Identifying the Factors Contributing to the Volume of Coffee Export from North Sumatra to the United States, Malaysia and Japan

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Abstract

The fluctuation of coffee export from North Sumatra to the three primary destination countries, including the United States, Malaysia and Japan, has never been reported simultaneously. The research was aimed to analyze the factors affecting the volume of coffee export from North Sumatra to the United States, Malaysia and Japan. The research was conducted in November 2019 until March 2020. This study employed secondary data, which were obtained from the Statistics of Sumatera Utara, International Coffee Organization, Bank Indonesia and Trading Economics in the time series of 34 years (1986 until 2019). The data were analyzed using the quantitative descriptive method with the panel data regression analysis by applying the Chow and Hausman tests with the Eviews 10 software. The analysis results show that the Free on Board (FOB) value, Indonesia Coffee Prices (ICP), Rupiah Exchange Rate (RER), Gross Domestic Product (GDP) per capita and coffee yield simultaneously and significantly affected the Coffee Export Volume (CEV) from North Sumatra to the United States, Malaysia and Japan. The FOB value, ICP and coffee yield had a partially significant positive effect on the CEV from North Sumatra to the three countries. The GDP per capita had a partially significant negative effect, while the RER did not put significant effect on the CEV. The FOB value, ICP and coffee yield are necessary to be increased for maintaining and supporting a rise in the volume of coffee export from North Sumatra.

Keywords: coffee price; FOB; GDP; panel data; rupiah exchange

INTRODUCTION

Economic diplomacy is carried out to achieve economic safety through trade diplomacy. Foreign trade is an important variable of economic growth and countries strive to encourage trade cooperation, including Indonesia. This goal can be achieved by encouraging domestic exports and reducing the volume of imports (Sabaruddin, 2015). Economically, international trade will also affect the aspects of consumption, production and income distribution (Sabaruddin, 2013). International trade occurs

if a country has a comparative advantage, meanwhile a country can produce goods with lower production costs compared to other countries (Krugman et al., 2012). The international trading potential from Indonesia takes the form of coffee export. Indonesia has many varieties of coffee that have specificities and become an attraction that are in great demand in the international market (Meiri et al., 2013). Exports have a significant role in the basic concept of economy. The volume of export can be influenced by the quantity of export demand. Export demand refers to the

request from foreign countries for goods and services produced in the country (Adesoye, 2017).

Indonesia is a sub-tropical region that is suitable for the development of plantation commodities. Plantation commodities are the primary sectors to increase the national income and contribute to the country's foreign exchange. It can be seen from the export value obtained from plantation commodities of 31.80 Billion in 2017 (Database Agricultural Statistics, 2018). Coffee is one of the mainstay crops in the plantation sub-sector in Indonesia that has wide domestic and global markets. It is a primary commodity that is necessary in contributing to the country foreign exchange, increasing incomes of farmers and employment. The export value of this commodity was the fourth-place, with 1.19 billion dollars after oil palm, rubber and coconut, in 2017 (Database Agricultural Statistics, 2018).

The highest coffee yield was found in the five provinces in Indonesia, South Sumatra, Lampung, East Java, North Sumatra and Aceh, respectively, in 2018 (BPS - Statistics of Indonesia, 2019). According to Kartika et al. (2013), the production value had an impact on the coffee export value in North Sumatra. International Coffee Organization (2018) reported that Indonesia was at the fourth-place coffee exporter in the world with an average of 8,198 ton of total world exports after Brazil of 30,638 ton, Vietnam of 23,209 ton and Colombia of 12,985 ton. BPS - Statistics of Indonesia (2019) recorded that the Coffee Export Volume (CEV) from Indonesia has increased annually therefore it has great opportunities to become the world major coffee consuming country.

The coffee export from North Sumatra Province fluctuated from 2009 until 2017. It increased by 17.08% from 2009 to 2010, decreased until 2013 and then increased until 2015. The value decreased by 4.60% and 1.65% in 2016 until 2017 (BPS - Statistics of Sumatera Utara, 2018). The decrease in coffee export in North Sumatra could be caused by several internal and external factors. According to Kartini (2018), the yield, inflation and exchange rates have a positive and significant effect on Indonesia coffee exports to the United States during the period of 1981 to 2016.

Indasari et al. (2016) stated that the coffee from North Sumatra had a Revealed Comparative Advantage (RCA) value of 6.13 (competitive) and a Trade Specialization Index (TSI) value of 0.97 (coffee exporters) and thus, this region is considered as a coffee exporting and competitive province. Hia et al. (2013) conveyed that the coffee export price and Gross Domestic Product (GDP) per capita could increase the coffee export value in North Sumatra. Marpaung et al. (2018) added that the Indonesia Rupiah Exchange Rate (RER) significantly increased the arabica CEV in the long-run from North Sumatra.

Darmi et al. (2020) stated that the coffee export price formation of North Sumatra in the long-run was influenced by import prices and export volumes in the Japan and Malaysia markets. Coffee export price was also affected by the import prices in Australian, Japanese and Malaysian markets, as well as export volumes and the RER on the US dollar in the short-run. Based on previous research, it can be seen that the RER, GDP per capita (GDPC), international coffee prices, coffee yield and the other factors can increase the coffee exports from North Sumatra.

