

## **Analysis of Price Transmission on Coffee Export Markets in Indonesia and United States**

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(Received : June 17, 2021; Accepted : August 22, 2021)

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### **ABSTRACT**

This paper revealed the transmission of coffee export prices between Indonesia and the United States. The data analysis method in this paper used the Asymmetric Error Correction Model (AECM), with time series data with a monthly period starting in 2016 Q1 - 2020 Q12. The result was that there was an asymmetric relationship in the short term and there was a long-term asymmetric relationship between the export price of Indonesian coffee and the price of US coffee. The existence of an asymmetric price relationship in the long term indicated that there was a price game or an abuse of market power by coffee exporters in Indonesia.

**Key words** : Coffee, price transmission, AECM

### **INTRODUCTION**

This paper revealed the transmission of coffee export prices between Indonesian and the United States (US). Several empirical studies on the transmission of export prices of a commodity showed different results. Research conducted by Khumaira *et al.* (2016) shows that the transmission of Indonesian coffee export prices to the main destination countries is asymmetric in the long term due to the absence of a response price leadership from importing countries, while in the short term the transmission of coffee export prices is asymmetric. It is due to cost adjustments in the ongoing trading process. The transmission of Indonesian coffee export prices is symmetrical in the long term, because there is no abuse of market power on the part of exporters and importers, while in the short term, the transmission of coffee export prices is asymmetric due to the necessary cost adjustments (Juliaviani *et al.*, 2018; Damanik *et al.*, 2020). The transmission of food commodity export prices between Thailand, Vietnam and the United States is symmetrical both in the long term and in the short term (Chen and Saghaian, 2016).

The diversity of coffee types originating from various regions in Indonesia has a marketplace large in the global market. Indonesia is also one of the largest coffee

producing and exporting countries in the world, which has the power to maintain and expand its export market network in the global market. Coffee is also a plantation commodity that generates the fourth largest foreign exchange after palm oil, rubber and cocoa. David and Christian (2013) examine the competitiveness and determinants of coffee prices and production prices. The results of his research improve export performance and ensure sustainable growth in the main strongholds of the subsectors (exports, prices and production), based on the forecasts proposed investments in yield-enhancing innovations, design and implement measures to improve quality control in the supply chain, address issues with price risk, minimize the occurrence of smuggling and more importantly minimize transaction costs. In line with this study, Baroh *et al.* (2014) also conducted a study aimed at identifying the competitiveness of Indonesian coffee in the international market. The supply of Indonesian coffee in Japan and Australia has influenced by last year's supply, while in the Netherlands, the United States and Germany has influenced the price of Indonesian coffee (producer price). On price side, consumer prices in five importing countries of Indonesian coffee influenced producer prices, the exchange rate against the US dollar and technology. From the statement above, this paper focused on discussing the

transmission of coffee export prices in Indonesia.

**MATERIALS AND METHODS**

Research conducted by Chen and Saghaian (2016) explained that there was a price asymmetry in export and import activities. On the other hand, the price of coffee exports in Indonesia with export destinations United States, Germany and Japan, there was a price asymmetry in the short term, but in the long term there was symmetry (Khumaira *et al.*, 2016). The research conducted by Damanik *et al.* (2020) explained that the export price of Arabica coffee in North Sumatra was symmetrical in the long term, but asymmetrical in the short term. The specifications of the research model are as follows :

$$EP = f(IP) \quad \dots(1)$$

EP : Export price  
IP : Import price

Equation (1) was transformed into econometrics as follows :

$$EP_t = a_0 + a_1 IP_{j,t} + \varepsilon_t \quad \dots(2)$$

Equation (2) explained that the export price of coffee in year *t* ( $EP_t$ ) was influenced by the export price of coffee in the last year *t-1* and the import price of USA *j* in year *t* ( $IP_{j,t}$ ). The method used to identify the asymmetry of coffee export prices in Indonesia was the Asymmetric Error Correction Model (AECM). The use of the AECM method was due to a special method to identify price asymmetry over the long and short term (Chen and Saghaian, 2016; Khumaira *et al.*, 2016; Damanik *et al.*, 2020). The AECM method was a development of the Error Correction Model (ECM), so that the basic model used a modified ECM. Thus, equation (2) was a transformation into the AECM model as follows :

$$\Delta EP_t = a_0 + a_1 \Delta IP_{j,t} + a_2 \Delta ECT_{t-1} + a_3(L)\Delta EP_{t-1} + a_4(L)\Delta IP_{j,t-1} + \varepsilon_t \quad \dots(3)$$

