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Analysis of Price Transmission and Price Formation at the Level of Arabica Coffee Marketing Institutions in North Tapanuli Regency

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Abstract.
This study analyzes the price transmission between Arabica coffee marketing agencies and the factors in the formation of Arabica coffee prices in North Tapanuli Regency. The analytical model used is the Asymmetric Error Correction Model (AECM) for price transmission between institutions in the Arabica coffee marketing channel and the factors for the formation of Arabica coffee prices at the marketing agency level using the Error Correction Model ECM model. The results showed that the pattern of price transmission between Arabica coffee marketing agencies in North Tapanuli Regency was asymmetric in the wholesale-producer and wholesale-consumer relationships in the short and long term. The formation of Arabica coffee prices at the producer level in the short term is influenced by the price of crude oil, while in the long term it is influenced by the price of crude oil and coffee producer prices in the previous month.
Keywords*: arabica coffee, coffee price formation, price transmission, NorthTapanuli*

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I. Introduction

Arabica coffee is one of the plantation commodities that has high potential to be cultivated in North Tapanuli Regency. North Tapanuli Regency is the largest producer of Arabica coffee in North Sumatra, Arabica coffee production is able to support the local revenue of North Tapanuli Regency. Prices of plantation commodities have an important role in controlling the economy. Failure or a shock will cause fluctuations in plantation commodity prices in the domestic market and end up with inflation in the economy (Prastowo, 2008). Stable and affordable prices can maintain an even distribution and supply chain of commodities throughout the region. Commodity prices that fluctuate too much can be detrimental to traders.

The price of North Tapanuli arabica coffee has experienced high price fluctuations with an increasing trend of 5% in recent years which makes it difficult for Arabica coffee farmers to make production decisions and creates disincentives in doing business. Marketing institutions, both producers and traders, also have links with each other, this is according to research (Dewi et al., 2021) which describes the marketing institutions involved in the marketing of cloves in Bali, which include producers (farmers) – traders – wholesalers – final consumers. High price fluctuations at the marketing agency level will provide opportunities for market participants, especially those who have the power to influence prices to manipulate prices. Information about price transmission can provide specific evidence about market competition, the effectiveness of decision-making and pricing efficiency, as well as the behavior of marketers which ultimately indicates the efficiency of a marketing channel. (Sukiyono & Asriani, 2020).

The transmission of Arabica coffee prices in North Tapanuli Regency between producers (farmers) and collectors (wholesale) and retailers greatly determines the efficiency of a marketing channel involved. The condition of farmers who do not know about price developments, allows the marketing margin between prices at the farm level and prices at the consumer level to be very high. This market phenomenon according to (Kohls, 2002) has caused the market mechanism to not work perfectly and as a result the marketing system becomes inefficient. Whether or not price transmission is symmetrical in a marketing channel cannot be separated from the market behavior of the institutions involved in the marketing chain.(Prastowo, 2008) states that the behavior of traders in setting prices also determines the formation of Arabica coffee prices at the merchant level. So, according to (Firdaussy Yustiningsih, 2012) Intermediary traders play a role in causing competition restraint on

distribution channels and imperfect price transmission between producer and consumer levels. Research on the transmission of coffee prices in the Indonesian market using the AECM (Asymmetric Error Correction Model) model. The results show that in the long run there is a symmetrical relationship between coffee export prices in the Indonesian market and the United States, Germany and Japan markets. This is because there is no abuse of market power by the importer market, while in the short term there is an asymmetric relationship between coffee export prices in Indonesia and coffee import prices in the United States and Japan markets in period t-1.(Khumaira et al., 2016). This study aims to analyze price transmission between institutions in the Arabica coffee marketing channel and analyze market behavior at Arabica coffee marketing institutions in the formation of Arabica coffee prices in North Tapanuli Regency.

II. Theoretical framework

Arabica coffee is the most widely developed coffee in the world and in Indonesia in particular. This coffee is grown in the highlands which has a dry climate of about 1350 - 1850 meters above sea level (masl) and in Indonesia this coffee can grow and produce at an altitude of 1000 - 1750 meters above sea level. Arabica coffee plantations in North Sumatra are located in several areas, including North Tapanuli, Dairi, Tobasa, Humbang Hasundutan, Mandailing, Simalungun and Karo (Direktorat Jenderal Perkebunan, 2018).