Therefore, the research of coffee export from North Sumatra is expected to increase the efforts to support the sustainability of coffee yield. The sustainability of coffee yield will affect the coffee total export volume from North Sumatra to destination countries. According to Saragih (2013), the increasing arabica coffee yield can be achieved with an intensification strategy by increasing the fertilizer recommendation application, facilitating coffee agricultural credit, optimizing land use (intercropping), optimizing the use of family labor and implementing shade trees, organic fertilizer, coffee pruning and land conservation. The ecological dimension has an important role in the development of special arabica coffee in Simalungun highlands; such as increasing yield per ha, improving the quality of coffee and supporting the sustainability of coffee yield. Sulewski et al. (2018) also added that the agricultural sustainability can be observed by the economic, social and ecological dimensions.

The CEV from North Sumatra has never been reported simultaneously in the three primary destination countries for Indonesia coffee export. Therefore, the specific research is required on the factors influencing the CEV, including the Free on Board (FOB) value, coffee yield, international coffee prices, GDPC and RER from North

Sumatra Province to the three destination countries, such as the United States, Malaysia and Japan. The research was aimed to analyze the factors contributing to the CEV from North Sumatra to the United States, Malaysia and Japan.

MATERIALS AND METHOD

Study area

The study area was selected using the purposive sampling in the fourth highest coffee yielding area in Indonesia, North Sumatra Province. This research was conducted in November 2019 until March 2020.

Data collecting method

This study used secondary data collected from national and international sources from 1986 until 2019. The data sources on the factors underlying the volume of coffee export from North Sumatra are presented in Table 1.

Table 1. Data sources on factors affecting the CEV from North Sumatra

No.	Variable and data type	Data source	Website
1.	Independent		
	FOB value of North Sumatra	Statistics of Sumatera Utara	
	Indonesia Coffee Prices (ICP) to the United States	ICO	http://www.ico.org/trade_statistics.asp
	ICP to Malaysia		
	ICP to Japan		
	Rupiah exchange to USD	BI	https://www.bi.go.id/en/moneter/informasi-kurs/transaksi-bi/Default.aspx
	Rupiah exchange to Ringgit		
	Rupiah exchange to Yen		
	GDPC of the United States	TE	https://id.tradingeconomics.com/gdp-per-capita
	GDPC of Malaysia		
	GDPC of Japan		
	Coffee yield of North Sumatra	Statistics of Sumatera Utara	
2.	Dependent		
	CEV of North Sumatra	Statistics of Sumatera Utara	

Note: ICO = International Coffee Organization; BI = Bank Indonesia; TE = Trading Economics

Data analysis technique

The data were analyzed using a quantitative descriptive method with panel data regression through several approaches using Eviews 10 software. The most appropriate methods for testing models include three approaches (Gujarati and Porter, 2009):

a. Chow test
   H0: Common Effect Model (CEM) is selected if the prob value > 0.05.
   H1: Fixed Effect Model (FEM) is selected if the prob value < 0.05.

b. Hausman test
   H0: Random Effect Model (REM) is selected if the prob value > 0.05.
   H1: FEM is selected if the prob value < 0.05.

c. Lagrange test
   H0: CEM is selected if the prob value > 0.05.
   H1: REM is selected if the prob value < 0.05.

The influence of FOB value from North Sumatra (FOBNS), ICP, RER, GDPC and coffee yield of North Sumatra (CYNS) on the CEV to the United States, Malaysia and Japan were analyzed using the model of panel data regression. In general, it was estimated with the following formula (Temple, 2010):

$$CEV = b_0 + b_1 FOBNS + b_2 ICP + b_2 RER + b_3 GDPC + b_4 CYNS + \varepsilon$$

Classic assumption assessment

The data could be further analyzed into statistical assessment, with the classical assumptions assessments, including multi-collinearity, heteroscedasticity, autocorrelation and normality (Celik, 2011). Multicollinearity was used in the Pearson correlation coefficient matrix. The greater regression model does not show multicollinearity with a Pearson correlation matrix value < 0.9 (Hair et al., 2006). Heteroscedasticity occurs when the variance is non constant with the result that several groups of data have various ranges

of errors. Heteroscedasticity is seen by comparing the values of probabilities with a significant value of 5%. The probability value < 0.05 is classified as heteroscedastic, while the probability > 0.05 is classified as homoscedastic. Autocorrelation errors in an equation tend to independent or dependent. The autocorrelation assessment in this study was conducted with the Durbin-Watson (DW) value and compared to the Durbin-Watson table (Table 2).

Table 2. Interpretation of the autocorrelation assessment

Durbin-Watson	Interpretation
$1.65 < DW < 2.35$	no autocorrelation
$1.21 < DW < 1.65$ and $2.35 < DW < 2.79$	unconcluded
$DW < 1.21$ and $DW > 2.79$	autocorrelation

Source: Trihendradi (2007)

The normality test in this study was used to determine the residual variables to have a normal distribution. The assessment was conducted by the probability value on the Jarque-Bera graph. The probability value > 0.05 is classified as normally distributed, while the probability value < 0.05 is classified as non-normally distributed.

Statistical assessment

The statistical assessments were performed to examine the independent variable significant on the dependent variable. The assessments include the F-test, t-test and the determination coefficient.

