

ANALYSIS OF THE INTEGRATION OF THE INDONESIAN COFFEE MARKET WITH THE UNITED STATES

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Abstract

This research aims to analyze the development of prices and integration of the Indonesian coffee price market and the price of United States coffee. The analysis model is used to look at the integration of Indonesian coffee price integration with the United States by using the Johansen Cointegration Test, Error Correction Model, and price transmission. The results of the analysis showed that (1) the development of coffee prices in Indonesia since 1980-2018 fluctuated with a variation coefficient of 16.78% and coffee prices in the United States market fluctuated with a variation coefficient of 17.05%. The change in coffee prices in Indonesia is linear with changes in coffee prices in the United States market. This means that if there is an increase and decrease in coffee prices in the United States will result in an increase and decrease in the price of coffee in Indonesia (2) the elasticity of coffee price transmission in Indonesia with the price of coffee in the United States in the long term is elastic. With a relatively strong cointegration (stability of price variables in the long run).

Keywords: Coffee Price, Integration, Cointegration, Transmission

INTRODUCTION

Coffee commodities are important commodities for many countries that work on coffee plantations, which contribute as a source of state foreign exchange. In Indonesia Coffee plant area of 1.28 million ha with production of 668,677 tons (Central Statistics Agency, 2017). Indonesia's coffee consumption tends to increase along with the increasing population of Miftakudin, Whinarko, and Panji (2019), Todaro (2011) that the price competitiveness of a product from a country will greatly determine the volume of exports and export value. Indonesia has the potential to be a coffee exporting country in various export destination countries. For Indonesia coffee exports contribute to economic growth, as a source of foreign exchange, encourage industries that use coffee raw materials and open employment opportunities for the population.

International trade, import export activities and commodity markets are increasingly integrated along with the increasingly strengthening economic globalization. Market integration can reflect the strength of price interrelationships between markets. Price movements in one country will be determined by price changes from the reference state. The price development issued by the United States is integrated with the price of Indonesian coffee. The linkage between the Indonesian coffee market and the United States coffee market is influenced by the rise and fall in prices in the international market. The export prices of a country's commodities will always keep abreast of international price developments, Sukirno (2013) and Densky et, al (2018). International coffee prices will determine the price movement of coffee in Indonesia and the price of coffee in the United States. As a result, Indonesia's market position cannot be

a determinant of coffee prices in the world market but only as a price taker,(Khumaira, 2016). The United States is the country that imports the most coffee from Indonesia, meaning the U.S. becomes a potential market share for Indonesian coffee exports. The gap in coffee prices in the U.S. market with world coffee export prices and Indonesian coffee prices occurs due to strong or weak market integration that occurs. Fluctuations and trends in the increase in international, American and Indonesian coffee prices can affect Cointegration of the market, speed, adjustment of price changes and elasticity.

The incompatibility of market prices that occur can threaten the existence of economic actors. Market coherence will determine coffee export activities, coffee export prices and coffee imports between Indonesia and the United States. The coherence between the Indonesian coffee market and the United States coffee market is influenced by the change in the ups and downs of coffee prices in the United States market. In this relationship whether there is a dependence on coffee prices in both countries and whether coffee prices are well integrated or there is a transmission of prices in both the Indonesian and American markets. From the description, this article is intended to analyze the trend of the development of Indonesian coffee prices with U.S. coffee prices and the integration of Indonesian coffee prices with the United States...

RESEARCH METHODS

This research focuses on coffee prices and the integration of Indonesian coffee prices with coffee prices in the United States. The time series data used is data from 1980-2018. Data analysis uses descriptive and inductive analysis. Descriptive analysis to describe the development of coffee market prices in both countries. Analysis of the coherence between domestic market prices and the reference market using the following stages of analysis:

1. Unit Root Testing (uji akar unit)

Time series data used whether the stationer was tested with augmented Dickey Fuller Test (ADF testt), (Widarjono, 2013),(Djulin and Malian, 2003) as follows:

$$\Delta Y_t = \phi Y_{t-1} + e_t \text{ (no intercept)}$$

$$\Delta Y_t = \beta_1 + \phi Y_{t-1} + e_t \text{ (with intercept)}$$

$$\Delta Y_t = \beta_1 + \beta_2 t + \phi Y_{t-1} + e_t \text{ (intercept with time trend)}$$

Where:

Δ = First difference of variable used

T = variable trend

Δy_t = change in shape of first difference

ϕ = regression coefficient for log y

β_1, β_2 = coefficient

e_t = error term

Degree of trust 95% or proba valueblitas 5 %. The hypothesis is $H_0 : \beta_1 = 0$ (there are root units) and $H_1: \beta_1 \neq 0$ (no root units).

