

Integration between the benchmarking market and the retail market for Curly Chili Commodities in Makassar City

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9
Integration between the benchmarking market and the retail market for Curly Chili Commodities in Makassar City

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Abstract. Market integration is related to marketing agencies which plays a role in connecting producers or traders with consumers. The chili trader as marketing agencies, caused price changes in the benchmarking market with prices in the retail market because the distribution of goods from the benchmarking market to the retail market take marketing costs and profits. It will cause the price of a commodity in one market to differ from another. This study aims to analyze the integration between the benchmarking market and the retail market. The data analysis technique used is the Index of Market Connection (IMC) analysis, the Stationarity Test, and the Cointegration Test. The results of this study indicate that the integration of the curly chili market between Terong Market and Toddopuli Market has an IMC value of 0.55 that indicates a high short-term market integration. Meanwhile, for Terong and Pabaeng-baeng Market, the IMC value was 1.11 indicating a low short-term market integration, so that Terong Market was not the main factor affecting the price formation in Pabaeng-baeng Market.

1. Introduction

The demand for chili commodities in Indonesia is uncertain because of changing the needs of each month for this commodity. The need for this commodity is increasing in line with the varied types and menus of food that use this product. Also the export of non-oil and gas commodities. Mainly for curly chilies, because this is why curly chilies have a high selling price [1].

Likewise, with the demand for chili commodity in Makassar City, where the demand cannot be met from within the region itself. Because Makassar City is not produced large amounts of curly chilies, so to fill the demand, Makassar City must supply from the other region outside Makassar. The marketing activity of agricultural products, especially the curly chili commodity, in determining the price is entirely determined by the market mechanism so that at any time the price at the producer level and the consumer level can change.

Marketing of curly chilies is an economic activity that affects the high and low income of chili farmers. High production does not give big profits to farmers without good and efficient marketing. Marketing will run well and efficiently if information about the product can be known by all parties, including information on types of commodities, quality, price, market, and availability [2].

In general, marketing is considered as the process of the flow of goods that occurs in the market. In this case, the goods flow from the producer to the end consumer which is accompanied by the addition of the form through the processing process, the use of space through the transportation process, and the use of time through the storage process. The location of agricultural production is often far apart



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from the place of the producer. In order for this agricultural production to be utilized by consumers, the agricultural commodity must be transported and then distributed from the producer location to the consumer's hand [3].

A market is needed in the marketing process of curly chilies as a place for producers to deliver their products to consumers [4]. Kotler [5] says that the market is a collection of all potential customers who share needs, desires who may want and can engage in exchanges to satisfy needs or wants. Therefore, farmers will try to market their produce to a market that can accommodate their farming products at a favorable price. Under certain conditions, all prices in the market are uniform or the same after taking into account the additional costs for the use of place, time and form. However, the fact is that prices are not always the same in every market, so they state that the price difference between markets is comparable to the cost of moving products between markets [6].

The linkage of prices at various levels of stakeholders in allocating commodities from producers to consumers due to changes in place, time, and form of commodities is referred to as market integration. There are two kinds of market integration, namely horizontal market integration and vertical market integration. Horizontal market integration is market integration that occurs between producers. Meanwhile, vertical market integration is market integration between markets at the producer level and the market at the consumer level [7].

Market integration model can be used to measure how prices in the local market are affected by prices in the reference market by considering the price at a certain time (t) and the price at the previous time (t-1). The activities of these markets are linked by the flow of commodities so that the price and quantity of commodities marketed will change if there are price changes in other markets [8].

Prices formed in the benchmarking market cannot follow price changes that occur in the retail market due to lack of information. This will cause a relatively large price difference. In each marketing agency, prices are interrelated with one another, so this will affect price changes both at the reference market level and at the retail market level. In other words, there is a relationship between prices at the reference market level and prices in the retail market.

In Makassar itself, there is the Terong Market as a central market for procurement and distribution of agricultural products to other regions. This market is the initial place for the formation of agricultural product prices circulating in Makassar City. In other words, the Terong Market is a benchmarking for retail markets in the Makassar City area, in this case, Pa'baeng-baeng and Toddopuli Market, so that price formation in the retail market is considered a relevant response to the price in the Terong Market. An illustration of the differences in chili prices at the Terong Market, Pa'baeng-baeng Market and Toddopuli Market can be seen in table 1.