The F-test was conducted to determine the independent variables significant simultaneously on the dependent variable, by comparing the probability value of F-statistic with significance of 5%. If the probability value < 0.05, all independent variables simultaneously affect the dependent variable. Meanwhile, if the probability value > 0.05, all independent variables do not simultaneously affect the dependent variable. T-test was conducted to examine the expected coefficient of the independent variable, whether it was partially significant on the dependent variable. The t-test was performed by comparing the probability value of t-statistic by 5%. If the probability value < 0.05, the independent variables partially affect the

dependent variables. On the other hand, if the probability value > 0.05, the independent variables do not partially affect the dependent variable. The determination of coefficient (R^2) was conducted to measure the suitability rate between actual and predicted data (Freund et al., 2010). R^2 used ranges from $0 < R^2 < 1$. The determination coefficient is towards one, then the greater model.

RESULTS AND DISCUSSION

The growth analysis of factors contributing to the CEV from North Sumatera

The growth of FOB value, ICP, RER, GDPC, coffee yield and CEV from North Sumatra to the United States, Malaysia and Japan for 34 years (1986 until 2019) fluctuated and these are presented in Figure 1. The FOB value, coffee yield and CEV from North Sumatra increased by 9.83%; 3.21% and 1.92%, respectively. The ICP multiplied by 1.03%; 9.18% and 1.18%, respectively to the United States, Malaysia and Japan. The RER to the United States, Malaysia and Japan by 8.65%; 7.04% and 13.08%, respectively. The GDPC developed by 1.64%; 3.64% and 1.42%, respectively, to the United States, Malaysia and Japan.

The growth was encouraged by the fact that the coffee yield from North Sumatra contributed significantly to export volumes. According to Saragih (2013), North Sumatra is the largest arabica coffee producer in Indonesia. Coffee yield could reach by 46,814 tons with a growth of 4.59% per year in the period 2006 until 2010. The arabica coffee yield contributed by 33.20% to the national production volume. Nopriyandi and Haryadi (2017) stated that the coffee prices, Indonesia GDP and the exchange rate have a short-term relationship and long-term balance on the Indonesia CEV. Lukman (2012) confirmed that the demand for Indonesia coffee export varied with an average of 6.17% to the United States for the period of 1985 until 2009. Sahat et al. (2016) mentioned that Indonesia coffee exports were still dominated by coffee beans in the period of 1994 until 2013. Internationally, the coffee bean price as a commodity fluctuated and was easily influenced by the market condition.
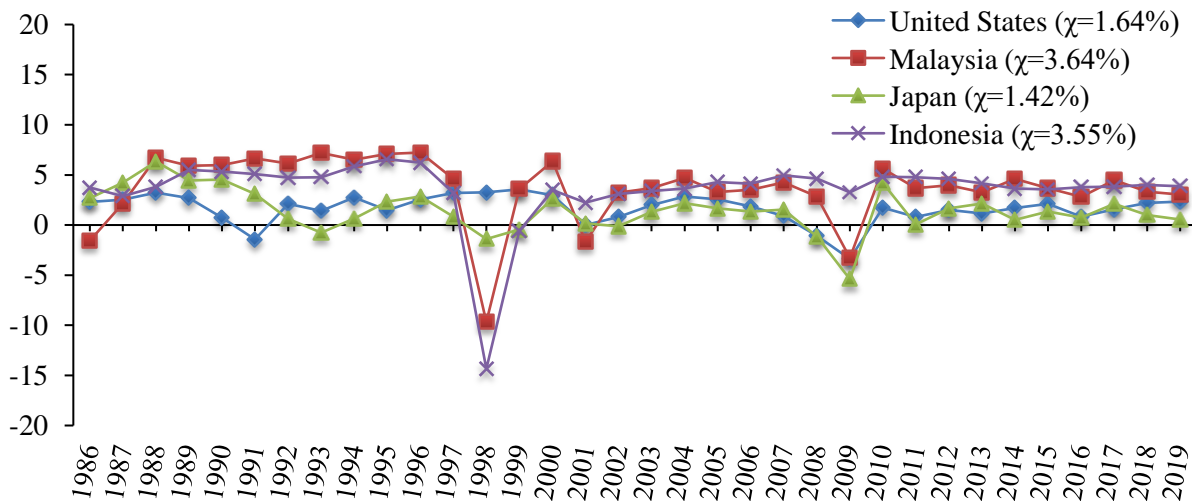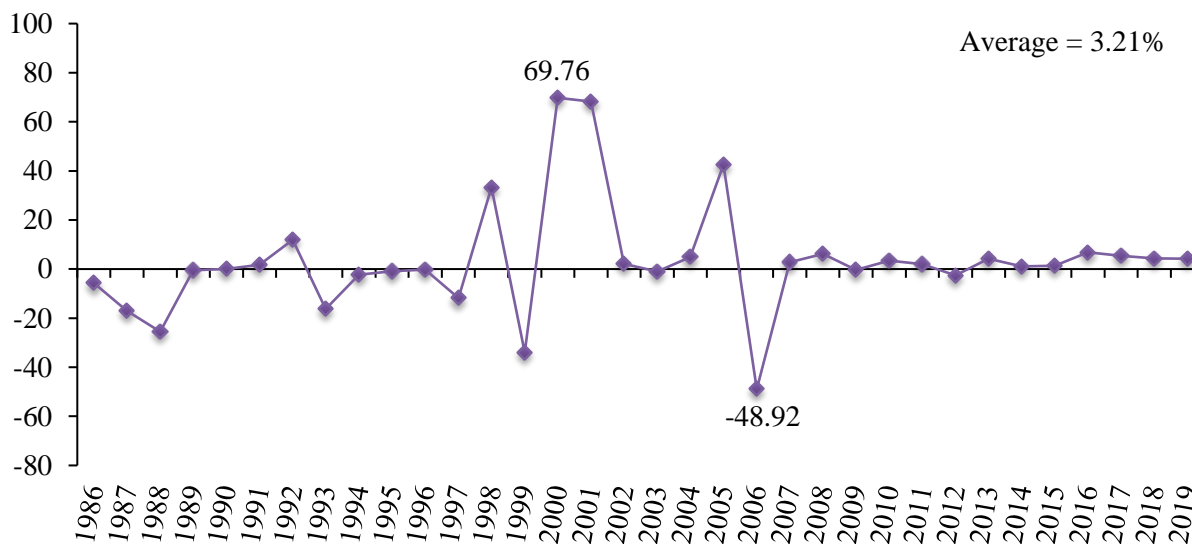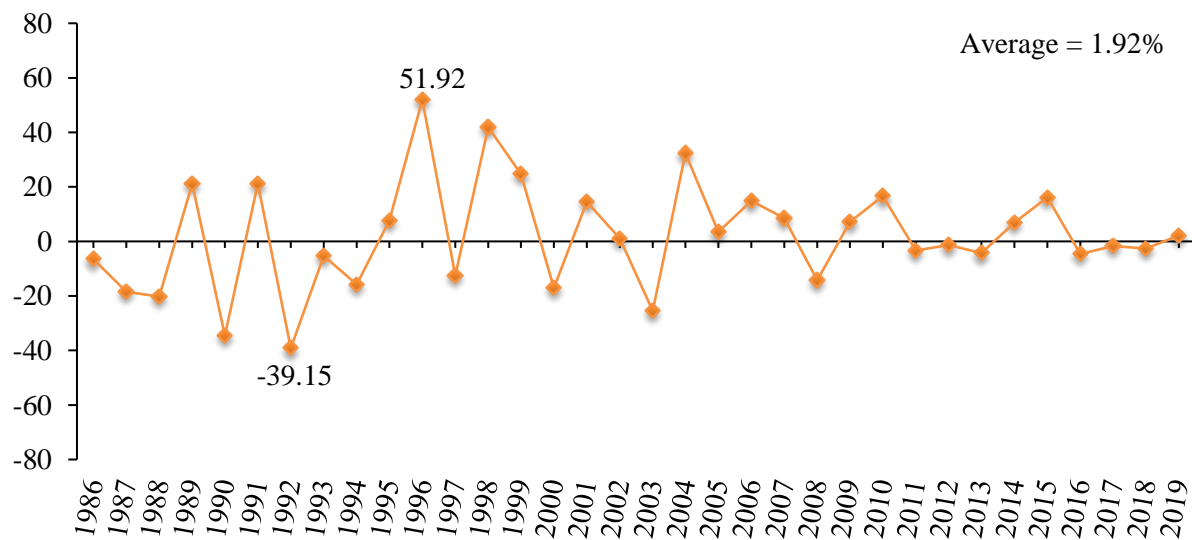
A.