In economics, a market can be termed as a place for transactions that can be carried out anywhere between sellers and buyers can relate directly or indirectly. People who become market participants or intermediaries in the trading system are often called brokers, brokers, agents and others, this depends on the provisions according to applicable trade law. Even though they have different names, their duties are the same as intermediaries (Muazu et al., 2014). Marketing channels function to move goods from producers to consumers. Marketing channels overcome the time, place, and ownership gaps that separate goods and services from those who need or want them (Kotler, 2012).

Price transmission analysis is one indicator to determine market efficiency. Price transmission is an analysis of how a price affects each other in the market, both spatially (geographical differences) and vertically (marketing chains) (Conforti P, 2004). Price transmission is said to be asymmetric if there is a difference in price response between a positive price shock (when a price increases) and a negative price shock (when a price declines). Price transmission is the sending or forwarding of prices from one place to another. In price transmission, it can be seen the interplay of prices between various markets. Symmetrical price transmission will work well in a market that adheres to the Law of One Price. The Law of One Price is the law of adjusting prices for the same product and leading to an equality of prices in a certain range. In general, the ideas that are formed occur in a competitive market with information disclosure. With the Law of One Price, the same or identical product in a competitive market must be at the same price. Price transmission is said to be asymmetric if there is a difference in price response between a positive price shock (when a price increases) and a negative price shock (when a price declines) (Goodwin BK, 2006).

III. Method of Research

The first problem is that the transmission of arabica coffee prices in North Tapanuli Regency is analyzed using the Asymmetric Error Correction Model (AECM). The data variables are prices at the producer level, wholesaler prices and retail prices. The data used is secondary data obtained from the Department of Agriculture, North Tapanuli Regency. This method refers to the price of Arabica coffee producers reacting to changes in prices for collectors and retailers. The condition of asymmetric price transmission occurs if there is a difference in the price response of Arabica coffee producers between changes in the increase and decrease that occur in the prices of collectors, retailers and vice versa. The condition of asymmetric price transmission is seen from the side of the price scale. The formula for price asymmetry with AECM is (Porter, 2012)

$$\Delta HP_t = a0 + \sum_{i=1}^{n} \beta^- \Delta HK_{t-i}^- + \sum_{i=1}^{n} \beta^- \Delta HG_{t-i}^- + \prod_1^- ECT_{t-1}^- + \sum_{i=1}^{n} \beta^+ \Delta HK_{t-i}^+ + \sum_{i=1}^{n} \beta^+ HG_{t-i}^+ + \prod_2^+ ECT_{t-1}^+ + \varepsilon_t$$

$$\Delta HG_t = a0 + \sum_{i=1}^{n} \beta^- \Delta HK_{t-i}^- + \sum_{i=1}^{n} \beta^- \Delta HG_{t-i}^- + \prod_1^- ECT_{t-1}^- + \sum_{i=1}^{n} \beta^+ \Delta HK_{t-i}^+ + \sum_{i=1}^{n} \beta^+ HG_{t-i}^+ + \prod_2^+ ECT_{t-1}^+ + \varepsilon_t$$

$$\Delta HK_t = a0 + \sum_{i=1}^{n} \beta^- \Delta HK_{t-i}^- + \sum_{i=1}^{n} \beta^- \Delta HP_{t-i}^- + \prod_1^- ECT_{t-1}^- + \sum_{i=1}^{n} \beta^+ \Delta HK_{t-i}^+ + \sum_{i=1}^{n} \beta^+ \Delta HP_{t-i}^+ + \prod_2^+ ECT_{t-1}^+ + \varepsilon_t$$

Dimana :

Δ HPt = Price of the Arabica coffee producer in t time (Rp/kg)

Δ HGt = Price of the Arabica coffee wholesaler in t time (Rp/kg)

Δ HKt = Price of the Arabica coffee retailer in t time (Rp/kg)

ECT^+ = adjustment of the dependent variable to the independent when the price deviation is above its equilibrium
ECT^- = adjustment when price deviation is below equilibrium positive sign (+) represents a price increase, and a negative sign (-) describe the price drop. Stages before analysis with AECM:

