Asymmetric Price Transmission of Red Chili Market in North Sumatra Province, Indonesia

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Abstract. The high disparity in red chili prices between producer prices and consumer prices indicates that farmers and consumers do not benefit from the red chili trade, due to the long marketing channels and market power of intermediaries. Prices that fluctuate and do not reflect actual market conditions indicate the inefficiency of marketing agents is called asymmetric price transmission. This study aims to analyze the transmission pattern of red chili prices from producer to consumer level in North Sumatra Province. The analytical model used in this study is the Asymmetric Error Correction Model (AECM). The data used is secondary data that is systematically recorded in the form of monthly time series data from 2016-2020. The results showed that the price transmission between red chili marketing institutions in North Sumatra Province is asymmetric in the short term and long term in the wholesale-producer and wholesale-consumer relationships.
Keywords: asymmetric; error correction model; price transmission; red chili

INTRODUCTION

Red chili commodity has become a strategic issue for the government because this commodity contributes to inflation. Red chili is one of the commodities contributing to inflation due to high fluctuations in the price of red chili throughout the year. Moghaddasi (2008) states that fluctuating prices affect the efficiency of resource allocation and price transmission in an integrated market, both vertically and spatially. High price fluctuations at the level of marketing institutions, will provide opportunities for market participants, especially those who have the power to influence prices to manipulate prices.

Therefore, traders play a role in creating an efficient or not a market. Distribution is an economic activity that bridges production and consumption so that goods can be channeled from producers to consumers. If the distribution chain can be realized efficiently, then the movement of an item from producer to consumer will be able to be reached at the lowest cost, thus having an impact on a fair distribution of the total price paid by consumers to all parties involved in it.

The pattern of red chili price movements tends to be different every year throughout the year of observation. Vavra (2005) found the behavior of intermediary traders who try to maintain their profit level and will not increase or decrease prices according to the actual price signal. This condition causes price control in the distribution channel, causing imperfect price transmission between producer and consumer levels. Firdaussy (2013) suggests that the higher the distribution margin indicates that the actors in the distribution channel have strong enough market power to set prices above their marginal cost and indicate that the actors are in a concentrated market.

The development of red chili prices at the producer level is relatively more stable compared to prices at the wholesale and consumer levels. Indications of asymmetric price transmission can be seen from the disparity in marketing margins between red chili marketing institutions. Goodwin (2006) states that in analyzing vertical price transmission there are three aspects that need to be considered, namely the magnitude of the response of price adjustments of a market to price changes in other markets, the adjustment time to price lags, the level of asymmetric adjustment whether positive shocks are transmitted differently from negative shock. Prastowo (2008) stated that the market structure at the farmer level is usually in a perfectly competitive market condition, especially at harvest time. The homogeneity and abundance of production make farmers do not have a bargaining

position to determine prices.

Meanwhile, the market structure at the intermediary level tends to be oligopoly and often forms a cartel in the agreement on market prices. This causes intermediaries to have the power to influence price formation. Vavra (2005) states that traders have a role in price formation. Rational traders are profit oriented and will always maximize profit (profit maximization) in every economic activity.

The behavior of traders in responding to price changes tends to be asymmetrical which causes competition restraint on the distribution channel, so that price changes are not transmitted perfectly. Conforti (2004) states that there are five factors that can influence price transmission, namely transportation costs or transaction costs, market power, homogeneous and differentiated products, exchange rates and regional policies. Based on this, this study aims to analyze that the transmission pattern of red chili prices at the producer, wholesaler and consumer levels in North Sumatra Province

METHODS

North Sumatra Province was chosen with the consideration that North Sumatra Province is one of the third largest red chili production centers in Indonesia (BPS, 2020) . The secondary data used to analyze the transmission of red chili prices from the producer level to the consumer level are monthly producer prices, wholesale prices and consumer prices for red chili commodities in North Sumatra Province. The data studied are monthly price data, totaling 60 observations from 2016-2020. The data used is only 5 years because the monthly price data used is 60 research data so that it meets the requirements for the research data used. Secondary data obtained from the Ministry of Agriculture, the Food Security Agency of North Sumatra Province and the Central Statistics Agency (BPS) of North Sumatra Province. The approach used to analyze the red chili price transmission is the Asymmetric Error Correction Model

(AECM) developed by (Cramon, 1996).

