

Price Asymmetric Evaluation on the Cocoa Market as an Effort to Increase Economic and Bargaining Position of Cocoa Farmers in Pidie, Aceh

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ABSTRACT

The price transmission process on agricultural commodities especially at the smallholder level generally occurs imperfectly as price asymmetric. This study aims to evaluate and identify the occurrence of price asymmetric in the cocoa commodity market in the Pidie Regency. This study also aims to look at the causes and obstacles faced by cocoa farmers in the price issue and how the solutions strengthen their bargaining position against the power of wholesalers in the cocoa market. Thus, a solution will be found to reduce the gap between cocoa farmers and traders. Increasing the bargaining position of farmers is of course one of the efforts to increase. This study uses the Vector Error Correction Model (VECM) method. The data used are secondary data in the form of monthly average data for 2018-2020. There is a long-term and short-term price transmission relationship between the price of cocoa at the farm level and the price of cocoa at the collected trader's level in the Pidie Regency. The causes of the price transmission relationship are the lack of information availability, the low quality of cocoa produced by farmers, less supportive agribusiness institutions such as the inactive cocoa farmer associations or cooperatives and limited transportation. For this reason, an efficient marketing channel is needed, for example by establishing farmers cocoa association, and drying the processing practices that comply with the desired moisture standard.

Keywords: *bargaining position, asymmetric, price transmission*

1. INTRODUCTION

Cocoa is a commodity that is a source of income for smallholder farmers in Indonesia, as well as Aceh's smallholders. It is estimated that there are 1.84 million planters in Indonesia who depend their main source of livelihood on cocoa [1]. The potential for cocoa development is actually very promising. This is because the cocoa industry is never devoid of demand, both at the upstream and downstream levels. There are approximately 1 million families in Indonesia who depend on the cocoa downstream sector for their

livelihood. In addition, processed cocoa products can also be consumed by all age levels.

But behind that the welfare of cocoa farmers who live in rural areas is generally still relatively low when compared to the welfare of cocoa industry players in the downstream. This is due to the weak bargaining position of cocoa farmers in the village against the prices set by traders. The lack of knowledge of farmers about the drying and initial fermentation of cocoa which causes the low quality of cocoa farmers In addition, the lack of intensive cocoa cultivation systems starting from maintenance, fertilization, care and protection against pests also causes low cocoa productivity in Aceh with a

decrease of -0.34 percent in the last 2 years. Whereas if community cocoa plantations are managed more intensively starting from the cultivation, postharvest, processing, packaging, distribution and marketing industries, it will provide opportunities to increase production and reduce poverty of cocoa farmers in Pidie District.

The potential for cocoa development is actually very promising because the cocoa industry is never devoid of demand, both at the upstream and downstream levels and can be consumed by all ages. However, due to the lack of good cocoa cultivation system starting from maintenance, fertilization, care and post-harvest as well as the weak bargaining position of cocoa farmers, cocoa farmers are generally still at the poverty line. The same is true for cocoa farmers in Pidie. In fact, if people's cocoa plantations are managed more intensively starting from the cultivation, postharvest, processing, packaging, distribution and marketing processes, it will provide opportunities to increase production and increase the income and bargaining position of cocoa farmers.

The trading system also greatly affects the efficiency of marketing and revenue that will be received by cocoa farmers. The lack of information on cocoa prices at the farmer level, the low quality of post-harvest handling, the distance of the plantation land from the city, the limited means of transportation to the market, and the poor functioning of the cocoa farmer cooperatives in accommodating cocoa from farmers have resulted in the weak bargaining position of cocoa farmers against traders. The circle of low bargaining position will lead to low income of cocoa farmers. If this continues, the result will certainly have an impact on the decline in cocoa production due to the low enthusiasm of farmers to grow cocoa.

Price fluctuation is a condition that shows symptoms of rising and falling prices and price changes that are influenced by supply and demand. Price fluctuations can occur due to the low bargaining power of farmers who are only price takers. They cannot influence and determine the price in the market. Agricultural commodities such as cocoa are commodities that are very vulnerable to price fluctuations.