2. Cointegration Test

The co-integration test method used refers to (Yantu, M.R et,al,2010) and (Rosadi, 2012). The cointegration test uses the Johansen test,with the equation:

$$e_t = P_{HKIt} - \beta_0 - \beta_1 P_{HKSt}$$

L_{HKIt} = indonesian coffee price at t (us\$/ton/year)

L_{HKAst} = U.S. coffee price at t (us\$/ton/year)

B_0, β_1 = coefficient

ET = error term

If the trace statistics value > the critical value, then the variables are cointegrating.

3. Error correction Model (ECM)

ECM models refer to (Widarjono, A, 2009) (Yantu, M.R et, al 2010) (Elisha, LC, 2015). Simply put, the ECM for HKAst and HKIt models is;

$$\Delta HKIt = \alpha_0 + \alpha_1 \Delta PHKAST + \mu (PHKIt-1 + \beta_0 - \beta_1 PHKIt-1) + ETC$$

ΔL_{HKIt} = Change in Indonesian coffee prices at t (us\$/ton/year)

ΔL_{HKAst} = Change in U.S. coffee prices at t (us\$/ton/year)

$\alpha_0 \alpha_1$ = Short term coefficient

B_0, β_1 = Long term coefficient

ρ = Adjustment speed

4. Granger Causality Test

Granger Causality Test was conducted to see the United States coffee market and Indonesian coffee whether it affects each other. The model used refers to Jhuanda, B and Junaidi (2012) as follows;

$$P_{HKIt} = \sum_{j=1}^k a_j P_{HKIt} + \sum_{j=1}^k \beta_j P_{HKAst} + e_{it}$$

L_{HKIt} = Indonesian coffee price in year t (us\$/ton/year)

L_{HKAst} = U.S. coffee price in 2015 (us\$/ton/year)

k, j = Number of logs

a_j, b_j = Coefficient of each variable

e_{it} = Confounding Variable

Test hypothesis:

H₀: $a_j = \beta_j = 0$; (HKAS_t no granger hkit causality)

H₁: $a_j \neq \beta_j \neq 0$; (HKIt no Granger HKAS_t causality)

5. Price Transmission Elasticity

Determination of price transmission elasticity refers to Irawan (2017) with the following formula

$$\text{Elasticity} = \frac{\% \Delta \text{HKIt}}{\% \Delta \text{HKAS}_t}$$

ΔHKIt = Change in Indonesian coffee prices at t (US\$/ton/year)

ΔHKAS_t = Change in U.S. coffee prices at t (US\$/ton/year)

RESULTS AND DISCUSSIONS

The Development of Coffee Prices in the United States and Indonesia

The development of coffee prices in both Indonesia and the United States shows the development of prices that fluctuate. If the price of coffee in Indonesia rises, the price of coffee in the United States also rises, and conversely if the price of coffee in Indonesia decreases, the price of coffee in the United States also decreases.