Table 1. Average Prices of Curly Chili in the Terong Market, Pa'baeng-baeng Market and Toddopuli Market in 2017 and 2018 [9]

Market	Chilli Price (IDR/Kg)		Margin between Terong Markets (IDR/Kg)	
	2017	2018	2017	2018
Terong (PT)	17,333	23,063	-	-
Pa'baeng baeng (PB)	17,688	25,500	354	2,438
Toddopuli (PTO)	21,979	30,521	4,646	7,458

Table 1 shows the lowest selling price at the Terong Market in 2017 and 2018. This is because the Terong market is the benchmarking market for the other two markets. The initial price formation process is in the Terong market. The price difference between the Terong Market and Toddopuli also Pa'baeng-baeng Market which is quite large causes the need for information on price changes that occur in the Terong Market to be submitted to the Toddopuli Market and the Pa'baeng-baeng Market. If the market information is not known by the retail market, it will hamper the marketing process of curly chili among these markets. A market is said to be efficient if it can provide price information quickly and accurately. The marketing system is said to be efficient if the markets involved in the

system can utilize all available information. In other words, a market can take advantage of past price information precisely in determining the current price [9].

From this situation, it is necessary to study whether changes in prices at the benchmarking market level will affect price changes at the retail market level and whether past prices will affect prices the next time.

2. Research methods

2.1. Time and location

This research was conducted in 3 traditional markets in Makassar City, namely Terong as a benchmarking market, and Toddopuli and Pabaeng-baeng Market as retail market. The location selection was carried out deliberately (purposive sampling) which was taken based on the broadest consideration of the traditional market, namely the Terong Market which is the center for distribution of agricultural products originating from other areas, especially curly chilies in Makassar City. Meanwhile, Toddopuli and Pa'baeng-baeng Market were chosen because these markets are retail markets that follow the reference price for curly chili commodities in the Terong market.

The research time was carried out using time series data such as weekly data, monthly data, annual data and others [10]. The time used to conduct this research was carried out from August to September 2019. The time series data used in this study are monthly data for 36 months, from January 2016 to December 2018.

2.2. Types and sources of data

The data used is secondary data which is obtained and processed by agencies or institutions that are related to the research such as BPS. The data used in this study are data in the form of monthly curly chili price data and Consumer Price Index (CPI) data which applies in Makassar City.

Secondary data used were obtained from the BPS Makassar City, the Office of Management of the Terong Market, the Pa'baeng-baeng Market, and the Toddopuli Market in Makassar City, as well as the Makassar City Fisheries and Agriculture Office. According to Gujarati [11], the minimum number of observations required in relation to the Durbin Watson table is 15 samples because if a sample is less than 15 then the observations will be very difficult to be able to draw definite conclusions.

2.3. Data analysis method

2.3.1. Stationarity test or unit root test. A stationarity test is conducted to determine whether the data used is stationary or not and avoid spurious regression (false regression). There are several methods to test data stationarity such as Augmented Dickey-Fuller (ADF), Dickey-Fuller GLS (ERS) Phillips-Peron, Ng-Peron, Kwiatkowski-Phillips-Schmidt-Shin, or Elliot-Rothenberg-Stoc Point Optimal. The method used in this study is the Augmented Dickey-Fuller (ADF) method at the same degree to obtain stationary data. This means that there is no data whose variance is not too large and has a tendency to approach the average value. The null hypothesis (H_0) in this study is that there is a unit root (not stationary), while the opposite of this hypothesis Hypothesis one (H_1) means that there is no unit root (stationary). The condition of acceptance or rejection of H_0 is based on the absolute McKinnon value with the statistical ADF test value. Reject H_0 if the statistical ADF test value of each variable is greater than the McKinnon critical value at the determined real level.

2.3.2. Johansen cointegration test. The cointegration test aims to determine whether the variables that are not stationary are cointegrated or not. The cointegration test is carried out if the price variables under study are not integrated at level $I(0)$. This test is conducted to determine whether there is integration in the long term or not. The cointegration test in this study is the Johansen cointegration test, where this test can be used to see the amount of cointegration rank between variables [12]. To test this hypothesis, a trace statistic or maximum eigenvalue test can be used. The presence or absence of

cointegration is based on the likelihood ratio (LR) test. If the calculated LR value is greater than the critical value then we accept the cointegration of some variables and vice versa if the calculated value LR is smaller than the critical value, so there is no cointegration. VAR Model estimation.