Farmer-level cocoa prices in Pidie are generally set by collectors. Cocoa farmers in Pidie Regency market their harvests by visiting or waiting for the muge (collector traders) to come to their gardens. It is Muge who will then market the cocoa to wholesalers in the district. This causes a gap between the price at the wholesaler level and the price received by farmers. This is known as price asymmetry. Cocoa prices are also very easy to fluctuate because of the quality of the cocoa itself and also because the demand and supply of cocoa varies from time to time. The study of price asymmetry can also provide information on how price transmission is between integrated markets and can describe how

efficient the market is for these commodities. In the cocoa bean marketing system, farmers often do not have a good bargaining position and are only the recipient of prices from traders. Thus, it is suspected that there is a market power gap between farmers and traders.

[2] Found that the transmission of changes in world cocoa bean prices to the domestic price of cocoa beans in Sulawesi is fluctuating and statistically significant. However, the transmission is no longer real from the district's domestic cocoa bean market to the cocoa bean market at the farmer level. From the results of their research, it can be seen that the cocoa bean market at the farmer level is segmented and the price asymmetry occurs, in contrast to the cocoa market at the world level with the prices of traders in the Regency. The fluctuating price transmission pattern takes place under conditions of statistically significant market integration in the long term at various levels of the cocoa bean market, except for the cocoa bean market at the farmer level. Meanwhile, in the short term, the integration of the cocoa bean market is not only weak, but also the degree of integration is not statistically significant. So, besides the transmission of prices to cocoa bean prices at the farmer level is not real, there is also no integration of the market at the farmer level with the district's domestic cocoa bean market (even segmented).

Price transmission is a system of forwarding prices from one place to another. The Law of One Price is the law of price adjustment on the same type of product and leads to an equivalent price in a certain range and usually forms a competitive market with information disclosure. Based on this law, similar products in a competitive market must be at the same price.

Price transmission runs quickly from one market level to another so that it does not trigger abnormal returns (the difference between the actual profit level and the expected profit level) and market integration will be achieved if there is adequate market information. Therefore, price transmission and market integration have a very close relationship.

The process of price transmission in agricultural commodities usually occurs imperfectly (asymmetrically). In general, the price of agricultural commodities at the trader level has the same type of pattern as the price dynamics in the producer (farmer) area. However, because information about price fluctuations is slow and imperfectly conveyed to farmers, it causes price fluctuations at the trader level to be higher than at the farmer level. This will result in asymmetric price prices being more imperfect if the price fluctuations are getting bigger.

The limited research on price asymmetry in the cocoa market causes in this proposal the researcher summarizes several research tracks related to price asymmetry and transmission in commodities other than cocoa. From the

research track record, it can be seen that the analytical model used to examine price asymmetry is always related to VAR (Vector Autoregression), VCM (Vector Correction Model) and VECM (Vector Error Correction Model).

[3] and [4] conducted research using the VAR and VECM models to find the occurrence of price asymmetry in agricultural commodities between the farmer level and the trader level. The results of this study also show that between the producer market and the wholesale market for shallot and rice commodities, there is no long-term market integration but integration in the short term. In addition, high price fluctuations are very unfavorable for farmer actors because there are negative influences that result in uncertain income that will be obtained. Accordingly [4] put forward an empirical assessment of the speed of market adjustment to spatial price differentials to help solve the debate about government intervention vs non-intervention policies in the market. Furthermore, [5] suggested that information about market integration can provide specific evidence about market competition, decision-making effectiveness [6] and pricing efficiency. Market integration is a way to analyze the linkage or price integration between markets. According [7] and [3] market integration is the level of price movement in different regions, where the same product will have the same price, even though it is sold at different places and price signals and market information are transmitted evenly [8].

[9] conducted a study using the ECM (Error Correction Model) method, showing that in the short term the transmission of farmer prices to rice prices at the consumer level is symmetrical, while in the long term it is asymmetric. In rice commodity, the phenomenon of asymmetric price transmission is caused by abuse of market power by middlemen and government policies.