3.1. Data Stationarity Test
To see the data used is stationary or not. If the data is not stationary at the level level, then the derivation process is carried out until the data is stationary (maximum second degree derivation). Stationary data by performing the Augmented Dickey Fuller Test (ADF Test) with the formula:

$$P_t = a_0 + \gamma P_{t-1} + \sum_{i=1} a_i P_{t-i+1} + \varepsilon_t$$

$$\Delta P_t = a_0 + \gamma P_{t-1} + \sum_{i=1}^{j} a_i \Delta P_{t-i+1} + \varepsilon_t$$

P_t is the equation of the variable that is stationary at the level, while ΔP_t is an equation of the first derivative or first difference (Pt-Pt-1) of the variables that have been tested

3.2. Cointegration Test
The long-run or equilibrium relationship between the variables is not stationary. The cointegration test used is the Johansen Cointegration Test. Whether or not there is cointegration seen in the likelihood ratio test using the multivariate 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 & Junaidi, 2012). One of the developed cointegration test methods (Johansen S, 1991) namely the Johanssen Cointegration Test. To see the existence of a long-term relationship, this method uses the trace test (TS) and minimum eigenvalue (ME) with the equation: $\lambda_{trace}(r) = -T \ln (1 - \lambda_1^2)$
maximum eigenvalue (ME) with the equation:
$\lambda_{trace}(r) = -T \ln (1 - \lambda_{r+1})$
If the value of TS and ME is greater than the value of t-statistics, it can be said that there is cointegration in the analyzed variables. In using Eviews software, decision making is done by looking at the critical value and trace statistics. If the trace statistic > critical value, the equation is said to be cointegrated, so the hypothesis H0 = non-cointegration is rejected or H1 is accepted, which means cointegration occurs.

3.3. Causality Test
In this case, the price of coffee at the farmer level has causality to the price of coffee at the retailer, if the lag of the coffee price variable at the farmer can predict the magnitude of the coffee price at the retailer in the future, it is better than using the variable lag of the coffee price at the retailer itself. The causality test in this study uses the Granger test as in (Juanda & Junaidi, 2012) with the following model

$$Y_t = \sum_{i=1}^{n} \alpha i Y t_{-1} + \sum_{i=1}^{n} n\, \beta_i X_{t-i} + e_1 \ (\textit{unrestricted Y})$$

$$X_t = \sum_{i=1}^{m} \gamma i X t{-}1 + \sum_{i=1}^{m} \lambda_i Y_{t-i} + e_{1t} \ (\textit{unrestricted X})$$

The test criteria have a significant effect if H_0 is rejected, namely the calculated F value > F table.

3.4. Wald Test
Tests of price transmission can run symmetrically or asymmetry proven statistically using the Wald test. If in the short term the results of the Wald test show a significant value, it means that the asymmetry of price transmission is influenced by the adjustment cost factor. Meanwhile, in the long term, if the Wald test shows a significant value, it means that the asymmetry of price transmission is influenced by market power. Wald test formula:

$$H_0 : \sum \beta^-_{i=0}{}^{n} = \sum \beta^+_{i=0}{}^{n} = \text{Short term symmetry}$$

$$H_1 : \sum \beta^-_{i=0}{}^{n} \neq \sum \beta^+_{i=0}{}^{n} = \text{Short term asymmetry}$$

$H_0 : \pi^- = \pi^+$ = Long term symmetry
$H_1 : \pi^- \neq \pi^+$ = Long term asymmetry

The problem of the two factors in the formation of producer-level Arabica coffee prices in North Sumatra Province was analyzed using the ECM model. ECM is an analysis used for variables that have dependencies which are often referred to as cointegration. The ECM method is used to balance the short-term relationship between variables that have a long-run economic equilibrium. The models for the formation of Arabica coffee prices are as follows:

$$\Delta HN_t = a_0 + a_1\Delta HP_t + a_2\Delta HK_t + a_3\Delta HG_t + a_4\Delta BBM_t + a_5\Delta HP_{t-1} - ECT(-1) + e_t$$

description:

HNt = Factors forming the price of Arabica coffee (Rp/kg)
HPt = Price of the Arabica coffee producer in t time (Rp/kg)
HKt = Price of the Arabica coffee consumer in t time (Rp/kg)
HGt = Price of the Arabica coffee wholesaler in t time (Rp/kg)
HBBMt = retail gasoline price for the t-month (Rp/liter)
HP_{t-1} =Price of producer month t-1 (Rp/Kg)
ECT =*Error correction term.*
T = time (month)
E = *error*.