3.3. *Market Integration Analysis.* Determine the integration of the curly chili commodity market between the benchmarking market and the retail market in Makassar City. The statistical analysis was carried out of secondary data using the IMC (Index of Market Connection) model approach. This model is written as follows:

Curly Chili for benchmarking market (Terong) with retail market (Toddopuli/Pabaeng-baeng) :

$$HPT_t = b_1(HPT_{t-1}) + b_2(HPTO^*_t - HPTO^*_{t-1}) + b_3(HPTO^*_{t-1}) \quad (1)$$

Information :

- HPT_t = Curly Chili Prices in benchmarking market at time t
- HPT_{t-1} = Curly Chili Prices in benchmarking market at time t-1
- HPTO*_t = Prices of Curly Chili in retail market at the time t
- HPTO*_{t-1} = Prices of Curly Chili in the retail market at the time t-1
- b₁ = Regression coefficient PT_{t-1}
- b₃ = Regression coefficient PTO*_{t-1}
- b₂ = Regression coefficient PTO*_t – PTO*_{t-1}

The big effect of prices on the benchmarking market and the retail market can be determined using the Index of Market Connection (IMC).

$$IMC = b_1/b_3 \quad (2)$$

Information :

- b₁ = Benchmarking Market regression coefficient_{t-1}
- b₃ = Retail Market regression coefficient_{t-1}

The criteria for calculating the IMC value is if the IMC value is <1 and is close to zero. It indicates that the level of market integration is getting higher. This indicates that conditions benchmarking market are the main factor influencing price formation in the retail market. If the IMC value ≥ 1, indicates a low integration market, where the price in the benchmarking market is not fully transformed into the retail market and causes the main factor for price formation in the retail market is only the conditions in the retail market.

The test tool for regression analysis uses the SPSS application to obtain the regression coefficient value for each independent variable. Then the Stationary test tool and Cointegration Test are used. Based on the approach to the problem of market integration between the Terong market with Toddopuli and Pa'baeng-baeng Market is a horizontal market integration, namely between the benchmarking market and the retail market in the short term which can be analyzed by the Index of market connection (IMC).

3. Result and discussion

16. *Market integration analysis of curly chili between terong market and toddopuli market.* Based on the results of the regression analysis, the regression coefficient value of each independent variable (b₁, b₂, b₃) can be obtained. Table 2 is the results of regression analysis prices between the Terong Market and Toddopuli Market.

24
Table 2. Results of regression analysis of curly chili prices between the Terong Market and Toddopuli Market

Independent Variable	Coefficient	Significance
Prices of curly chilies at the Terong Market at the time t-1	0.297 (0.176)	0.101

Difference in curly chilies at Toddopuli Market	0.872 (0.115)	0.000
Prices of curly chilies at Toddopuli Market at the time t-1	0.540 (0.162)	0.002
IMC	0.55	

3.1.1. *The results of the stationarity test between terong market and toddopuli market.* This test was conducted to see the relationship between variables by looking at the consistency of time series data movements and preventing the occurrence of spurious regressions. The data is said to be stationary if the ADF value is less than the critical value of McKinnon. Conversely, if the ADF value is greater than the McKinnon critical value, the data is said to be not stationary.

Table 3. The results of the stationarity test between terong market and toddopuli market.

Variables	Differenced	ADF test statistic	McKinnon Critical Value (5%)	Conclusion
Prices of curly chilies at the Terong Market at the time t-1 (X ₁)	I (0)	-2.8585	-2.9511	Not Stationary
	I (1)	-7.9283	-2.9511	Stasioner
Difference in curly chilies at Toddopuli Market (X ₂)	I (0)	-7.0654	-2.9511	Stasioner
	I (1)	-9.3283	-2.9511	Stasioner
Prices of curly chilies at Toddopuli Market at the time t-1 (X ₃)	I (0)	-3.1191	-2.9511	Stasioner
	I (1)	-6.8220	-2.9511	Stasioner

The results of the stationary test show that the variable price of curly chilies at X₁ (-2.8585) is not stationary at the level, because the ADF value is greater than the McKinnon critical value at the 5% real level. While X₂ (-7.0654) and X₃ (-3.1191) are stationary at the level, but because X₁ is not stationary, the null hypothesis is rejected. Therefore, the unit root test was continued for the first difference. It is indicated that at the 5 percent real level, all variables or data used were stationary (ADF less than the McKinnon value) at the first difference. The stationary variables used to indicate that this study avoids spurious regression which results in high R² but in economics, it has no relationship. The variables are also stationary in avoiding errors or inaccuracies in the estimation results.