Fluctuating prices provide opportunities for collectors to abuse market power. This can lead to an asymmetry in the course of price transmission. This results in farmers not benefiting from price increases at the level of collecting traders. The behavior of market players in the cocoa marketing chain causes no market efficiency to be created, this is an indication of asymmetric price transmission. Based on this, researchers are interested in researching how the price asymmetry in the cocoa market occurs in an effort to improve the bargaining position of cocoa farmers in Pidie Regency.

2. METHODOLOGY

The data collected is cocoa price data at the farmer level and at the district wholesaler level. The data is time series data for the period 2018 to 2020. The analytical method used in this study is the Vector Error Correction Model (VECM) method. Testing with this model is

carried out with several pre-estimated tests, namely as follows:

2.1. Root Test (Stationarity of Data)

The initial step that must be done in the estimation of this research is to test the stationarity of the data. Stationary test data can be analyzed with the Augmented Dickey-Fuller (ADF) test at the same degree (level or different level) which will obtain stationary data, namely data whose variance is not large and tends to have closeness in the average value [10]. A data is said to be stationary if the ADF t-Statistic value is smaller than the critical value. Stationary testing using Augmented Dickey-Fuller has three levels, namely level level, first difference and second difference, which are used according to the needs of the data being tested. If the data is stationary at the level, there is no need to proceed to the first difference level.

$$\Delta x_t = \alpha_0 + \gamma x_{t-1} + \beta_1 \Delta x_{t-1} + \beta_2 \Delta x_{t-2} + \varepsilon_t \quad (1)$$

Information:

$x_t - x_{t-1}$, t = Time period

$\alpha_0, \beta_1, \beta_2$ = Coefficient

ε = Equation error

2.2. Optimal Lag Test

Determination of optimal lag is one of the problems that occur in the root test (stationarity test). The stationarity test too little lag is used, then white noise will not be displayed by the residuals from the regression so that the model cannot estimate the actual error correctly. In determining the optimal lag using the information criteria, the criteria chosen are those that have the smallest number of AIC and SBC among the various recommended lags. Determination of lag can be seen by the number of stars from the results that have been tested.

2.3 Cointegration Test

Cointegration test is performed on the variables to analyze whether the regression residual has reached stationary or not. The method used is to compare the calculated value on the test statistic with the critical value. It is concluded that there is cointegration if the calculated value of the test statistic, namely the trace statistic and the maximum eigenvalue, is greater than the critical value.

$$\Lambda_{\text{trace}} = -T \sum_{i=k+1}^n \ln(1 - \Lambda_i) \quad (2)$$

$$\Lambda_{\text{max}}(r, r+1) = -T \ln(1 - \Lambda_{r+1}) \quad (3)$$

Information:

$k = 0,1, \dots, n-1$

T = Number of observations used

i = Estimated value of the root characteristic selected from the matrix estimate

r = Vector sum of cointegration vector

2.4. Causality Test

According to [11] if the two variables are proven to be integrated with the cointegration test in the previous stage. So it is necessary to know the relationship between these variables with the causality test. The causality test is carried out by comparing the probability value with the real level used.

2.5.VECM (Vector Error Correction Model) Testing

Vector Error Correction Model (VECM) is a restricted VAR model that is used for variables that are not stationary but have the potential to be cointegrated. After testing the cointegration of the model used, it is recommended to include the cointegration equation into the model used. In time series data, most have a level of stationarity at the first difference (first difference). The VAR model can be arranged after the variables are seen for stationarity, cointegration, inertia, and the suitability of the variables to be included in the model. If there is cointegration in the data that is checked for stationary, the model used is the VECM (Vector Error Correction Model) model.

The VECM testing stage is a stage that serves to explain how the short-term integration relationship and the long-term integration relationship. [8] explained that VECM can measure how price deviations can return to a state of equilibrium. The VECM model in this study is as follows:

$$\Delta P_t = \alpha_0 + \alpha_1 P_{t-1} + \sum_{i=1}^p \alpha_{2i} \Delta P_{t-i} + \epsilon_t \quad (4)$$

Information:

P_t = Aceh cocoa price at farmer level in period t (IDR/kg).