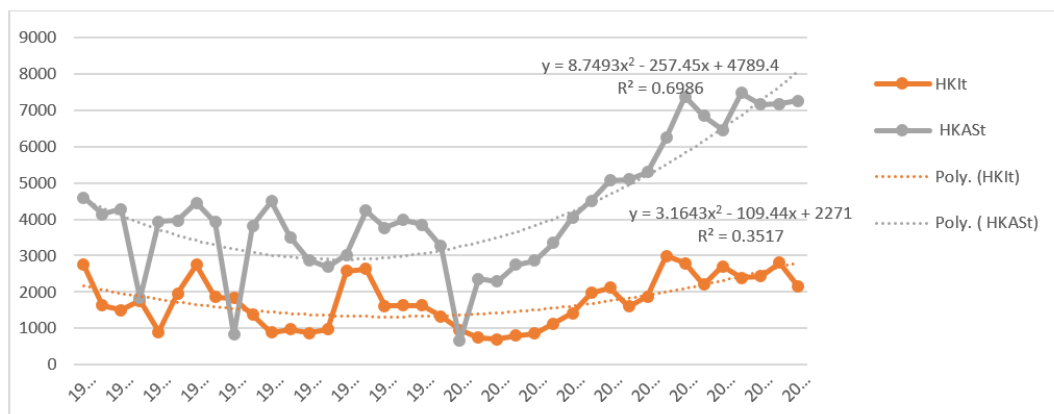


Figure 1: The Development of Coffee Prices in the Indonesian Market and the United States Market

Figure 1 shows on the HKIt chart the average price in 1980 to 2018 amounted to US\$ 1,750 / ton. From the chart the highest price increase trend in 2011 amounted to 2,990 US\$ / ton, while the low price was 700 US \$ / ton in 2002. The highest coffee price in the United States reached 7,460 US\$ / ton in 2015, while the lowest price reached the price of 6,600 US \$ / ton occurred in 2000. Since 1980-1982 the price of coffee in the United States still looks stable at 4,330 US \$ / year. In 1983 the price of coffee in the United States decreased dramatically to 1,840 US \$ / year. In 2006 the average increase every year until 2018 with the highest price in 2015 was

7,460 US \$ / year. In each know there is a price margin between the price of Indonesian coffee with the price of American coffee, and the average coffee price is higher in the United States. According to Dradjat, B et al (2007), that the development of coffee export prices is not linear with the development of coffee export volume.

The price of Indonesian coffee compared to the price of U.S. coffee has a price difference of 4,470 US \$ / ton or 59.91%, with the difference from 1980 to 2018 is 1,740 US \$ and 4,240 US \$. The development of Indonesian coffee export prices from 2005 - 2014 fluctuated, where the highest export price occurred in 2011 at 2,990 US\$ According to Bambang Dradjat et al (2007) that the development of export prices was not in line with the development of export volumes, this happened because the orientation of coffee commodities was based on production development.

Analysis of the Integration of the Indonesian Coffee Market with the United States Coffee Market

1. Unit Root Test

Analysis of whether the data is stationary or not, used rootunit unit (unit root test), with the Dickey-Fuller Augmented method (ADF), Widarjono (2009). The ADF Test estimate is presented in Table 1.

Table 1: ADF Test Results

Prices in Pasar Indonesia (HKIt)				Prices in the United States Market (HKASt)			
Level (Intercept)							
Test Critical Value		ADF test	Prob	Test Critical Value		ADF test	Prob
1%	-3.632900	-2.588175	0.1049	1%	-3.615588	-1.708603	0.4190
5%	-2.948404			5%	-2.941145		
10%	-2.612874			10%	-2.609066		
Market coffee price in Indonesia (PRIt)				Market coffee price in united states (HKASt)			
First difference (Intercept)							
Test Critical Value		ADF test	Prob	Test Critical Value		ADF test	Prob
1%	-3.626784	-6.263674	0.0000	1%	-3.621023	-7.930607	0.0000
5%	-2.945842			5%	-2.943427		
10%	-2.611531			10%	-2.610263		
Prices in Pasar Indonesia (PRIt)				Prices in the United States Market (HKASt)			
Second level difference (Intercept)							
Test Critical Value		ADF test	Prob	Test Critical Value		ADF test	Prob
1%	-3.632900	-10.26896	0.0000	1%	-3.639407	-6.389674	0.0000
5%	-2.948404			5%	-2.951125		
10%	-2.612874			10%	-2.614300		

Table 1 shows that the variable level of coffee prices at the intercept data is not stationer or critical value of 5%, smaller than mac Kinnon's value of -2.59 with a prob value of 0.1049.. This unused data is forwarded to the first difference in intercepting the data into a stationer and resulting in a probability value smaller than the critical value of 5%. The ADF value in the first

difference is -6.263673 with a prob value of $0.0000 < \alpha 0.01$. This means that the data has no root units. Consistent with Nugroho (2013) shows that international coffee prices have a positive effect on Indonesia's coffee export offerings.