IV. Results and Discussion

4.1. Data Stationarity Test

The initial stage before carrying out statistical analysis to determine the price transmission pattern in this study, firstly a stationary test of price time series data was carried out at the producer, wholesaler and consumer levels. The data stationarity test is carried out to determine the consistency of the movement of the data used and to avoid spurious regression results or the state of the variables on other variables resulting in a high R^2 (Firdaus, 2011).

The data stationarity test was carried out several times to see under which conditions the data would be stationary. If the data series is stationary without differencing, it can be said that the data is stationary at level or I (0). However, if the data series is stationary after differencing on the first derivative, it can be said that the data series is stationary in the first difference or I(1) condition. e Testing the stationarity of the data was carried out using the Augmented Dicky Fuller test (ADF) at a significance level of 5%. 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 Arabica coffee price data for producers, wholesalers and consumers at the level and first difference level can be seen in Table 1.

Table 1. Data Stationarity Test

Variable	ADF Test Value	
	Level	First Difference
Producer Price	0.0044	0.0009
Wholesaler Price	0.0000	0.0000
Consumer Price	0.1907	0.0000

The results of the data stationarity test show that the Arabica coffee price data at the producer level and wholesalers are stationary at the level level. However, the price at the consumer level is not stationary, therefore a further data stationarity test is carried out on the first difference. After the stationarity test was carried out on the first difference, all variables were stationary.

4.2. Price Transmission Pattern Analysis

Price transmission occurs symmetrically, the increase or decrease in the price of Arabica coffee in the reference market will be responded equally by the follower market both in terms of speed and magnitude. On the other hand, asymmetric price transmission indicates market inefficiency in the Arabica coffee marketing chain. The asymmetry condition is also seen based on the positive error correction term (ECT) coefficient and negative error correction term (ECT) coefficient. 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 Arabica coffee prices is symmetrical. The short-term relationship will be analyzed through each independent variable that significantly affects the price formation in the reference market by looking at the probability value. The more identical the coefficient values

of a variable will indicate the similarity of responses due to price increases and decreases or in other words shows the symmetrical nature of price transmission from the two markets. However, to predict the existence of asymmetry in a market, it must be strengthened by using the Wald test. Long-term price transmission will be seen based on the coefficient value of a positive ECT describing the condition of price deviations above the long-term equilibrium line, namely when the decline in Arabica coffee prices in the reference market is not followed by a decrease in prices in the follower market. Negative ECT describes the condition of price deviations when it is below the long-term balance line, namely when an increase in the price of Arabica coffee in the reference market is not followed by a price increase in the follower market. (Ruslan, Firdaus, 2016). 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 long-term price adjustment time can be calculated by multiplying the ECT coefficient value by 12 months. The estimation results of the price asymmetry model in the Arabica coffee marketing chain can be seen in Table 2.

Table 2. Price transmission in the Arabica coffee marketing chain

Variable	Wholesaler → Producer	Variable	Wholesaler → Consumer
Konstanta	28.73821	Konstanta	1321.998
	(0.8178)		(0.3521)
ΔHP^{+}_{t-1}	0.689845	ΔHK^{+}_{t-1}	0.780359
	(0.0000)***		(0.0000)* **
ΔHP^{-}_{t-1}	0.546081	ΔHK^{-}_{t-1}	- 0.350420
	(0.0000)** *		(0.0002)***
ΔHG^{+}_{t}	0.019897	ΔHG^{+}_{t}	-2.074043
	(0.3801)		(0.0000)***
ΔHG^{-}_{t}	0.105792	ΔHG^{-}_{t}	-0.212161
	(0.0001)***		(0.4567)
ECT^{+}_{t-1}	-1.084241	ECT^{+}_{t-1}	-0.924981
	(0.0000)***		(0.0000)***
ECT^{-}_{t-1}	0.226639	ECT^{-}_{t-1}	0.052014
	(0.0005)***		(0.4666)
R- squared	0.906401	R- squared	0.845575
Adjusted R – squared	0.894452	Adjusted R – squared	0.825862
F-statistic	75.85658	F-statistic	42.89264
Prob (F-statistic)	0.000000	Prob (F-statistic)	0.000000
Durbin-watson stat	1.704569	Durbin-watson stat	1.668070