P_{t-1} = Aceh cocoa price at Farmer level in the previous period (IDR /Kg).

P_{P_t-1} = Aceh cocoa price at the level of collectors in the period previously (IDR/Kg).

$\alpha_0, \alpha_1, \alpha_2$ = Coefficient

ϵ = Equation error

p = Length of lag

t = Trend time.

3. RESULT AND DISCUSSION

3.1. Pidie Cocoa Production and Price Fluctuation

Cocoa is one of the most prominent commodities in Pidie Regency, in addition to coconut, coffee and areca nut. Cocoa production centers are located in the Districts of Tangse, Glumpang Tiga, Padang Tiji, Keumala and Tiro/Truseb. Tangse District has the largest area of productive plantations, which is 2,177 hectares, with a production of 1,197 tons per hectare per year.

Although cocoa is a leading commodity, cocoa farmers in Pidie do not yet have a strong bargaining position in transactions. The cocoa farmers there market their harvests by going directly to the muge (gathering traders) or also by waiting for the collecting traders to come to their settlements. In this case, traders have stronger power in determining the price of cocoa compared to farmers. Farmers generally only accept prices set by traders. The difficulty of access to transportation from cocoa plantations to the city sometimes makes many farmers just waiting for the collecting traders to arrive.

Cocoa prices fluctuate very easily. These fluctuations are influenced by the quality of cocoa from farmers as well as varying demand and supply of cocoa. Collectors usually assess the price of farmers' cocoa based on the level of moisture content. However, farmers often sell their cocoa with a relatively high moisture content. This is because farmers need money for their daily needs. The development of monthly cocoa price fluctuations during 2018 to 2020 can be seen in Figure 1.

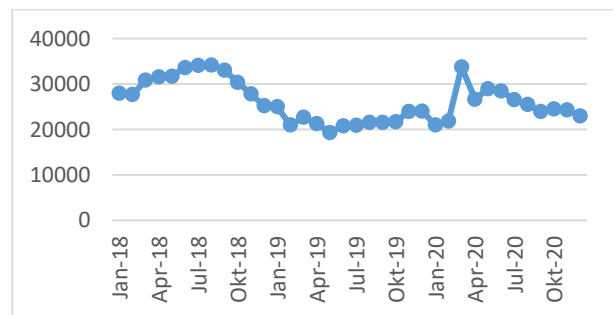


Figure 1. Cocoa Prices at the Pidie Farmer Level (IDR/Kg)

The limited transportation owned by farmers and the ability of farmers to dry cocoa beans also cause farmers to sell their cocoa directly every time collector traders come to their village. This is due to farmers' land which is generally located far from the city and the lack of knowledge of farmers in drying and fermenting cocoa. This makes traders more flexible in determining the selling price of cocoa than farmers.

Table 1. Result of Johansen Cointegration Test

Hipotesis	Trace Statistic	Critical Value	Max-Eigen Statistic	Critical Value
None	23.33100	15.49471	20.15466	14.26460
Atmost	3.176837	3.841466	2.176837	3.841466

3.2. Cointegration of Farmers' Cocoa Prices and Trader's Cocoa Prices

Cointegration testing in this study uses the Johansen test approach. The Johansen test in this study was carried out by comparing the trace statistic value with the critical value and the maximum eigenvalue with the critical value

Based on Table 1 it is known that the trace statistic and maximum eigenvalue are greater than the critical value. This shows that there is a cointegration relationship between prices at the farmer level and prices at the collectors level, which means that there is a long-term relationship between cocoa prices at the farmer level and cocoa prices at the collectors level. Thus, it can be concluded that there is a long-term cointegration relationship, this is indicated by the trace statistic value 23.33% greater than the critical value 15.49% and the maximum eigenvalue statistic 20.15% greater than the critical value 14.26%.