1. Unit Root Test
The unit root test estimated the stationary data by performing the Augmented Dickey Fuller Test (ADF Test).

$$P_t = a_0 + \gamma P_{t-1} + \sum_{i=1}^{j} a_i P_{t-i+1} + \varepsilon_t \qquad (1.1)$$

$$\Delta P_t = a_0 + \gamma P_{t-1} + \sum_{i=1} a_i \Delta P_{t-i+1} + \varepsilon_t \quad (1.2)$$

Pt in equation (1.1) is the equation of the variable that is stationary at the level, while in equation (1.2) is the first derivative equation or first difference (Pt-Pt-1)

2. Optimal Lag (Order) Determination
This study uses the Schwarz Information Criterion (SIC) and Hannan - Quinn Criterion (HQ)

$$SIC(k) = T \ln \frac{(SSR(k))}{T} + n \ln(T) \qquad (2.1)$$

$$HQ = -2L_{max} + 2k(\ln(n)) \qquad (2.2)$$

SSR is the residual Sum squares, and n is the number of estimated parameters. Lmax is the log-likelihood ratio

3. Cointegration Test
The variables in the model can be said to be cointegrated if the stationary variable at the same degree moves with the same wavelength (Juanda, 2012). One of the cointegration test methods developed by (Johanssen S, 1991) is the Johanssen Cointegration Test. To see the existence of a long-term relationship, this method uses the trace test (TS) and maximum and minimum eigenvalue (ME) with the equation:

$$\lambda_{trace}(r) = -T \ln(1 - \lambda^2) \qquad (3.1)$$
$$\lambda_{trace}(r) = -T \ln(1 - \lambda_{r+1}) \qquad (3.2)$$

If the trace statistic and maximum eigenvalue > critical value, the equation is said to be cointegrated

4. Causality Test
The causality test in this study used the Granger test with the following model Unrestricted Y and X :

$$Y_t = \sum_{i=1}^{n} \alpha i Y t - 1 + \sum_{i=1}^{n} n \beta_i X_{t-i} + e_1 \qquad (4.1)$$

$$X_t = \sum_{i=1}^{m} \gamma_i X_{t-1} + \sum_{i=1}^{m} \lambda_i Y_{t-i} + e_{1t} \qquad (4.2)$$

Restricted Y and X :

$$Y_t = \sum_{i=1}^{n} \alpha_i Y_{t-1} + e_{2t} \qquad (4.3)$$

$$X_t = \sum_{i=1}^{m} \gamma_i X_{t-1} + e_2 t \qquad (4.4)$$

The analysis was carried out by calculating the F value using the residual sum of square (RSS) equation for the restricted and unrestricted variables as follows

$$F = (n-k)\ \frac{RSS_R - RSS_{UR}}{(m(RSS_{UR})} \qquad (4.5)$$

RSSR = residual sum of squares restricted
RSSUR=residual sum of square unrestricted

5. Analysis of Error Correction Model

This ECM model was first introduced by Sargan, developed by Hendry and popularized by (Robert, 1987). The existence of cointegration in non-stationary time series economic data indicates the possibility of short-term imbalance between the analyzed data but has a long-term relationship. With the ECM model, short-term imbalances will be corrected by including adjustments for short-term imbalance corrections towards long-run equilibrium.

Cramon (1996) by separating positive and negative ECT as well as changes in the increase and decrease in the independent variables to obtain an asymmetric price transmission model, so that the form of the equation is:

$$\Delta P_{i,t} = \beta_0 + \beta_1^+ \Delta P_{j,t}^+ + \beta_1^- P_{j,t}^- + \beta_2^+ ECT_{t-1}^+ + \beta_2^- ECT_{t-1}^- + \beta_3(L)\Delta L_{i,t-1} + \beta_4(L)\Delta L_{j,t-1} + \varepsilon_t \quad (5)$$

Pi is the price in market i, Pj is the price in market j, ECT is the error term, L is the lag polynomial, (+) is the price increase and (-) is the price decrease. Based on this, the analysis of red chili price transmission between producers, wholesalers, and consumers in North Sumatra Province using the Asymmetric Error Correction Model (AECM) is as follows:

$$\Delta HP_t = a_0 + \Sigma_{i=1}^{n} \beta^- \Delta HP_{t-i}^- + \Sigma_{i=0}^{n} \beta^- \Delta HG_{t-i}^- + \Pi_1^- ECT_{t-1}^- + \Sigma_{i=1}^{n} \beta^+ \Delta HP_{t-i}^+ + \Sigma_{i=0}^{n} \beta^+ HG_{t-i}^+ + \Pi_2^+ ECT_{t-1}^+ + \epsilon_t \qquad (5.1)$$