B.

C.
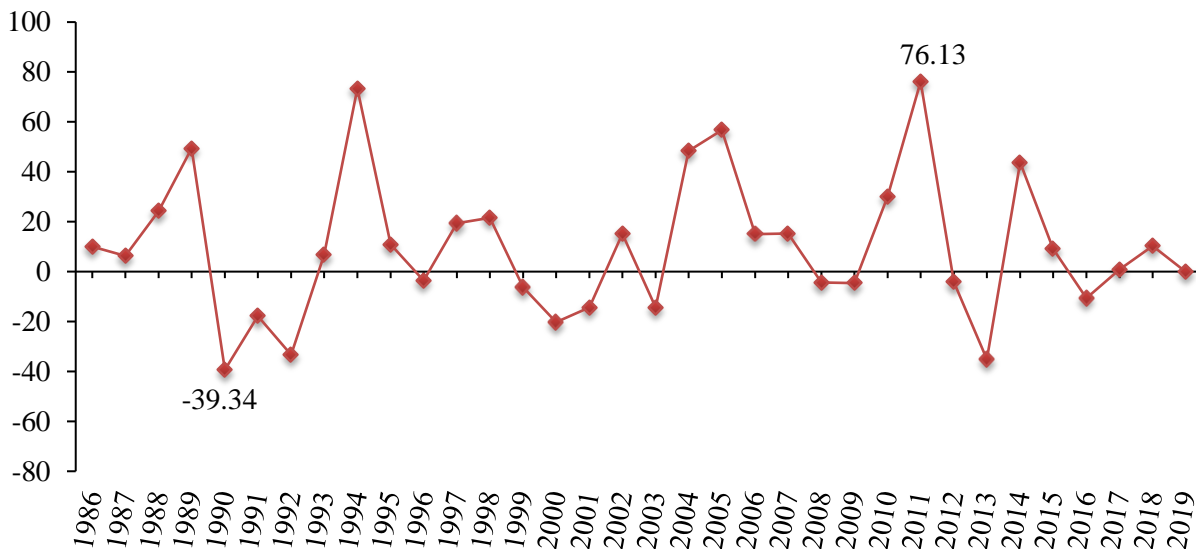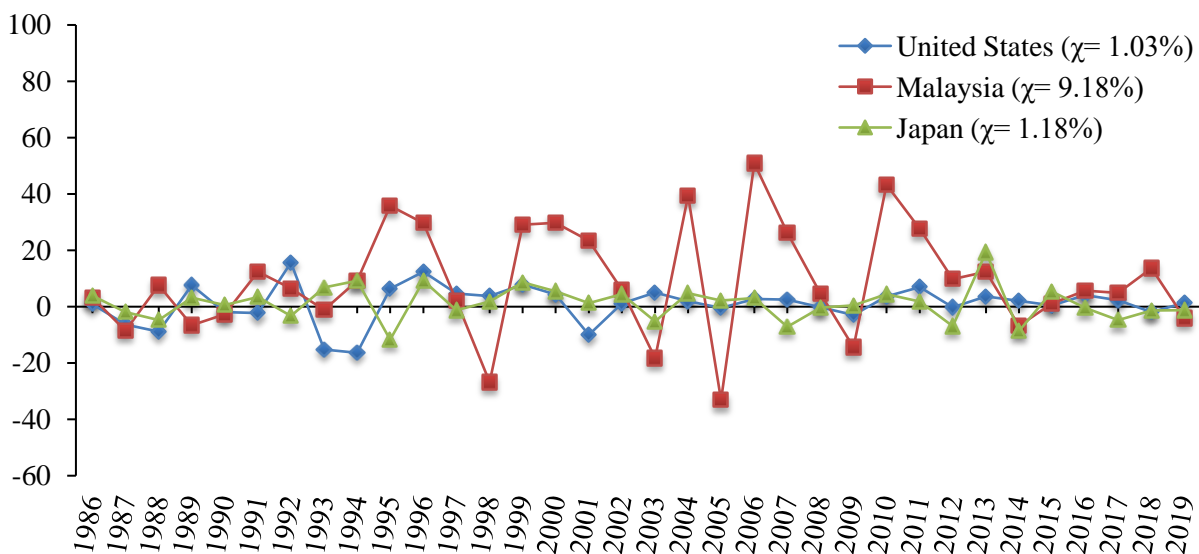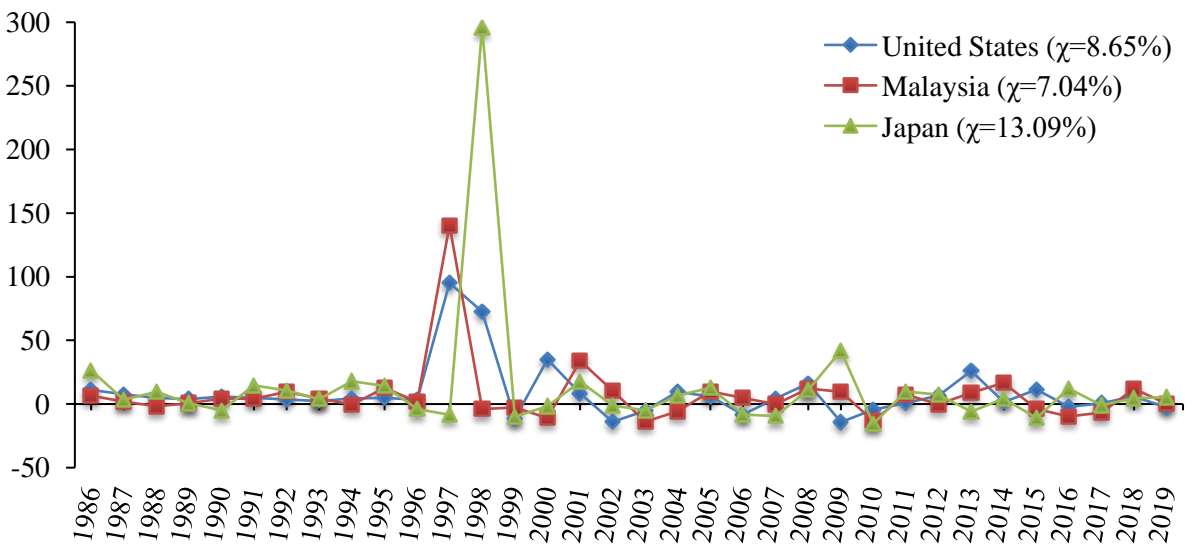
Figure 1. The growth analysis of FOB value (A); ICP (B); RER (C); GDPC (D); coffee yield (E) and CEV (F) to the United States, Malaysia and Japan for 34 years (1986 until 2019)

Selection model

Chow and Hausman assessment results of the factors affecting the CEV from North Sumatra to the United States, Malaysia and Japan are displayed in Table 3. The results show the probability value 0.0003 < 5% and therefore, it was selected the FEM model. The Hausman assessment results demonstrate the probability value of 0.0000 < 5% and thus, it was selected the FEM model.

