

Impact of Non Tariff Policy on Indonesian Coffee Exports To Main Importer Countries

1st Rossanto Dwi Handoyo
Department of Economics
Airlangga University
Surabaya, Indonesia
rossanto_dh@feb.unair.ac.id

2nd Angga Erlando
Department of Economics
Airlangga University
Surabaya, Indonesia
angga.erlando@feb.unair.ac.id

3th Ria Dwi Rafita Sari
Department of Economics
Airlangga University
Surabaya, Indonesia
riadwirafitasari@gmail.com

4th Feri Dwi Riyanto
Department of Management
Islamic University of Maulana
Malik Ibrahim
Malang, Indonesia
feri.rivan@gmail.com

5th Andre Pupung Darmawan*
Department Of Islamic Economics
Airlangga University
Surabaya, Indonesia
apupungd@gmail.com
*corresponding author

Abstract— This study discussed about the impact of non tariff policy on Indonesian coffee export to main importer countries such as, United States of America, Japan, Germany, Philippines, Malaysia, and Italy in 2003-2017. The Sanitary and Phytosanitary (SPS) dan Technical Barriers to Trade (TBT) were measured using an inventory approach in the form of coverage ratio. This research uses gravity model and panel data regression method. The result showed that GDP of importers, exchange rates, and TBT have a positive and significant effect on Indonesian coffee exports. However, the distance and SPS have no effect on Indonesian coffee exports.

Keywords—ARDL, Coffee Export, SPS and TBT, Coverage Ratio, Gravity Model, Panel Data Regression.

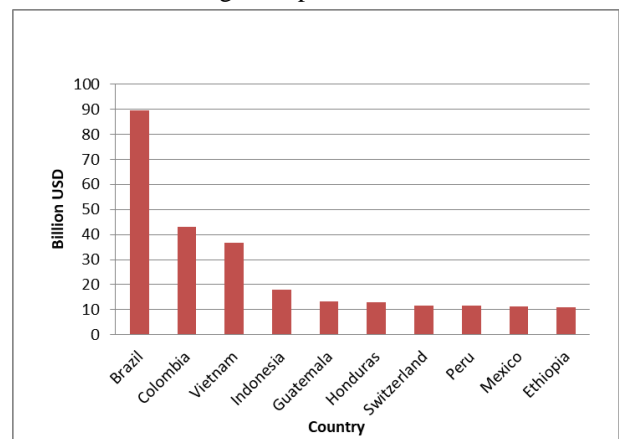
I. INTRODUCTION

Indonesia is a country that has an open economic systems. Open economies conduct economic transactions with foreign parties called international trade. The increasingly rapid development of the international economy has led to interrelated relations between countries. International trade is needed to meet domestic needs that the country cannot produce. World Trade Organization (WTO) is the only international organization that regulates trade between countries. WTO aims to help producers, exporters, and importers do their business. One of the WTO barriers are non tariff measures (NTMs). NTM is a policy measure other than the normal customs tariff that has the potential to have economic effects on international trade. The most used NTMs in various countries is Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT). SPS is a measurement to ensure that products are safe for consumers and to prevent the spread of pests or diseases among animals and plants that can affect humans. Otherwise TBT is another technical step that refers to product quality, product standardization, and product conformity assessment procedures. SPS and TBT could have positive or negative impacts on international trade [1].

Indonesia's agricultural sector is the big three that contributes to Indonesia's Gross Domestic Product (GDP) except industry and trade sector. One of the leading

agricultural sectors is coffee. The area of Indonesia's coffee plantation in 2017 was recorded at 1,253.8 thousand hectares. Association of Indonesian Coffe Exporters and Industries (AICE) explains that 96 percent is a community coffee plantation area and the rest is owned by private and government plantations. The Ministry of Trade of the Republic of Indonesia states that one of the ten main commodities of Indonesian exports is coffee. Indonesia ranks fourth on the list of the top ten producers and exporters of world coffee commodities.

Figure 1
The World's Largest Exporter of Coffee Commodities



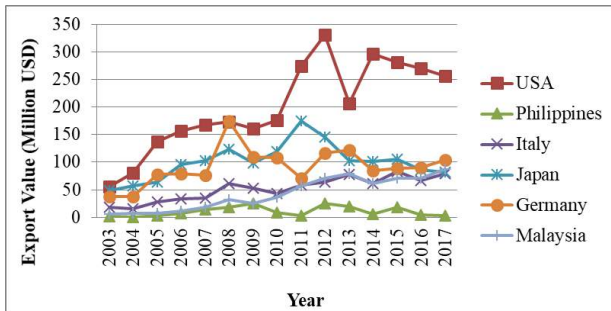
Source: United Nation Commodity Trade (UN COMTRADE), 2018.