$$\Delta HG_t = a0 + \Sigma_{i=1}^{n} \beta^- \Delta HK_{t-i}^- \Sigma_{i=1}^{n} \beta^- \Delta HG_{t-i}^- + \Pi_1^- ECT_{t-1}^- + \Sigma_{i=1}^{n} \beta^+ \Delta HK_{t-i}^+ + \Sigma_{i=1}^{n} \beta^+ HG_{t-i}^+ + \Pi_2^+ ECT_{t-1}^+ + \varepsilon_t \qquad (5.2)$$

$$\Delta HK_t = a0 + \Sigma_{i=1}^{n} \beta^- \Delta HK_{t-i}^- \Sigma_{i=1}^{n} \beta^- \Delta HP_{t-i}^- + \Pi_1^- ECT_{t-1}^- + \Sigma_{i=1}^{n} \beta^+ \Delta HK_{t-i}^+ + \Sigma_{i=1}^{n} \beta^+ \Delta HP_{t-i}^+ + \Pi_2^+ ECT_{t-1}^+ + \varepsilon_t \qquad (5.3)$$

HPt : Price of red chili producer level in t month (Rp/kg)
HGt : Price of red chili at wholesaler level in t month (Rp/kg)
HKt : The price of red chili at the consumer level in the t month (Rp/kg)
ECT : Error correction term
α : intercept   ε : error term   n : long lag
A positive sign (+) represents an increase in price, and a negative sign (-) represents a decrease in price. ECT^+ is an adjustment of the dependent variable to changes in the independent variable when the price deviation is above its balance, on the contrary ECT^- is an adjustment when the price deviation is below the balance. Testing the asymmetric price transmission in the short term using the following hypothesis: This hypothesis is to test the difference in the coefficients of ECT^+ and ECT^-, meaning that there is no difference in the price response at the downstream level when there is a change in price increases and decreases at the upstream level in the long run. The coefficient value of the ECT indicates the adjustment time required for the follower market to increase or decrease the price according to the price formed in the reference market in order to reach the equilibrium line. The time required for price adjustment to reach long-run equilibrium can be calculated by multiplying the value of the ECT coefficient by 12 months. Tests of price transmission can run symmetrically or asymmetry proven statistically using the wald test.

6. Wald test

Tests of price transmission can run symmetrically or asymmetry proven statistically using the wald test. The hypothesis test in wald's test is :

a) Short Term:
Price symmetry in the short term

$$H_0 : \sum_{i=0}^{n} \beta^- = \sum_{i=0}^{n} \beta^+$$

Price asymmetry in the short term

$$H_1 : \sum_{i=0}^{n} \beta^- \neq \sum_{i=0}^{n} \beta^+$$

b) Long term
$H_0 : \pi^- = \pi^+$ Price symmetry long run
$H_1 : \pi^- \neq \pi^+$ = Price asymmetry long run

   If the results of the Wald test show that H0 is accepted, it means that in the short and long term, the transmission of red chili prices in North Sumatra is symmetrical. If the results of the Wald test show that H0 is rejected, it means that in the short and long term, the transmission of red chili prices in North Sumatra Province is asymmetrical.

RESULTS AND DISCUSSION

Data Stationarity Test

The data stationarity test was carried out using the Augmented Dicky Fuller test (ADF) at a significance level of 5%. The test was carried out at the level and first difference levels. The data is said to be stationary if the t-statistic value of the ADF test results is smaller than the MacKinnon critical value. The results of the stationarity test of red chili price data at the producer, wholesale and consumer levels at the first level and difference can be seen in Table 1.

Table 1. Data Stationarity Test Results

Variable	Section Level		Section First Different	
	Value of ADF Test	Probability	Value of ADF Test	Probability
Producer Price	- 2.755	0.451	- 7.796	0.000*
Wholesale Price	- 2.255	0.220	- 6.201	0.000*
Consumer Price	- 3.038	0.131	- 5.136	0.001*

Note: * stationary at the level of 5%

   Table 1 based on the ADF test value can be concluded that the producer, wholesale and consumer price variables are not stationary at the level. After the stationary test was carried out in the first difference, then all the variables tested were stationary. The existence of non-stationary variables at the level indicates that there is a long-term relationship (cointegration) between the variables, so it is necessary to carry out a cointegration test to ensure the existence of long-term relationship between the variables used.