3.3. Asymmetry of Farmers' Cocoa Prices and Traders' Cocoa Prices

Price asymmetry can be seen from the reciprocal relationship between 2 price levels. To see whether the price is asymmetric at the existing market level, a causality test is carried out. The Granger Causality Test was conducted with the aim of seeing whether the price of farmer's cocoa has a causal relationship with the price of collecting cocoa, and vice versa. This causality test is

The absence of causality between markets is often found in agricultural product markets. The cause of the absence of causality is due to the poor distribution system and also the existence of market power which makes the market mechanism not work well. Thus the price is not transmitted properly from one market level to another. If

at the five percent level. If the trace statistic and the maximum eigenvalue are greater than the critical value, it indicates that in the system of equations there is a long-term relationship or cointegration. Cointegration test aims to see the existence of a relationship between variables, especially in the long term.

carried out by comparing the probability with the value of the significance level (5%) used. In this study, causality testing will be tested using the Granger Causality Test method. The results of the causality test can be seen in the table below.

Based on the results of the causality test in Table 2 it can be seen that the probability value of the two variables tested is greater than the value of the real level used (5%) which is $0.365 > 0.05$, which means accept H_0 . In this case, it can be concluded that there is no causal relationship between the P variable (cocoa price at farmer level) and PP (cocoa price at the collector level) variable. In the absence of a causal relationship between the two variables, it is explained that there is no reciprocal relationship between the two prices. This could be due to the lack of information on the delivery of prices from collecting traders to farmers. Price changes at the level of cocoa collectors are not transmitted to cocoa prices at the farmer level, and vice versa. This shows the existence of asymmetric cocoa prices and the inefficiency of the cocoa market in Pidie.

cocoa farmers have associations, associations or cooperatives that at any time accommodate cocoa production from farmers, farmers will have stronger power in the market. In addition, with the existence of associations or cooperatives, coaching and training from cultivation to post-harvest handling can also be carried out with more incentives.

Table 2. Asymmetric Test Results of Farmers' Cocoa Prices and Traders' Cocoa Prices

Null Hypothesis:	Obs	F-Statistic	Prob.
P does not Granger Cause PP	34	1.04257	0.3654
PP does not Granger Cause P	1.90671	0.1667	

Table 3. Estimation Results of the Long-Term Effect of Farmer Prices and Collecting Trader Prices

Variable	Coefisient	Standar Error	T.Statistic
P(-1)	1.000000		
PP (-1)	-0.961691	0.01544	-62.2996
C	1419.158		

3.4. Effect of Changes in Cocoa Market Prices

The effect of price changes at the cocoa market level, both long-term and short-term, between price variables at the farmer level and prices at the level of collectors can be seen from the value of the Vector Error Correction Model (VECM) estimation result.

To see how big the change in cocoa prices at the level of collectors is to cocoa prices at the farmer level in the long term, it can be seen in Table 3 below:

Based on the test results in Table 3. a long-term relationship is obtained which explains that the P and PP variables have a negative relationship, the following is the equation formed:

$$P = 1419.158 - 0.961691 PP(-1)$$

Based on these equations, it can be seen that the variable collectors (PP) has a negative influence on farmers (P) which is -0.96%, meaning that if there is an increase in prices at the collectors, it will cause prices at the farmer level to decrease by -0.96%. This is because when the price of cocoa at the level of collecting traders rose in the previous period, it would cause cocoa farmers to immediately sell their plantation products without estimating the quality of the cocoa itself, and vice versa. If the price at the collector traders decreases, the cocoa farmers sell their plantation products longer than usual with better results, but because the prices at the collector traders are low, the price that farmers produce is also lower. Based on this explanation, we can see that there is a long-term relationship between farmers and traders.

Based on the results of the short-term estimation test in Table 4, the following equation is obtained:

$$D(P) = -206.476 + 1.881900 D(P(-1)) + 1.287233 D(P(-2)) - 2.215574 D(PP(-1)) - 1.416551 D(PP(-2))$$

From this equation, it is explained that the short-term estimation results show that the farm-level price variable has a positive effect on the five percent real level, which is 1.8%, meaning that if there is a 1% increase in cocoa prices in the previous year, it will increase cocoa prices at the farmer level by 1.8%. in the current year. Increaseing of 1% in the selling price of cocoa at the farmer level in the previous two periods will increase the selling price of cocoa at the current farmer level by 1.28%. Meanwhile, an increase in the selling price of cocoa at the level of collectors in the previous period by 1% will reduce the selling price of cocoa at the current farmer level by 2.2% and an increase in the selling price of cocoa at the level of collectors in the two previous periods by 1% will reduce the selling price. cocoa at the farmer level is currently 1.41%.