Table 3. The assessment of Chow, Hausman and FEM of factors affecting the CEV from North Sumatra to the United States, Malaysia and Japan

Chow test	Effects test	Statistic	df	Prob.	FEM
	Cross-section F	9.0449	(2/94)	0.0003	
Hausman test	Summary test	Chi-Sq. statistic	Chi-Sq. df	Prob.	FEM
	Random cross-section	37.3405	2	0.0000	

FEM				
Variable	Coefficient	Std. error	t-statistics	Prob.
Constant	52053.96	12494.13	4.166274	0.0001
FOB value	0.093815	0.011039	8.498146	0.0000
ICP	2.289642	0.912787	2.508407	0.0138
RER	0.690225	0.749020	0.921504	0.3591
GDPC	-1.723637	0.451957	-3.813723	0.0002
Coffee yield	0.311137	0.067640	4.599889	0.0000
Effects specification				
Cross-section fixed (dummy variable)				
R^2	0.746008	Mean dependent var		55566.89
Adjusted R^2	0.727093	S.D. dependent var		17259.20
S.E. of regression	9016.286	Akaike info criterion		21.12664
Sum squared resid	7.64E + 09	Schwarz criterion		21.33252
Log-likelihood	-1069.459	Hannan-Quinn criter		21.21001
F-statistic	39.44140	Durbin-Watson stat		1.272351
Prob (F-statistic)	0.00 million			

Regression equation

The FEM assessment of factors affecting the CEV from North Sumatra to the United States, Malaysia and Japan are demonstrated in Table 3. The regression equation obtained is as follows:

$$Y = 52053.96 + 0.0938 \, X_1 + 2.2896 \, X_2 + 0.6902 \, X_3 - 1.7236 \, X_4 + 0.3111 \, X_5$$

The regression equation shows that the factors of FOB value had a significant and positive influence on the CEV from North Sumatra, with a coefficient value of 0.0938. This exemplifies that when the FOB value increased by 1%, the CEV to the United States, Malaysia and Japan also multiplied by 9.38%. It was supported by the growth of FOB value in North Sumatra by 9.83% from 1986 to 2019 (Figure 1A). This was so for FOB value in North Sumatra could affect the coffee price in the international market. According to Sihotang (2013), Indonesia coffee yield, Indonesia export price on the international market and RER to USD had a positive effect on the Indonesia coffee export for 15 years (1998 until 2012). Lubis et al. (2018) mentioned that the export prices, exchange rates, coffee yield of Aceh and world coffee yield had a positive and significant effect on the demand and CEV for 28 years (1990 until 2017).

The price of Indonesia coffee from North Sumatra had a significant and positive influence on the CEV with a coefficient value of 2.2896. The price increased by 1% and this contributed to the increase in CEV of 228.98% to the United States, Malaysia and Japan. This was attributed to the growth of ICP to the United States, Malaysia and Japan by 1.03%; 9.13% and 1.18%, respectively for 34 years (1986 until 2019) (Figure 1B). According to Desnky et al. (2018), the growth

of ICP increased by 8.81% and affected coffee export for 16 years (2000 until 2015) to the United States. Raharjo (2012) specified that the coffee retail price had a positive contribution to the demand for Indonesia coffee export to the United States of 35.39% for 16 years (1994 until 2010). Setiawan and Sugiarti (2016) listed that the Indonesia coffee export price could affect the Indonesia coffee export to Malaysian market. Sari et al. (2016) itemized that the coffee price also affects the world demand. The increase in coffee demand in the world was marked by the consumption and increasing the number of world coffee imports for 12 years (2001 until 2012).

The RER had a coefficient value of 0.6902. This rate increased by 1%, contributing to an increase in CEV of 69.02% to the United States, Malaysia and Japan. It was determined by the growth of the RER to the United States, Malaysia and Japan by 8.65%; 7.04% and 13.09%, respectively, for 34 years (1986 until 2019) (Figure 1C). The effect of the RER was partially significant in increasing the CEV from North Sumatra to the three countries, which was caused by the presence of a substitute country for coffee export and the highest in income per capita with the result affecting human habits to always consume coffee in the three countries.

Hidayah (2017) declared that the RER to USD was insignificant and did not put effect on the number of Indonesia coffee export to the United States for 25 years (1990 until 2014). It was influenced by the availability of alternatives for coffee exporters. Fadhilah (2018) stated that if the exchange rate increased by 1 rupiah, the Indonesia CEV decreased by 0.243%; however, if the exchange rate decreased by 1 rupiah, the Indonesia CEV would be increased by 0.243% for 26 years (1991 until 2016). Meiri et al. (2013) confirmed that the rupiah real exchange rate did not affect the Indonesia CEV to destination countries, including Japan, the United States, Germany, Italy, Britain, Malaysia, Belgium, Egypt and Algeria, for 22 years (1990 until 2011). Webb and Hall (2009) acknowledged that coffee is an inelastic commodity with the result that if a change or an increase in prices occurs, consumers will continue to consume coffee.

The GDPC had a significant negative influence on the volume of coffee export from North Sumatra with the coefficient of -1.7236. The GDPC increased by 1%, with the decrease in CEV to the United States, Malaysia and Japan of 172.36%. This was attributed to the growth of GDPC in Indonesia of 3.55%, which was higher than the GDPC in the United States and Japan of 1.64% and 1.42%, respectively and was lower than the GDPC in Malaysia of 3.64% for 34 years (1986 until 2019) (Figure 1D). The results in the purchasing power and consumption of coffee in the United States and Japan were lower, compared to Malaysia.