Optimum Lag Determination

Determination of optimal lag aims to see how long a variable reacts to other variables. Determination of the optimum lag in this study using the Schwarz Information Criterion (SC) and Hannan Quinn Information Criterion (HQ). The results of determining the optimal lag on the price of red chili at the producer, wholesaler and consumer levels in North Sumatra Province can be seen in Table 2 below.

Table 2. Optimum Lag Determination Results

Lag	LogL	Criteria	
		SC	HQ
0	-1670.089	60.94910	60.88195
1	-1568.921	57.92599*	57.65739*
2	-1558.701	58.21011	57.74006
3	-1556.222	58.77573	58.10423
4	-1552.949	59.31243	58.43948
5	-1550.812	59.89048	58.81608

Note: * Indication of order lag based on criteria

   Based on the Schwarz Information Criterion (SC) and Hannan Quinn Information Criterion (HQ), the optimum lag length used in the red chili price transmission

model at producer, wholesaler and consumer levels is lag 1.

Cointegration Test

The cointegration test aims to analyze the existence of a long-run equilibrium between the variables used in a price asymmetry study

using the Error Correction Model (ECM) approach. The cointegration test in this study was carried out through the Johansen cointegration test approach with an optimum lag length of 1 based on the SC and HQ criteria.

Table 3. Cointegration Test Results

Price Variable	Hypothesis Null	T race Statistic	Critical value 5%	Max-Eigen Statistic	Critical 5%
Producer-	None *	21.823	15.495	15.365	14.265
Wholesaler	At most 1 *	6.458	3.841	6.458	3.841
Wholesaler-	None *	20.683	15.494	11.748	14.264
Consumer	At most 1 *	8.934	3.841	8.934	3.841
Consumer-	None *	18.743	15.495	12.553	14.265
Producer	At most 1 *	6.189	3.841	6.188	3.841

Note: * stationary at the level of 5%

Based on the cointegration test results in Table 3, it can be seen that the trace statistic and maximum eigenvalue are greater than the critical value with a significance level of 5%. This shows that there is a cointegration relationship, meaning that there is a long-term relationship between the variables.

Causality Test

The causality test aims to see the

relationship between institutions involved in the red chili marketing chain. The causality test in this study uses the Granger Causality Test to see which levels of the market affect price formation in the red chili marketing chain. To see the direction of vertical price transmission, a causality test was carried out on the three levels of red chili marketing institutions.

Table 4. Granger Causality Test Results

Market	F-Statistic	Prob
Producer →Wholesaler	0.55130	0.4609
Wholesaler→ Producer	5.28711	0.0252*
Consumer → Wholesaler	1.11311	0.2959
Wholesaler → Consumer	7.17649	0.0097**
Producer → Consumer	2.70016	0.1059
Consumer → Producer	0.81837	0.3695

Granger causality test results in Table 4. with a significant level at the level of 5% indicates that in the red chili marketing chain, prices at the wholesale level have the power to influence prices in the producer and consumer markets. The relationship between producer prices and wholesale prices is one-way. Wholesale prices affect prices at the producer level but prices at the producer level have no significant effect on wholesale prices. Prices at the wholesale level have the power to influence prices at the consumer level at a significant level of 1%. The relationship is one-way, meaning that prices at the wholesale level affect prices at the consumer level, but prices at the consumer level are not able to influence prices at the

wholesale level. The relationship is one-way, meaning that prices at the wholesale level affect prices at the consumer level, but prices at the consumer level are not able to influence prices at the wholesale level. Thus, it shows that the price formation between red chili marketing institutions in North Sumatra is more determined from the supply side or is one-way, namely from upstream to downstream. The results of this study are in line with research conducted by (Elvina et al., 2018) which shows that red chili at the wholesale level significantly affects prices at the producer and consumer levels based on national price data. This is also in line with the fact on the ground that prices at the farm level tend to be influenced by prices at the

wholesale market level and not vice versa.