Variable coffee price in the United States market level in intercept data shows that the stationer or critical value is 5% greater than mackinnon value of 5% which is -1.708603 with a prob value of 0.4190. However, the critical value with MacKinnon's difference was very small, so to convince again proceeded to first difference in intercept. The test results showed that the ADF value in the first difference was -7.931 with a prob value of $0.0000 < \alpha 0.01$. Testing for the root of each variable's root unit has been fulfilled so that it can be continued with the co-integration test

Variable coffee prices in the Indonesian market and coffee prices in the United States market at a level without intercept experienced a constant average at first but the variable value of coffee prices in the Indonesian market and coffee prices in the United States market increased with time. The variable price of coffee in the markets of both countries at the intercept level is not only a variable price that is not constant but also the average increases with time.

2. Cointegration Test

The long-term balance test as desired in econometric theory is used johansen Cointegration test (Fazaria, et al 2016). (Widarjono, 2009). Johansen's Cointegration test can be seen the results of the estimate presented in Table 2.

Table 2: Results of the Johannsen Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.357679	18.15419	15.49471	0.0194
At most 1	0.046853	1.775499	3.841466	0.1827
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistics	0.05 Critical Value	Prob.**
None *	0.357679	16.37869	14.26460	0.0228
At most 1	0.046853	1.775499	3.841466	0.1827

Table 2 shows that at the statistical trace level of the critical value of 5% there is only one variable indicated to influence each other. Table 2 shows statistical traces only at No. None whose statistical trace value is greater than the critical value at the 5% level of 18.15419 which means integrated. Similar to the max Eigen statistic only at No. None, the maxEigen statistic is greater than the critical value of 16.37869 which means integrated. Johansen's test results explained that the price of U.S. coffee affects the price of coffee in Indonesia in the long run. Table 2 also shows that the critical value with a significant rate of 5% max-Eigen statistical value is smaller than the max-eigen value. Indicates a long-term relationship or balance of coffee prices in both countries in the long term. Consistent with the results of purwandhini research, USA (2015) that there is integration of world coffee market prices to Indonesian coffee prices in the long term.

3. Error Correction Model Analysis (ECM)

The results of the expected ECM of U.S. coffee prices affecting coffee prices in Indonesia can be seen in Table 3.

Table 3: Results of ECM Ice of U.S. Coffee Prices Affect Coffee Prices in Indonesia in the Long Term

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	624.7435	225.0131	2.776476	0.0086
HKAST	0.264560	0.049096	5.388644	0.0000
R ²	0.739712	F-statistic		29.03748
Adj.R ²	0.724569	Prob(F-statistic)		0.000004
DW. Stat	1.503625			

Table 3 shows that the R² value of 0.739712 means that coffee prices in the United States can explain the price of coffee in Indonesia 73.97% and 26.03% influenced by other variables outside the model. In the F test obtained a prob value of 0.0000 < α 0.01, meaning that the price of U.S. coffee affects the price of coffee in Indonesia is very significant. The ECM equation of the effect of coffee prices in the United States market on Indonesian coffee prices in the long term can be written as follows:

$$HKIt = 624.7435 + 0.264560 HKASt$$

This model shows that coffee prices in the United States have a positive influence in the long-term balance of coffee prices in Indonesia In the long run there is an effect on coffee prices in the United States on coffee prices in Indonesia in real terms. This is shown with a prob value of 0.0262 < α 0.05 means that the price of coffee in the United States has a real effect on the long term on Indonesian coffee received. The increase in coffee prices in the United States of 100 US\$ will increase the price of coffee in Indonesia Rp 452,621 in the long term assuming other factors are considered fixed. Consistent with Mustika's research (2018) that in the long run the determining factor to the volume of coffee exports to the United States market is determined by the exchange rate and price of coffee. Furthermore Purwandhini (2018) that the formation of coffee prices in the long term is strongly integrated and in the short term has weak integration. In this case Noer et, al (2012) is not integrated coffee market price occurs due to monopsony or oligopsonary forces in the Indonesian coffee market.

While the estimated ECM of coffee prices in Indonesia affects the price of coffee in the United States in the long term can be seen Table 4.