Based on the explanation of the equation, it is explained that there is a short-term relationship between the price variable at the farmer level and the price variable at the level of the collectors. As with long-term relationships, price increases at the level of collecting traders will cause farmers to immediately sell their harvests in the hope of getting a high price but not paying attention to the quality of the cocoa itself, where traders judge the price based on the level of dryness. This opportunity is used by traders after buying cocoa from the farmer level, they will process the cocoa first, so that the water content decreases. Thus the selling price they receive will be higher.

Table 4. Short-term Estimation Results

Variable	Coefisient	T-Statistic
Cointeq1	-3.775119	-2.41635
D(P(-1))	1.881900	1.46203
D(P(-2))	1.287233	1.05206
D(PP(-1))	-2.215574	-1.72062
D(PP(-2))	-1.41655	-1.14840
C	-206.476	-0.42816

The price transmission relationship that occurs in cocoa commodity in Pidie is vertically. This is seen based on the marketing chain which is still within the scope of one region (region). Some of the factors that influence price transmission in this study are the quality of the products produced, transportation and the lack of price information. The quality of cocoa products produced by cocoa farmers is not good, because it still has a relatively high moisture content (> 7.5 percent). This causes low prices received by farmers.

Transportation and market infrastructure where cocoa cultivation is located in the highlands makes it difficult for farmers to gain access to information and transportation. The distance from the cultivation location to the market location is quite far. In general, cocoa farmers in Pidie District have plantations far from the city center. This is what causes farmers to immediately sell their harvests when collecting traders come to their settlements regardless of the quality of the cocoa they dry. This is also because they are pressed to immediately get income from their crops.

The factor that causes low price transmission is also due to the lack of price information at the farmer level market, causing farmers to only accept prices determined by collecting traders. Information on price fluctuations is not perfect at the farmer level, causing cocoa price fluctuations at the trader level to be higher than at the farmer level. This will result in more imperfect price transmission, especially if the price fluctuations are getting bigger. This is also happened at research by [2] that showed the cocoa bean market in Sulawesi has a fluctuating price transmission pattern. Statistically real market integration in the long term at various levels of the cocoa bean market, except for the cocoa bean market at the farmer level. Meanwhile, in the short term, the integration of the cocoa bean market is not only weak, but also the degree of integration is not statistically significant. So, in addition to price transmission to cocoa bean prices at the farmer level, there is no real integration of the market at the farmer level with the district's domestic cocoa bean market (even segmented), and this is consistent with the degree of integration between the two markets which is also not statistically real. This of course will not happen if at the farmer level there is an association or group of cocoa farmers chaired by someone who has access to IT technology. With such an association, all developments of any information about cocoa will reach all farmers. In addition, the process of fostering and training farmers both regarding cultivation, pest management, and post-harvest handling can be carried out more intensively. Especially if the cocoa center areas all have cooperatives that are ready to accommodate cocoa production from farmers at a better price and quality at any time.

4. CONCLUSION

The conclusion that can be drawn based on the results of the research that has been done is that there is a long-term and short-term price transmission relationship

between cocoa prices at the farmer level and cocoa prices at the level of collectors in Pidie Regency. The causes of the price transmission relationship are the lack of availability of information, the low quality of cocoa produced by farmers, and limited transportation. To reduce market asymmetry and improve the bargaining position of cocoa farmers, the government needs to provide facilities such as internet network or website of cocoa in every village so that cocoa farmer groups can access it. In addition, information about the price of cocoa on a regular basis, which can be published in print media, electronic media or television, where farmers will be able to know any changes in cocoa prices. The government also needs to improve transportation facilities from villages to cities. To improve the skills of farmers in processing their production, it is necessary to have continuous training and coaching involving the cocoa industry. Thus, farmers are more certain in marketing their production

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