Price Transmission Pattern Analysis
The next stage after knowing the direction of the relationship between markets through causality testing is estimating the price asymmetry equation to find out the pattern of price transmission between red chili marketing institutions in North Sumatra symmetrically or asymmetrically. When price transmission occurs symmetrically, the increase or decrease in the price of red chili in the reference market will be responded equally by the follower market both in terms of speed and magnitude. Firdaussy (2012) explains that price transmission in the short term is influenced by cost adjustments. On the other hand, if price transmission occurs asymmetrically, changes in the increase and decrease in the reference market price will be responded differently by the follower market. Asymmetric price transmission indicates market inefficiency in the red chili marketing chain according to (Vavra, 2005) generally caused by uncompetitive market behavior

(abuse of market power) in the red chili marketing chain. Through the Asymmetric Error Correction Model (AECM) in addition to being seen based on positive shocks (price increases) and negative shocks (price declines), asymmetry conditions are also seen based on positive error correction term (ECT) coefficients and negative error correction term (ECT) coefficients. This model separates the transmission of prices in the short and long term. If the coefficients obtained from the estimation results show the similarity between positive shocks and negative shocks, it means that the transmission of red chili prices is symmetrical.

The coefficient value of the ECT indicates the adjustment time required for the follower market to increase or decrease the price according to the price formed in the reference market in order to reach the equilibrium line. The estimation results of the price asymmetry model in the red chili marketing chain can be seen in Table 5.

Table 5. The estimation results of the price transmission asymmetry model in the red chili marketing chain

Variable	Wholesaler→ Producer	Variable	Wholesaler → Consumer
Constanta	-65.998 (0.8348)	Constanta	-327.799 (0.3980)
ΔHG^-_{t-1}	0.132 (0.0015)***	$\Delta HG\text{-}t\text{-}1$	0.101 (0.0085)***
ECT^+_{t-1}	- 0.695 (0.0376)**	ECT^+_{t-1}	0.549 (0.0391)**
ECT^-_{t-1}	- 0.806 (0.0171)**	ECT^-_{t-1}	0.014 (0.9548)
ΔHG^-_{t-1}	0.132 (0.0015)***	ΔHG^-_{t-1}	0.101 (0.0085)***
ECT^+_{t-1}	- 0.695 (0.0376)**	ECT^+_{t-1}	0.549 (0.0391)**
ECT^-_{t-1}	- 0.806 (0.0171)**	ECT^-_{t-1}	0.014 (0.9548)
ΔHG^-_{t-1}	0.132 (0.0015)***	ΔHG^-_{t-1}	0.101 (0.0085)***
ECT^+_{t-1}	- 0.695 (0.0376)**	ECT^+_{t-1}	0.549 (0.0391)**
ECT^-_{t-1}	- 0.806 (0.0171)**	ECT^-_{t-1}	0.014 (0.9548)
R- squared	0.695	Adjusted R – squared	0.645
F-statistic	13.931	Prob (F-statistic)	0.0000
Durbin-watson stat	1.355		

This shows that there is a difference in transmission when there is an increase and decrease in the price of red chili from the wholesale level to the producer level. The wholesale price variable for period t shows a different significance value, namely only when there is a decrease in wholesale prices which is responded by producer prices, meaning that the increase in red chili prices at the wholesale level will not be responded to by producer prices. If seen from the sign of the coefficient, it shows a negative value, meaning that when prices increase at the wholesale level, producers will respond by lowering prices. The price increase at the wholesale level which is not responded to by the market at the producer level indicates asymmetric behavior at the producer level.

For wholesale prices in the previous period shows that there is no difference in producer price responses to price increases and decreases at the wholesale level. Wholesale price transmission with long-term producers can be seen from the ECT+ and ECT- values. From Table 5, it can be seen that there is a similarity in significance between ECT+ and ECT-, which means that in the long term both a decrease and an increase in prices at the wholesale level will be responded to by the market at the producer level. From the difference in the values of ECT+ and ECT–, it shows that the price of red chili is faster to adjust down than up at the producer level if there is a price change at the wholesale level.

Price transmission in the short term between wholesalers and consumers in period t and the previous period seen from the coefficient value and its significant probability indicates that changes in the price increase and decrease in red chili prices at the consumer level follow changes in prices at the wholesale level. Meanwhile, the long-term analysis of the relationship between wholesale and consumer price transmission shows a significant difference between ECT+ and ECT–, where only ECT+ is significant with a coefficient of 0.549. This means that when the price deviation is above the equilibrium line, that is, when the price at the consumer level does not go down when there is a price decline at the wholesale level. Consumer prices will slowly decrease according to wholesale prices with an adjustment period of 6.5 months.

Meanwhile, the ECT– coefficient with a coefficient of 0.014 and an insignificant value means that when prices increase at the wholesale level, prices at the consumer level will adjust to increase in the following 0.2 months. The conclusion that can be drawn from the transmission of red chili prices in each marketing chain is that wholesale prices in their formation tend not to be influenced by other marketing chains but affect price formation at other levels.