Table 2 explains that the variable before the arrow indicates the reference market and the variable after the arrow indicates the follower (endogenous) market. The transmission of Arabica coffee prices in the short term between wholesalers and producers has a coefficient difference between positive and negative shocks. The difference in shock is seen from the positive wholesale price coefficient and negative wholesale price coefficient. positive shock (price increase) and negative shock (price decline), asymmetrical conditions are also seen based on the positive error correction term (ECT) coefficient and negative error correction term (ECT). 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. This shows that there is a difference in transmission when there is an increase and decrease in Arabica coffee prices from the wholesale level to the producer level. The wholesale price variable shows a different significance value, namely only when there is a decrease in wholesale prices which is responded to by producer prices, meaning that the increase in Arabica coffee prices at the wholesale level will be responded to by producer prices. The positive coefficient value when prices increase at the wholesale level will be responded by producers by increasing prices. The price increase at the wholesale level was responded by the market at the producer level indicating asymmetry behavior at the producer level.

4.3. Wald Test

The Wald test is used to indicate the existence of price asymmetry in the price transmission process. Transmission between marketing institutions has variables that respond differently to positive and negative shocks, so 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. Wald's test was

carried out on variables that were significant in the estimation results using AECM. Short-term asymmetry separates positive and negative variables and then compares the identical coefficient values of the two.(Firdaussy Yustiningsih, 2012) explains that price transmission in the short term is influenced by adjustment costs. In the short term asymmetry this is in accordance with research (Juliaviani et al., 2018) which states that in the short term there is an asymmetric relationship between the United States and Japan on coffee export prices in Indonesia, this is due to the adjustment costs that occur. Adjustment costs are additional costs that must be incurred in connection with changes in costs. (Yustiningsih, 2013).

Meanwhile, long-term price transmission is influenced by the abuse of market power owned by one market. Long-term asymmetry analysis can be seen from positive ECT and negative ECT, then compare the identical coefficient values of the two. The results of the Wald test of the price transmission relationship between institutions involved in the Arabica coffee marketing chain in North Tapanuli Regency are presented in Table 3.

Tabel 3. Wald Test Results

Connection	Null Hypothesis (H_0)	F-stat	Prob
Wholesaler → Producer	$\Delta HP^{+}t\text{-}1 = \Delta HP^{-}t\text{-}1$	176.2205	0.0000***
	$\Delta HG^{+}_{t} = \Delta HG^{+}_{t}$	293.8565	0.0000***
	$ECT^{+} = ECT^{-}$	8.955999	0.0044**
Wholesaler → Consumer	$\Delta HK^{+}t\text{-}1 = \Delta HK^{-}t\text{-}1$	91.18336	0.0000***
	$\Delta HG^{+}_{t} = \Delta HG^{+}_{t}$	24.52063	0.0000***
	$ECT^{+} = ECT^{-}$	124.7689	0.0000***

*Significant at 10% significance level **Significant at 5% significance level ***Significant at 1% significance level

Price asymmetry in the long term can be seen from the positive 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 Arabica coffee marketing chain in North Sumatra is generally related to the market structure. (Juliaviani et al., 2018) explained that the market structure greatly affects the size of the profit margins set by economic agents in the marketing chain. The market structure is determined by several criteria, namely the number of companies in the market, barriers to entry and exit from the market, and product characteristics. The market structure will affect the strength of the companies in it to influence market prices. Uncertain price changes prevent traders from responding to price changes. Price changes are not transmitted by traders (McLaren, 2015). The results of this study are in line with previous research conducted by (Onubogu & Dipeolu, 2021) entitled Agricultural price transmission across space and time: The case of cowpea and yam markets in Nigeria which stated that low ECT indicates sluggishness in the system, in this case how the market may work. takes longer to reach equilibrium