The higher GDPC of a country will increase the purchasing power and consumption of various goods and services, including coffee needs. The demand for coffee in Indonesia was higher, causing a decrease in the availability of coffee export. According to the Ministry of Industry (2009), Indonesia coffee consumption increased by 3% in the year. Meiri et al. (2013) stated that the GDPC had a significantly negative effect on the Indonesia CEV to the destination countries, including Japan, United States, Germany, Italy, Britain, Malaysia, Belgium, Egypt and Algeria for 22 years (1990 to 2011).

The coffee yield had a significant positive influence on the volume of CEV from North Sumatra with the coefficient value of 0.3111. The coffee yield rose by 1% and this was followed by an increase in CEV of 31.11% to the United States, Malaysia and Japan. It was affected by the growth of coffee yield by 3.21% for 34 years (1986 until 2019) in North Sumatra (Figure 1E). According to Elisha (2015), the Indonesia coffee yield exported to the United States had a positive and significant impact in the short-run and long-run for 33 years (1981 until 2013). Prajanti et al. (2020) reported that Indonesia coffee yield significantly affected the coffee export. Desnky et al. (2018) stated that the coffee yield experienced an average growth of 2.11% and affected the coffee export for 16 years (2000 until 2015) to the United States. Rahmanta et al. (2019) assured that the plant quantity, plant age, labor quantity, the quantity of fertilizer and pesticides simultaneously had a significant contribution to the yield of arabica coffee from smallholder plantations in Dairi Regency.

Classical assumption assessment

The results of multicollinearity and heteroscedasticity assessments of the factors affecting the volume of coffee export from North Sumatra to the United States, Malaysia and Japan are demonstrated in Table 4.

Table 4. The multicollinearity and heteroscedasticity assessments of factors affecting the volume of coffee export from North Sumatra to the United States, Malaysia and Japan

Variable	Multicollinearity					Heteroscedasticity	
	X1	X2	X3	X4	X5	Probability	Interpretation
X1	1					0.2184	
X2	0.148	1				0.0946	
X3	0.345	0.769	1			0.1302	Homoscedastic
X4	0.207	0.740	0.367	1		0.7874	
X5	0.545	0.122	0.327	0.178	1	0.1388	

Note: X1 (FOB value); X2 (ICP); X3 (RER); X4 (GDPC); X5 (Coffee yield)

Table 4 shows that the factors affecting the CEV from North Sumatra to the United States, Malaysia and Japan had a Pearson Correlation matrix value < 0.9 and thus, there were not any multicollinearity among the factors. The probability values of heteroscedasticity assessments of the factors affecting the CEV from North Sumatra to the United States, Malaysia and Japan were 0.2184; 0.0946; 0.1302; 0.7874 and 0.1388, respectively. The factors were not heteroscedastic because of probability values > 0.05. The Durbin-Watson value in the autocorrelation assessment of the factors influencing the CEV was 1.9837, showing no autocorrelation for the autocorrelation value ranged from $1.65 <$ Durbin-Watson < 2.35.

The results of normality assessments of the factors affecting the CEV from North Sumatra to the United States, Malaysia and Japan are presented in Figure 2.
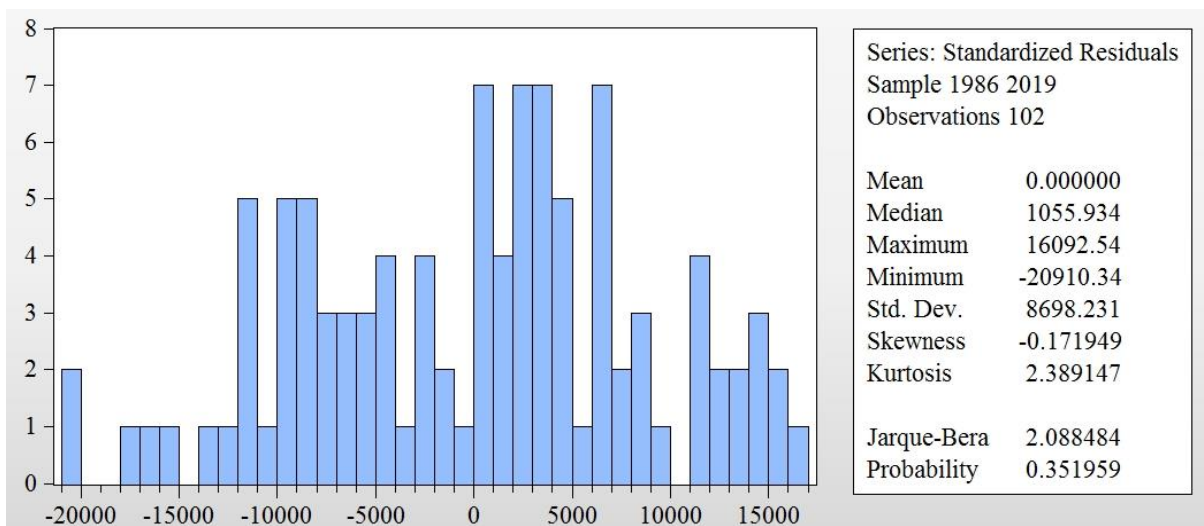

Figure 2. The normality assessment of factors affecting the CEV from North Sumatra to the United States, Malaysia and Japan

The probability value of normality assessment in the Jarque-Bera graph of the factors influencing the volume of coffee export was 0.3520 and they were distributed because probability values > 0.05. The FOB value, ICP, RER, GDPC and coffee yield on the CEV met the requirements of the classical assumption assessments and could be proceeded to statistical assessment.