The results of this study are in line with the research of (Nasution & Rahmanta, 2022) which shows that the pattern of price transmission between Arabica coffee marketing institutions in North Tapanuli Regency is asymmetric in the wholesale - producer and wholesale - consumer relationships in the short and long term.

Wald test

The Wald test is used to confirm the indication of the existence of price asymmetry in the price transmission process between related institutions in the red chili marketing chain. The Wald test was carried out on each variable, both when positive and negative shocks occurred in the short or long term. If in a transmission relationship between marketing institutions there are variables that respond differently to positive and negative shocks as indicated by the rejection of the null hypothesis (significant), it can be said that there has been an asymmetry in the price transmission process in the market. On the other hand, if there are no variables that respond differently to shocks, which is indicated by the absence of significant variables, it can be said that the price transmission in the two markets is symmetrical. Short-term asymmetry can be analyzed by separating the variables into positive and negative variables and then comparing the identical values of the

coefficients of the two. Meanwhile, long-term price transmission is influenced by the abuse of market power owned by one market. Long-term asymmetry analysis can be seen by separating the ECT variables into positive ECT and negative ECT, then comparing the identical coefficient values of the two. The results of the Wald test of the price transmission relationship between institutions involved in the red chili marketing chain in North Sumatra Province .

are presented in Table 6.

The results of the Wald test show that in the short and long term there is asymmetric price transmission in the relationship between wholesalers - producers and wholesalers - consumers. Asymmetric price transmission indicates an uncompetitive market competition, while symmetric price transmission means that the market has competitive competition.

Table 6. Wald Test

Market	Null Hypothesis (H_0)	F-stat	Prob
Wholesaler → Producer	$\Delta HP^+_{t-1} = \Delta HP^-_{t-1}$	0.045	0.8330
	$\Delta HG^+_t = \Delta HG^+_t$	7.730	0.0077***
	$\Delta HG^+_{t-1} = \Delta HG^-_{t-1}$	19.874	0.0000***
	$ECT^+ = ECT^-$	6.426	0.0146**
Wholesaler → Consumer	$\Delta HK^+_{t-1} = \Delta HK^-_{t-1}$	0.727	0.3982
	$\Delta HG^+_t = \Delta HG^+_t$	28.952	0.0000***
	$\Delta HG^+_{t-1} = \Delta HG^-_{t-1}$	0.028	0.8688
	$ECT^+ = ECT^-$	2.893	0.0953*

The results of the Wald test between wholesalers and producers show that the positive and negative shock values of the independent variables are significant, which means that in the short term there is a price asymmetry between wholesalers and producers. Firdaussy (2012) explains that price asymmetry in the short term is caused by a number of additional costs incurred by business actors to adjust the price. In economics, these costs are known as adjustment costs or menu costs, such as the costs used to make changes to labels, catalog prices and advertising costs.

McLaren (2015) states that the uncertainty of price changes whether they occur permanently or only temporarily prevents traders from responding to signals of price changes. So that price changes that are not too significant will not be perfectly transmitted by traders. Kostas (2011) explain that the transmission of price asymmetry can occur in the short term or in the long term. In the short term, price transmission is caused by the adjustment cost factor, where without market power, the price will adjust back to its long-term equilibrium line. Price asymmetry in the

long term can be seen from the positive ECT and negative ECT coefficients. In the wholesale model - producers and wholesalers - consumers show significant results seen from the probability value. This shows that in the long term there is an asymmetric price transmission which indicates the existence of market power at the wholesaler level. The abuse of market power by intermediary traders in the red chili marketing chain in Indonesia is generally related to the market structure. Traders have greater market power compared to producers, abuse of market power such as increasing prices at traders is higher than producers, this is caused by higher transportation costs charged to producers, so producers get prices that are much lower than the prices paid obtained by the merchant

CONCLUSION

The pattern of price transmission between red chili marketing institutions in North Sumatra Province is asymmetric in the wholesale - producer and wholesale - consumer relationships in the short and long

term. This shows that the marketing of red chili in the Province of North Sumatra has not been efficient between the producer and consumer centers. Asymmetric price transmission in the short term is formed due to adjustment costs in line with the movement of price changes that occur. Meanwhile, long-term price transmission occurs due to abuse of market power by wholesalers.

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