Figure 1. Shows that in the first position the world's largest coffee exporter is Brazil with an export value of 89.53 billion USD. Second and third positions are Colombia and Vietnam with each export value of 43.12 billion USD and 36.58 billion USD. Moreover, Indonesia has a fourth position with an export value of 17.94 billion USD, and followed by the countries of Guatemala, Honduras, Switzerland, Peru, Mexico and Ethiopia in the next order.

The first destination country for Indonesian coffee exports is United States with a total value of exported coffee of 3.63 billion USD. In the second and third position are Japan and the Philippines with the total value of coffee

exported at 2.29 billion USD and 2.08 billion USD respectively. The fourth position is Germany with the total value of coffee exported at 1.87 billion USD. The fifth and sixth position of the main importer countries for Indonesia's coffee exports are Malaysia with a total value of 1.1 billion USD and Italy with a total coffee value of 0.93 billion USD.

Figure 2
Export Value of Indonesian Coffee to Main Importer Countries



Source: UN COMTRADE, 2018.

Figure 2. shows the Indonesian coffee exports value for the six main importer countries (United States of America (USA), Japan, Germany, Philippines, Malaysia and Italy) from 2003 to 2017. The values of exports in each country was fluctuated. Declining or increasing in the value of exports from 2003 to 2017 is influenced by many factors. Several factors that can influence the increase and decrease in the value of exports will be discussed in this study. These factors are importer GDP, exchange rates, distance, SPS and TBT policies.

This study has the same exchange rate variables, panel data regression, analysis methods, and commodities if compare with previous study [2] [3] [4] [5]. However, there are differentiations because this study use different observations and variables. This study analyzes NTMs impact on Indonesian coffee exports to main importer country. The independent variable used is importer GDP, exchange rates, distance, and NTMs (SPS and TBT policies). The main importer countries for Indonesian coffee exports are United States, Philippines, Japan, Germany, Malaysia and Italy. This study uses panel data regression analysis with time series data, from 2003 to 2017 and cross section data, which is United States, the Philippines, Japan, Germany, Malaysia and Italy. This study also uses an inventory approach, namely coverage ratio to measure SPS and TBT policies.

II. LITERATURE REVIEW

An International trade policies are barriers and rules that govern the course of free trade in the world. Trade barriers are divided into two part, namely tariff barriers and non-tariff barriers[6]. Tariff barriers are taxes or import duties imposed on trade commodities that enter a national boundary. Non Tariff Measures (NTMs) is a policy other than customs tariffs that have the potential to affect the economy in international trade, especially on traded goods. The measurement of NTMs includes a variety of policies implemented by various countries on their imported and exported goods. NTMs could affect the price and quantity of goods traded. In the viewpoint of an economy NTMs is

neutral, can have a negative or positive impact on trade depending on commodities and the country [7]. The imposition of NTMs policies on imported products can have a positive impact because these policies increase consumer confidence in the quality assurance of the products provided. The negative impact of NTMs policy can occur when a country's export products cannot meet the requirements to overcome NTMs because to meet these requirements requires high costs and adequate technology and infrastructure [1].

Gravity model in this study explains the relationship between two countries through the size of the economies. Named the gravity model because it is based on Newton's law of gravity where the gravitational attraction between two objects is positively affected by the mass of objects and is negatively affected by distance. Trade between two countries is analogous to Newton's law of gravity, which is positively influenced by GDP and negatively affected by distance. Mathematically the gravity model can be written as follows:

$$T_{ij} = A \times Y_i \times Y_j / D_{ij}$$

Where T_{ij} is the value of trade between country i and country j , A is a constanta, Y_i is GDP of country i , Y_j is GDP of country j , and D_{ij} is distance between country i and country j . The negative impact of distance is caused by an increase in the transportation costs of goods and services traded [8].