3.1.2. *Johansen cointegration test results between terong market and toddopuli market.* Cointegration analysis is carried out to identify long-term attachments and relationships of time series data, where the cointegration test in this study uses the Johansen test approach. The Johansen test is done by comparing the trace statistic value or the maximum eigenvalue with the critical value at the real level of 5 percent. If the trace statistic value or the maximum eigenvalue is greater than the critical value, it indicates that in the equation system there is a long-term or co-integrated relationship. Table 4 shows the results of the Johansen cointegration test between Terong Market and Toddopuli Market.

Table 4. The results of the Johansen cointegration test between the Terong Market and Toddopuli Market, 2019

Number of Cointegration Equations	Trace Statistic Value	Critical Value (5%)
None *	42.49	29.79

At most 1	10.40	15.49
At most 2	3.00	3.84

table 4 shows that there is a long-term cointegration relationship between the price of curly chilies at X₁ (Terong Market Price at Time t-1), X₂ (Price Difference in Toddopuli Market), and X₃ (Toddopuli Market Price at Time t-1). This is indicated by the trace statistic value (42.49049) up to the 5 percent significance level, which shows that there is a cointegration equation. Thus, both Model 1 and Model 2 are not spurious, although individually not all variables are stationary at the level I(0). However, a linear combination of two or more time series data can be stationary. These results confirm that all research data can be used in estimating the research model.

3.1.3. *Market integration between the terongmarket and toddopuli market.* From the analysis results obtained the following equation:

$$HPT_t = 0.297(HPT_{t-1}) + 0.872(HPTO^*_{t-1} - HPTO^*_{t-1}) + 0.540(HPTO^*_{t-1}) \quad (3)$$

The regression results between the Terong Market and Toddopuli Market can be used to determine the level of market integration by looking at the IMC (Market of Connection Index) value. The level of market integration can be measured using the following formulation:

$$IMC = 0.297/0.540 = 0.55 \quad (4)$$

The comparison of the regression coefficient value of the curly chili price variable in the Terong Market in month t-1 (b₁) with the regression coefficient value of curly chili prices in the Toddopuli market in month t-1 (b₃), the IMC value is 0.55 which indicates market integration. Short term high between curly chili prices at the Terong Market and Toddopuli Market. This shows that the conditions in the Terong Market are the main factors that influence price formation in Toddopuli Market. The factor that causes high market integration in the short term between Toddopuli Market and the Terong Market is the relatively close market distance. Another factor is the smoothness of transportation facilities and infrastructure. Adequate road conditions between the two markets have high integration, causing smooth delivery of curly chilies from the Terong Market to the Toddopuli Market. This is supported by research conducted by Katrakilidis [13], a higher level of market integration that occurs due to the response of commodity price can occur quickly and well with the existence of good and adequate transportation infrastructure.

4.2. *Market Integration Analysis of Curly Chili between Terong Market and Pabaeng-baeng Market.* Based on the results of the regression analysis, the regression coefficient value for each independent variable (b₁, b₂, b₃) can be obtained. Following are the results of the regression analysis of the curly chili prices between the Terong Market and the Pabaeng-baeng Market.

Table 5. Results of regression analysis of curly chili prices between Terong Market and Pabaeng-baeng Market

Independent Variable	Coefficient	Significance
Prices of curly chilies at the Terong Market at the time t-1	0.445 (0.167)	0.012
Difference in curly chilies at Pabaeng-baeng Market	0.832 (0.106)	0.000

Price of curly chilies at Pabeng-baeng market at the time t-1	0.398 (0.142)	0.008
IMC	1.11	

3.2.1. *The Stationarity test or Unit Root Test between Terong Market and Pabaeng-baeng Market.* The data stationarity test uses the Augmented Dickey Fuller (ADF) test at the level and first difference. This test is carried out to see the relationship between variables by looking at the consistency of time series data movements and preventing the occurrence of spurious regressions. The data is said to be stationary if the ADF value is smaller than the McKinnon critical value. Conversely, if the ADF value is greater than the McKinnon critical value, the data is said to be not stationary. Table 6 shows the Stationarity Test Results between Terong Market and Pabaeng-baeng Market.

Table 6. Results of Stationarity Test between Terong Market and Pabaeng-Baeng Market.