Equation (3) was an ECM model by giving ECT as the error correction term and (L) as the lag polynomial. Furthermore, equation (3) developed into AECM mode as follows :

$$\Delta EP_t = a_0 + \sum_{i=1}^q \beta^- \Delta EP_{t-i} + \sum_{i=0}^q \beta^- \Delta IP_{t-i} + \pi_1^- ECT_{t-1} + \sum_{i=1}^q \beta^+ \Delta EP_{t-i} + \sum_{i=0}^q \beta^+ \Delta IP_{t-i} + \pi_2^+ ECT_{t-1} + \varepsilon_t \quad \dots(4)$$

Equation (4) was a research model using the AECM method. The AECM method separated ECT into positive and negative, as well as changes in the increase and decrease in the independent variable with the function of getting the asymmetric price transmission model. The function of  $ECT^+$  was an adjuster for the dependent variable to changes in the independent variable when price deviations were above equilibrium. On the contrary,  $ECT^-$  was an adjuster when prices were below equilibrium (Muhtaseb and Al-Assaf, 2016; Elvina *et al.*, 2018; Deb *et al.*, 2020).

**RESULTS AND DISCUSSION**

The US is one of the largest importers of Indonesian coffee and the response between price formations is seen in Table 1.

**Table 1.** Estimation results of AECM

Variable	Coefficient	Probability
Cons	-0.013505	0.000*
Ep_pos L1	-0.9981061	0.000*
Ep_neg L1	-0.9913899	0.000*
US_pos	0.2720012	0.000*
US_neg	0.3574218	0.000*
US_pos L1	-0.0415481	0.025*
US_neg L1	0.0662038	0.000*
ect_US_p	0.9601925	0.000*
ect_US_n	1.011333	0.000*
R <sup>2</sup>	0.9990	
R <sup>2</sup> _adj	0.9989	
F-Statistics	6437.69	

Source : Processed data. \*Significant at P=0.05.

The results of the analysis confirmed that there was an increase in coffee export prices in period t-1, a decrease in Indonesian coffee export prices responded to in period t. Meanwhile, there was a decrease in Indonesia coffee export prices in period t-1, an increase in Indonesia coffee export prices responded to an increase in Indonesia coffee export prices in period t. Meanwhile, when there was an increase in the price of coffee in the US in period t, it responded by an increase in the price of Indonesian coffee exports in period t. Furthermore, when there was a decline in the import price of coffee in the USA in period t, a decrease in Indonesian coffee export prices in period t responded.

In the intervening time, when there was an increase in the import price of coffee in the USA in period t-1, a decrease in Indonesian coffee export prices responded to in period t. In addition, the decline in US coffee import prices in period t-1 responded by a decrease in Indonesian coffee export prices in period t. The results of ECT showed that ECT+ and ECT- showed positive coefficient values and significant probability values. This result was confirmed by the coefficient value of 0.9691825 on ECT+ and 1.011333 on ECT- with each probability value of less than 5% alpha, which was 0.000. This result interpreted that in a long-term relationship when price deviations were above the balance line; so that when the decline in coffee import prices in the US hasn't followed by a decrease in domestic coffee export prices, and a positive coefficient indicated that deviations in the short term will not be corrected to the long-term equilibrium line. The Wald test for the US confirmed that in the long and short term, the transmission of Indonesia coffee export prices to coffee import prices in the US occurred asymmetrically (Table 2). This was indicated by a probability value less than 5% alpha, each of which was 0.0000. Asymmetrical relationship between the prices in the short term the price of Indonesian coffee exports by destination country's coffee imports due to the cost adjustment (adjustment cost) required by the exporter to export commodities. The results of this study are in accordance with research conducted by Khumaira *et al.* (2016), Juliaviani *et al.* (2018) and Damanik *et al.* (2020). Research conducted by Khumaira *et al.* (2016) confirmed that the transmission of Indonesian coffee export prices to three destination countries, namely, the United States (US), Germany and Japan had an asymmetric relationship in the short term and symmetrical in the long term. The asymmetric relationship in the short term was caused by adjustments to costs that must be borne by exporters such as changes in inflation,