Bora et al. [9] Describe the methodology to see how important a trade measure is. One of the methodology is inventory approach. One measurement using the inventory approach, namely the coverage ratio that produces a percentage to see how wide the scope of imported goods is subject to NTMs policies. Mathematically the coverage ratio can be written as follows:

$$C_{jt} = \left[\frac{\sum (D_{it} \cdot V_{it})}{\sum V_{it}} \right] \cdot 100$$

Where C_{jt} is coverage ratio of country j on year t , D_{it} is dummy variable of imported products i in the year of NTMs imposition t whose value is 1 when there is an NTMs imposed on imported products and 0 (zero) when there is no NTMs imposed on the imported product, V_{it} is the product export value i in year T .

III. METHODOLOGY AND MODEL SPECIFICATION

This study uses a quantitative approach. NTMs data in the form of SPS and TBT are calculating using an inventory approach to carry out an inventory of NTMs with the calculation of the Coverage Ratio (CR). This research also uses panel data regression method to see the effect of importer GDP variables, exchange rates, distance, SPS policies, and TBT policies on the value of Indonesian coffee exports in 2003-2017 in the main importer countries, which is United States, Philippines, Japan, Germany, Malaysia and Italy. Data on Indonesia's coffee export value is taken from the United Nation Commodity Trade (UNCOMTRADE) with HS code 0901. Importer GDP data and exchange rates are taken from the World Bank. Distance data is taken from the international prospective and information study center (CEPII). Data from the SPS and TBT policies imposed by the main importer countries were taken from The Global Database on Non-Tariff Measure United Nation Conference on Trade and Development (TRAINS UNCTAD).

The model used in this study can be written as follows:

$$\text{LnEX}_{ijt} = \beta_0 + \beta_1 \text{LnGDP}_{jt} + \beta_2 \text{LnER}_{ijt} - \beta_3 \text{LnDIST}_{ijt} - \beta_4 \text{CRSPS}_{ijt} - \beta_5 \text{CRTBT}_{ijt} + \mu_{ijt}$$

- Where,
- LnEX_{ijt} : Natural logarithm of Indonesian (i) coffee export value to importer country (j) in year t (USD)
 - β_0 : Constanta
 - LnGDP_{jt} : Natural logarithm of Gross Domestic Product per capita of importer country (j) in year t (GDP of percapita current USD)
 - LnER_{ijt} : Natural logarithm of exchange rate of the exporting country (i) against the currency of the importing country (j) in year t (IDR/LCU)
 - LnDIST_{ijt} : Natural logarithms from the distance of the exporting country (i) to the importer country (j) in year t (Km)
 - CR SPS_{ijt} : Coverage ratio of the SPS that imposed on importing country (j) to the exporter country (i) in year t (Percent)
 - CR TBT_{ijt} : Coverage ratio of the TBT that imposed on importing country (j) to the exporter country (i) in year t (Percent)
 - μ_{ijt} : Error term

Trade between two countries is directly proportional to the Gross Domestic Product (GDP) of the country, because GDP measures the total value of all goods and services produced in an economy [8]. When the importer's GDP increases, consumers will spend money to consume more goods and have high potential to consume goods from other countries [10]. The first hypothesis in this study states that importer GDP has a positive and significant effect on export value [4] [5] [11] [12] [13] [14].

The exchange rate between two countries describes the price of goods traded in these two countries. The exchange

rate variable used in this study is the nominal exchange rate, which is the relative price of the currency between two countries. When the exporting country's currency depreciates against the importer's country's currency, the price of the product of the exporting country is considered cheaper than the product of the importing country itself so that it will increase the value of exports from the exporting country [15]. The second hypothesis in this study states that the exchange rate has a positive and significant effect on the value of exports [16].

The distance describes the transportation costs that will be borne by the exporting and importing countries[10]. Further distance will cause greater transportation costs so that it can reduce the value of traded goods. The third hypothesis in this study states that distance has a negative and significant effect on export value [4] [5] [11] [12] [13] [14] [17].

Exporting countries find it difficult to export goods when the importing country imposes SPS policies on imported goods. The importing country sets a strict SPS policy to control imported goods and protect domestic consumers. Decline in export value when products are subject to SPS policies by importing countries occurs because exporting countries require more costs including improvements in technology and infrastructure to meet the SPS standards and requirements [2]. The fourth hypothesis in this study states that SPS has a negative and significant effect on export value [11] [12] [13] [14] [17] [18] [19].

When importing countries impose TBT policies on goods they import, it will increase fixed costs and variable costs in countries that export to that country. Increase in fixed costs and variable costs will reduce the number of countries that will export their goods to the importing country and reduce the export volume or value of each exporting country. The fourth hypothesis in this study states that TBT has a negative and significant effect on export values [5] [11] [14].