Variables	Differenced	ADF test statistic	McKinnon Critical Value (5%)	Conclusion
Prices of curly chilies at the Terong Market at the timet-1 (X ₁)	I (0)	-2.8585	-2.9540	Not Stationary
	I (1)	-7.9283	-2.9571	Stationary
Difference in curly chilies at Pabaeng-baeng Market (X ₂)	I (0)	-5.7084	-2.9540	Stationary
	I (1)	-8.9841	-2.9571	Stationary
Price of curly chilies at Pabeng-baeng market at the timet-1 (X ₃)	I (0)	-3.1662	-2.9511	Stationary
	I (1)	-5.5029	-2.9571	Stationary

The results show that the variable price of curly chilies at X₁ (-2.8585) is not stationary at the level, because the ADF value is greater than the critical value of McKinnon at the 5% real level, while X₂ (-5.7084) and X₃ (-3.1662) are stationary at the level, but because X₁ is not stationary then the null hypothesis is rejected. Therefore, the unit root test is continued at the first difference. This indicates that at the 5 percent real level, all variables or data used are stationary at the first difference. The stationary variables used to indicate that this study avoids spurious regression or spurious regression which results in high R² but in economics, it has no relationship. The stationary variables also avoid errors or inaccuracies in the estimation results.

3.2.2. *Cointegration Test Between Terong Market and Pabaeng-baeng Market.* Cointegration analysis carried out to identify long-term attachments and relationships of time series data, where the cointegration test in this study uses the Johansen test approach. The Johansen is done by comparing the trace statistic value or the maximum eigenvalue with the critical value at the real level of 5 percent. If the trace statistic value is greater than the critical value, it indicates that in the equation system there is a long-term or co-integrated relationship. Table 7 shows the results of the Johansen cointegration test between the Terong Market and the Pabaeng-Baeng Market.

Table 7. Johansen cointegration test results between the Terong market and Pabaeng-baeng market

Number of Cointegration Equations	Trace Statistic Value	Critical Value (5%)
None *	46.72649	29.79707

At most 1	15.57915	15.49471
At most 2	3.385473	3.841466

Table 7 shows that there is a long-term cointegration relationship between the price of curly chilies at X_1 (Market Price of Terong at Timet-1), X_2 (Price Difference in Toddopuli Market), and X_3 (Market Price of Toddopuli at Timet-1). This is indicated by the trace statistic value (46.72649) up to the 5 percent significance level, which shows that there is a cointegration equation. Thus, both Model 1 and Model 2 are not spurious, although individually not all variables are stationary at the level I (0), a linear combination of two or more time series data can be stationary. These results confirm that all research data can be used in estimating the research model.

3.2.3. *Market integration between the Terong Market and Pabaeng-baeng Market.* From the results of the analysis, the following equation is obtained:

$$HPT_t = 0.445(HPT_{t-1}) + 0.832(HPB^*_t - HPT^*_{t-1}) + 0.398(HPB^*_{t-1}) \quad (5)$$

The regression results can be used to determine the level of market integration by looking at the IMC (Market of Connection Index) value. The level of market integration can be measured using the following formulation:

$$IMC = 0.445/0.398=1.11 \quad (6)$$

From the comparison of the regression coefficient value of the curly chili price variable in the Terong Market in month t-1 (b_1) with the regression coefficient value of curly chili prices in the Pabaeng-baeng Market in the month t-1 (b_3), it can be seen that the IMC value is 1.11 which indicates a low short-term market integration between curly chili prices at the Terong Market and Pabaeng-baeng Market. In other words, it shows that the conditions at the Terong Market are not the main factor affecting the price formation in the Pabaeng-baeng Market. The factor that causes low market integration in the short term between the Pabaeng-baeng Market and the Terong Market is the considerable distance from the market.

4. Conclusion and suggestion

The short-term integration of the curly chili market between the Terong Market and Toddopuli Market is in 0.55 IMC value. This indicated a high short-term market integration. So the price formation in the Terong Market is influenced by the price in the Toddopuli Market. Meanwhile for the Terong Market and Pabaeng-baeng Market, the IMC value was obtained at 1.11, indicating that there is a low short-term market integration. So that the Terong Market is not the main factor and the price at the Terong Market is not fully influenced by Pabaeng-baeng Market.

To maintain an integrated market condition, it is necessary to improve transportation facilities and infrastructure, making it easier for the distribution of chili commodities to various retail markets in Makassar City.

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