing of grain prices in Lampung Province is not yet efficient and is included in the type of imperfect competition market. In line with Yuniarti's research [17] that if the value of et is formed > 1 , the marketing is not efficient.

According to Widiastuti [18], the occurrence of imperfect market competition tends to result from the determination of the selling price is controlled by collector traders, resulting in too high marketing margins. In addition, intermediary traders can freely abuse their market power for their own interests, and cause the process of price adjustment between marketing levels to be imperfect [19]. However, grain marketing in Lampung Province continues. According to Yuniarti [17], there are several reasons for the imperfect market competition process, including: (1) farmers have to sell their products to earn income/cash; and (2) there are certain social relationships between producer farmers and buyers (traders), including kinship and farm capital loan relationships. Therefore, the government's role is needed to regulate the grain market in Lampung.

CONCLUSIONS

The results showed that there is relatively high short-term and long-term integration between the price of grain at the mill level in Central Lampung Regency (consumers) to the price of grain received by rice farmers (producers) indicated by an IMC value of 0.500 (IMC < 1) for the short and long term length $b_2 > 0.500$. Integration/linkages between districts in Lampung Province is also indicated by the IMC and b_2 values which result that farmers in Central Lampung and East Lampung have short-term price integration/integration, while they do not have long-term linkages (coefficient $b_2 < 0.5$). Farmers in South Lampung do not have price integration in the short term. However, there is a coherence in the price of grain for farmers in South Lampung and Central Lampung farmers in the long term.

The resulting transmission elasticity value is 7.39 more than 1. So in this case it can be concluded that the marketing of grain prices in Lampung Province is not yet efficient and is included in the type of imperfect competition market.

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