Statistical assessment

The results of the statistical assessments of factors underlying the CEV from North Sumatra to the United States, Malaysia and Japan are displayed in Table 5.

Table 5. Statistical assessment of factors underlying the CEV from North Sumatra to the United States, Malaysia and Japan

Variable	F-statistic		t-statistic		R^2
	F-value	Probability	t-value	Probability	
FOB value			8.4981	0.0000*	
ICP			2.5084	0.0138*	
RER	39.4414	0.0000*	0.9215	0.3591[ns]	74.60%
GDPC			-3.8137	0.0002*	
Coffee yield			4.5999	0.0000*	

Note: * = significant at 5% probability; ns = not significant at 5% probability

Table 5 demonstrates that the probability value in the F-test of FOB value (X1), ICP (X2), RER (X3), GDPC (X4) and coffee yield (X5) simultaneously and significantly increased the CEV from North Sumatra to the United States, Malaysia and Japan and this was caused by probability values < 0.05. The determination of coefficient (R^2) of factors affecting the CEV was 0.7460. The FOB value (X1), ICP (X2), the RER (X3), GDPC (X4) and coffee yield (X5) rose the CEV of 74.60% in the model, meanwhile the remaining of 25.40% was explained by the other factors. According to Galih and Setiawina (2014), the quantity of coffee yield, land area and the US dollar exchange rate simultaneously had a significant effect of 84.8% on the volume of Indonesia coffee export in 2001 to 2011. Jamilah et al. (2016) stated that the RER, international prices and domestic production affected simultaneously and significantly on the Indonesia CEV of 24.10% in 2009 until 2013.

Table 5 presents that the probability value in the *t*-test of FOB value (X1), ICP (X2) and coffee yield (X5) had a partially positive effect, compared to GDPC (X4) with a partially negative effect (probability value < 0.05), in increasing the CEV from North Sumatra to the United States, Malaysia and Japan. The RER (X3) was partially insignificant in encouraging the volume of coffee export from North Sumatra to the United States, Malaysia and Japan. The RER was insignificant because peoples habits of coffee consumption became a trend so that consumers continued to consume coffee even though the price changed.

Komaling (2013) confirmed that the factors of world coffee prices, the exchange rate, real GDP and the domestic coffee price of destination countries significantly affected the Indonesia coffee export. Hong (2016) stated that the export price of Brazilian coffee had a positive effect on Vietnamese prices suggesting a competition between the two countries in the world coffee market. An increase by 10% in export prices of Brazilian coffee is also expected to increase Vietnamese coffee by 5%. Nugroho (2014) mentioned that the production coefficient had a positive and statistically significant sign that an increase in coffee output will be attractive escalate the exports quantity. Sofyan et al. (2018) reported that the Indonesia CEV was strongly influenced by 21% of international coffee prices and by 16% of the RER to the dollar in the long-term.

Efforts to increase of the volume of coffee export from North Sumatra

Based on the results of the research, efforts are necessary to increase the volume of coffee export from North Sumatra, such as:

1. Coffee smallholders in North Sumatra are expected to develop coffee yields with the higher quality to improve the competitiveness in the international market.
2. Government is required to participate in developing programs to improve the quality and quantity of coffee yields from North Sumatra and to provide financial assistance in the form of providing superior coffee seeds, subsidizing fertilizers and pesticides, as well as providing credit funds for coffee farmers in North Sumatra to expand the marketing of coffee from North Sumatra to other countries, to improve the independency on other particular countries and anticipate the diversification of processed coffee products that can increase the value of selling coffee. The government has established relations between exporters and farmers in the coffee yield center from North Sumatra. Clay et al. (2018) also added that the problem of agricultural product prices can be managed by

implementing a basic price program scheme or Government Purchase Price (GPP) scheme that appreciate and benefits farmers.

3. Institutions/universities/research institutions are required to participate in the development of the research and processed coffee products in North Sumatra to support the increase in coffee export to other countries.

4. Researchers are expected to continue the research on the factors affecting the coffee export from North Sumatra.

CONCLUSIONS

The FOB value, ICP, rupiah exchange, GDPC and coffee yield simultaneously have a significant effect on the volume of coffee export from North Sumatra to the United States, Malaysia and Japan by 74.60%. The FOB value, ICP and coffee yield partially have a significant positive effect on the CEV of 9.38%; 228.96% and 31.11%, respectively. Also, the GDPC has a partially significant negative effect, while the rupiah exchange is not significant in the CEV. It is recommended that the efforts to increase FOB value, ICP and coffee yield in maintaining and supporting the increase in the CEV are performed through providing superior coffee seeds, subsidizing fertilizers and pesticides, as well as providing credit funds for coffee farmers.

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