Table 1
Operational Definition of Variables and Data Sources

Number	Variable	Unit	Description	Sources
Dependent Variable				
1.	Export Value (LnEX_{ijt})	USD	Value of Indonesia's coffee export to the main importer countries in 2003-2017 with HS code 0901	UNCOMTRADE
Variabel Independen				
2.	GDP percapita (LnGDP_{jt})	USD	GDP per capita of the six main importer countries, which is United States, Japan, Philippines, Germany, Italy and Malaysia in 2003-2017	World Bank
3.	Exchange Rate (LnER_{ijt})	IDR/LCU	Exchange rate of the Indonesian currency against the currencies of the six main importer countries in 2003-2017	World Bank
4.	Distance (LnDIST_{ijt})	Kilometer	Indonesia's geographical distance to the main importer countries	CEPII
5.	SPS (CR SPS_{ijt})	Percent	SPS policy imposed by the importing country is calculated using the inventory approach, namely the coverage ratio	TRAINS UNCTAD
6.	TBT (CR TBT_{ijt})	Percent	TBT policy imposed by the importing country is calculated using the inventory approach, namely the coverage ratio	TRAINS UNCTAD

Three methods in panel data analysis techniques that are often used in estimating models are Pooled Least Square (PLS), Fixed Effect Model (FEM), and Random Effect Model (REM). Choosing the estimation model between PLS, FEM, and REM that is most appropriate to use in estimating data can be done through three tests, namely the Chow test to choose between PLS or FEM estimation models, Hausman

test to choose between FEM or REM estimation models, and Lagrange Multiplier test to choose between PLS or REM estimation models. When the Pooled Least Square (PLS) or Fixed Effect Model (FEM) estimation model has been selected, it must do a classic assumption test which is multicollinearity test, heteroscedasticity test, and autocorrelation test. The next step is to do a statistical tests,

which is simultaneous tests to determine whether the independent variables in the equation tested together or simultaneously significantly affect the dependent variable

and partial test to determine whether the independent variables in the equation tested individually or partially affect the dependent variable significantly.

IV. RESULT AND DISCUSSION

This study uses data from 2003 to 2017 and the main importer countries, which is United States, Philippines, Japan, Germany, Malaysia and Italy. This study uses a panel data, a combination of time series and cross section data. The

analytical method used in this study is a regression panel of data analysis, which is Pooled Least Square (PLS), Fixed Effect Model (FEM), and Random Effect Model (REM).

Table 2
Regression Results

Variable	PLS		FEM		REM	
	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability
Constanta	8.8187	0.000	- 5.6789	0.032	8.8187	0.000
LnGDP	1.0024	0.000	1.8353	0.000	1.0024	0.000
LnER	0.0982	0.000	0.8414	0.107	0.0982	0.000
LnDIST	- 0.1894	0.092	0 (omitted)	0 (omitted)	- 0.1894	0.089
CR SPS	0.0006	0.740	- 0.0002	0.866	0.0006	0.739
CR TBT	0.0046	0.091	0.0035	0.136	0.0046	0.087
R-Squared	0.7841		0.5272		0.7841	
Prob > F	0.0000		0.0000		0.000	

Table 2 shows the results of panel data regression with PLS, FEM, and REM analysis methods. By using a significance level of 10%, GDP variable positively and significantly affects the value of Indonesian coffee exports in the three analysis methods, meaning that each increase in the importer's GDP will be followed by an increase in Indonesia's coffee exports to the main importer countries. Positive and significant exchange rate variables affect the value of Indonesian coffee exports in the method of PLS and REM analysis, meaning that any increase in exchange rates will be followed by an increase in the value of Indonesian coffee exports to the main importer countries. In the FEM analysis method, the exchange rate variable does not significantly affect the value of Indonesian coffee exports to the main importer countries. Distance variable is negative and significantly influences the value of Indonesian coffee exports in the PLS and REM analysis method, meaning that when the distance between the exporting country and the importer country increases considerably, the value of Indonesian coffee exports to the main importer countries will decrease. In the FEM analysis method the distance variable shows results that are omitted (cannot be estimated). SPS variable does not significantly affect the value of Indonesian coffee exports to the main importer countries. TBT variable positively and significantly affects the value of Indonesian coffee exports in the PLS and REM analysis method, meaning that one percent increase in the imposition of TBT policies on imported products will be followed by one percent increase in the value of Indonesian coffee exports to the main importer countries. In the FEM analysis method, TBT variable does not significantly affect the value of Indonesian coffee exports to the main export destination countries.

method between PLS or REM estimation models. The best model selection test results are explained in Table 3.