exchange rates and government regulations in both the countries of origin and destination countries that caused additional costs. Price asymmetry caused by adjustment costs generally affected the short-term period, and only delayed price transmission in trading activities. However, adjustment costs also affected the balance of trade in the long run (Khumaira *et al.*, 2016). The existence of adjustment costs in trading activities also had an impact on decreasing the level of output that was generated from trading activities which in turn also had an impact on the welfare level of the workforce, and the political economy of a country (Juliaviani *et al.*, 2018). There were several aspects that led to their adjustment costs in trading activities, an outline of these aspects was divided into two groups : private adjustment costs which consisted of cost adjustment due to the capital increase (capital) and additional manpower (labor) and public sector adjustment costs which included additional costs due to changes in public regulations set by the government (Robertson, 2018). Other factors that affected coffee export prices and created adjustment costs were pressure from financial markets and exchange rates from exporting countries (Nakatani, 2018; Chen *et al.*, 2021). One form of cost adjustment that occurred during 2020 was a regulation issued by the government of the destination country to restrict and prohibit import-export activities because of the COVID-19 pandemic. The form of the regulation of restrictions and prohibitions on trade activities in export destination countries was quota restrictions. Changes in customs tariffs, taxes, and other levies, as well as policies to quarantine export-import commodities, especially health and food commodities (Chandra *et al.*, 2020; Efendi *et al.*, 2020). The existence of export-import restrictions imposed in several countries triggered an increase in commodity prices due to the risk of scarcity, in addition to the quarantine policy of import-export

**Table 2.** The results Wald test

Wald-test	Variable	F-statistic	Probability	Information
US-Indonesia	Ect_USA_p = ect_USA_n	17586.64	0.000*	Asymmetric+
	L.ep_pos = L. ep_neg	22440.27	0.000*	Asymmetric+
	USA_pos = USA_neg	571.30	0.000*	Asymmetric+

Processed data. \*Significant at P=0.05.

commodities during the COVID-19 pandemic that was implemented in Indonesia also had an impact on increasing commodity prices due to additional costs for import and export (quarantine process). In addition, the geographical distance between Indonesia and the destination country was also one of the factors that created adjustment costs where geographical distance determined the amount of costs that must be incurred by exporters based on the Rupiah exchange rate against the Dollar and also the price of oil at the time of export (Darmi *et al.*, 2020). The farther the geographical distance between Indonesia and the destination country for coffee exports, the greater the costs must be incurred for the delivery process. In addition to distance, the amount of shipping costs determined by fluctuations in the exchange rate of the Rupiah against the Dollar and world oil prices.

The existence of an asymmetric price relationship in the long term indicated that there was a price game or market power (abuse of market power) carried out by exporters (Khumaira *et al.*, 2016; Damanik *et al.*, 2020). Market power exercised by exporters occurred because the coffee harvest period was carried out by farmers at most twice a year, while the export coffee trade and delivery process was carried out every month by exporters. Therefore, in this period the exporter bore the costs of warehousing and maintaining the coffee beans to maintain their quality, so that in the process exporters had the opportunity to exercise market power on the offer price of coffee exports.

The asymmetric finding of Indonesia coffee export prices was a turning point that the quality of coffee, especially small holder plantations was still minimal so that Indonesia was not been able to become a market leader in coffee commodities, even though Indonesia's coffee production was relatively large when compared to other ASEAN countries. According to USDA data; among ASEAN countries, Indonesia is known as the second largest coffee producer and exporter after Vietnam. However, Indonesia is the fourth largest coffee importer in ASEAN after the Philippines, Malaysia and Thailand. In the world, Indonesia has listed as the fourth largest coffee producer after Brazil, Vietnam and Colombia.

## CONCLUSION

Price asymmetry caused by adjustment costs generally affected the short-term period, and only delayed price transmission in trading activities. The problem of asymmetrical formation of Indonesia coffee export prices with the main destination countries for coffee exports was a critical point for policy makers to protect coffee producers or Indonesian coffee farmers. The asymmetric finding of Indonesia coffee export prices was a turning point that the quality of coffee, especially smallholder plantations, was still minimal so that Indonesia was not able to become a market leader in coffee commodities, even though Indonesia's coffee production was relatively large when compared to other ASEAN countries.

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