Table 4: Ecm Estimates of Indonesian Coffee Prices Affect Coffee Prices in the United States on a Long-Term Basis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1342.007	579.3737	2.316307	0.0262
HKIT	1.662049	0.308435	5.388644	0.0000
R ²	0.739712	F-statistic		29.03748
Adj. R ²	0.724569	Prob(F-statistic)		0.000004
DW.stat	1.253974			

Table 4 shows that the R^2 value of 0.739712 means that coffee prices in Indonesia can explain coffee prices in the United States 73.97% and 26.03% influenced by other variables outside the model. In the F test, the prob value of $0.0000 < \alpha 0.01$ means that the price of U.S. coffee affects the price of coffee in Indonesia as a whole. The ECM equation between coffee prices in the markets of both countries in the long term can be written as follows:

$$HKAS_t = 1342.007 + 1.662049 HKI_t$$

This model shows that coffee prices in Indonesia have a positive influence in the long-term balance of coffee prices in the United States. In the long run there is a very real influence on coffee prices in Indonesia on coffee prices in the United States. In the long run, the increase in the price of coffee in the Indonesian market of Rp. 1000 will increase the price of coffee in the United States by 646,480 US \$ assuming other factors *ceteris paribus*. Consistent with Hafizah (2009), that in the short term there is no market integration but in the long term there is integration of the Indonesian and Malaysian spot markets with the Rotterdam forward market.

4. Granger Causality Test

The price of Indonesian coffee with the price of U.S. coffee whether or not is used is a granger causality test. Granger causality test results can be seen Table 5

Table 5: Granger causality test estimation results

Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
HKIT does not have granger HKAST causality	37	2.02073	0.1491
HKAST does not have granger HKIT causality		4.84368	0.0145

Table 5 shows that the price of Indonesian coffee has no real effect on the price of U.S. coffee. This is evident from the prob value of $0.1491 > \alpha 0.05$. But the price of U.S. coffee can affect the price of coffee in Indonesia, it is seen from the value of prob $0.0145 < \alpha 0.05$. The occurrence of Cointegration between the price of Indonesian coffee and the price of U.S. coffee, indicates that the price of Indonesian coffee with the price of U.S. coffee has a causality relationship. Causality can occur if technological constraints are overcome, price information is perfect and eliminates the influence of variable disruptors of the previous period. This factor can overcome the possibility of price fluctuations as a cause of price instability Purwandhini, U.S. (2015)

5. Price Transmission Elasticity

Pricing Transmission Elasticity refers to Irawan (2007), and Aulia (2012) which are intended to measure the response of changes in coffee prices in the United States to changes in coffee prices in Indonesia.

Table 6: HKIt Price Transmission Elasticity

Elasticity	Value
Long Term Elasticity HKIt	0.264
Long Term Elasticity HKAST	1.662

Table 6 shows that coffee price transmission elasticity coefficient (α_0 in the ECM equation) of 0.264. This means that on the long-term balance an increase of 10% in coffee prices in Indonesia will result in an increase in U.S. coffee prices by 2.64%. The ECM equation shows that the elasticity of transmission between the two countries in the long term is elastic. In the ECM equation obtained coefficient values (α_1) by 1,662. On the long-term balance of coffee prices in the United States market affects coffee prices in Indonesia with a relatively strong price transmission. In this case, if there is a 10% price increase, the price of coffee in Indonesia will increase the price of coffee in Indonesia by 16.62%, the ECM equation shows the elasticity of price transmission of both countries in the long term is elastic.

CONCLUSION

The development of coffee prices in Indonesia from 1980 to 2018 is fluctuating with a variation coefficient of 16.78% and the price of coffee in the United States market fluctuates with a variation coefficient of 17.05%. Changes in coffee prices in Indonesia followed by the establishment of coffee prices in the United States, meaning that if the price of coffee in Indonesia increases then the price of coffee in the United States also increases. Conversely, the price of coffee in Indonesia has decreased, then the price of coffee in the United States has decreased. The elasticity of coffee price transmission in Indonesia with the price of coffee in the United States in the long term is elastic.). The integration of the U.S. and Indonesian coffee markets in the long term is relatively strong, but in the short term it is relatively weak.

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