4.4 Analysis of Factors for Formation of Producer Level Arabica Coffee Prices in North Tapanuli Regency

The independent variable that has been differentiated in the short term describes the "distubance" of the variable itself. Changes in the dependent variable due to changes in the independent variables in the long-term model will be balanced by the error correction component in the previous period. The error correction component represents a short-run adjustment to a long-run equilibrium (Juanda & Junaidi, 2012).

Tabel 4. **The results of the estimation of the factors that influence the formation of Arabica coffee prices at the producer level in the short term**

Variable	Coefficient	t-Statistic	Prob
Constanta	-3910.550	-0.917060	0.3634
Wholesaler Price	0.019236	0.507177	0.6142
Consumer Price	-0.009016	-0.927289	0.3581
Producer Price	0.223449	1.656551	0.1038
Retail Gasoline Price	1.505130	2.204259	0.0320
Previous Manufacturer Price	0.357727	1.301277	0.1990
ECT (-1)	-0.007285	-0.023463	0.9814
R-squared	0.480939	Adjusted R-squared	0.419873
F-statistic 7.875719	Prob 0.000005	Durbin-Watson stat	1.992369

Table 4 shows that the F-statistical value is significant at a probability value of 0.000, meaning that the independent variables included as a whole affect the price of Arabica coffee formed at the producer level. The short-term period of producer price formation in North Tapanuli Regency is influenced by fuel prices. Meanwhile, the producer price of the previous month had no effect on the price formation of Arabica coffee producers in North Tapanuli Regency. This is in line with research (Vera Erviana, Yusman Syaukat, 2020) that the price of red chili producers in the previous month has no effect on the formation of red chili prices in the short term. The estimation results show that the increase in wholesale prices has a positive effect on prices at the producer level with a coefficient value of 0.019. This means that when there is an increase in wholesale prices of Rp. 100 causes an increase in the producer's price of Rp. 1.92. Price increases at the wholesale level are not necessarily followed by price increases at the producer level. This is in line with the result of price asymmetry between wholesalers and producers. Consumer prices also have a negative and insignificant effect on the formation of Arabica coffee prices at the producer level. Fuel prices have a real and significant effect on the formation of Arabica coffee prices at the producer level with a coefficient value of 1,505 indicating that for every Rp.100 increase in fuel prices, there will be an increase in the price of Arabica coffee at the producer level of Rp. 150.5 Furthermore, to see the results of the long-term balance estimation can be seen in Table 5.

Table 5. **The results of the estimation of the factors that influence the formation of Arabica coffee prices at the producer level in the long term**

Variable	Coefficient	t-Statistic	Prob
Constanta	-3412.233	-0.834236	0.4079
Wholesaler Price	0.019968	0.561283	0.5770
Consumer Price	-0.009486	-1.007746	0.3182
Prducer Price	0.207346	1.651743	0.1045
Retail Gasoline Price	1.500913	3.128724	0.0029
Previous Manufacturer Price	0.352417	2.878066	0.0058
R-squared	0.480236		
Adjusted R-squared	0.431202		
F-statistic	9.793873		
Prob	0.000001		
Durbin-Watson stat	1.996972		

Table 5 shows the long-term model of the variable fuel prices and producer prices in the previous month showing a positive and significant influence on the formation of producer-level Arabica coffee prices. Wholesale prices, consumer prices and Arabica producers showed insignificant results. This condition indicates that changes in the price of Arabica coffee at the producer level in the current period follow changes in the price of Arabica coffee at the producer level from the previous period in the same direction. The results of short-term and long-term estimates show that farmers as producers have a very weak bargaining position in determining the selling price of their production.

V. Summary

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. This shows that the marketing of Arabica coffee in North Tapanuli Regency has not been efficient between producers and consumers. The formation of Arabica coffee prices at the producer level in North Tapanuli Regency in the short term is influenced by fuel prices, while in the long term it is influenced by fuel prices and coffee producer prices in the previous month.

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