Table 3
Best Model Selection Test Results

Best Model Test	Probability Value	Selected model
Chow Test	0.0000	FEM
Hausman Test	0.0000	FEM
Lagrange Multiplier Test	1.0000	PLS

Table 3 shows the Chow test results that have a probability value of 0.0000, which is less than the significance level of ten percent so that the null hypothesis is rejected and the chosen model is FEM. The Hausman test results also have a probability value of 0.0000, which is less than the significance level of ten percent so that the null hypothesis is rejected and the chosen model is FEM. FEM estimation model cannot be used in this study because the FEM regression results in STATA show distance variables that are omitted (cannot be estimated). The Lagrange Multiplier test is to choose between PLS or REM estimation models, because FEM cannot be used. The Lagrange Multiplier test results have a probability value of 1.0000, which is more than a significance level of ten percent so that the null hypothesis is accepted and the chosen model is the PLS estimation model. The Pooled Least Square (PLS) estimation model chosen to be the right model used in this study, it must to do a classic assumption test which is multicollinearity test, heteroscedasticity test, and autocorrelation test to avoid problems with the estimation results.

Table 4
Multicollinearity Test

Variable	VIF	1/VIF
InGDP	2.27	0.404456
InDIST	2.47	0.404800
crsps	1.33	0.751142
crtbt	1.26	0.794570
InER	1.03	0.974912
Mean VIF	1.71	

There are three tests to choose one of the three estimation models that are appropriate for use in analyzing data, which is Chow test, Hausman test, and Lagrange Multiplier test. The chow test is performed to select the appropriate analysis method between PLS or FEM estimation models. The Hausman test is carried out to select the appropriate analysis method between the FEM or REM estimation model and the Lagrange Multiplier Test to select the appropriate analysis method between the FEM or REM estimation model and the Lagrange Multiplier Test to select the appropriate analysis

Table 4 shows the mean value of VIF is 1.71. The mean VIF is smaller than 10 so it can be interpreted that there are no multicollinearity problems in the model. The R-squared value (coefficient of determination) is lower than 0.8 so it can be ascertained that there are no multicollinearity problems in the model.

Table 5
Heteroscedastisity Test

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho : Constant variance	
Variables : fitted values of LnEX	
chi2 (1)	= 37.54
Prob > chi2	= 0.0000

Table 6
Autocorrelation Test

Wooldridge test for autocorrelation in panel data	
Ho : first-order autocorrelation	
F (1, 5)	= 12.359
Prob > F	= 0.0170

Table 5 indicates that heteroscedasticity testing on the model produces a probability value (prob> chi2) is 0.0000 or lower than the significance level of 10%, so the null hypothesis is rejected and it can be concluded that the data used is heteroscedasticity. Table 6 indicates that the autocorrelation test on the model produces a probability value (prob> F) is 0.0170 or lower than the significance level of 10%, so the null hypothesis is rejected and it can be concluded that there is autocorrelation in the model used. The heteroscedasticity and autocorrelation problems that occur are cured by doing robustness on the model. The regression results using the PLS estimation model produce output that has heteroscedasticity and autocorrelation problems so that can be recovered by doing robust on the PLS estimation model. After being robust on the estimation model, the model is free from the problems of heteroscedasticity and autocorrelation.

Table 7
Results of the Regression of Pooled Least Square Estimation Model after robust

Variable	Coefficient	Probability (P > t)
Constanta	8.8187	0.000
LnGDP	1.0023	0.000
LnER	0.0982	0.000
LnDIST	- 0.1894	0.148
CR SPS	0.0006	0.679
CR TBT	0.0046	0.020
R-Squared	0.7841	
Prob > F	0.0000	

Table 7 shows the regression results of the PLS estimation model after being robust on the model. The next step is to do a simultaneous test and partial test to determine the effect of independent variables on dependent variable.

The regression results using the selected estimation model which is PLS, shows that the coefficient of determination (R2) of the model is 0.7841. The determination coefficient of 0.7841 means that the independent variable is able to explain the variance of the dependent variable by 78.41% and the rest of percentage is explained by other variables outside the model.

The probability value F (prob> F) is 0.0000 or less than the significance level of 10% so that the null hypothesis is rejected and statistically it can be concluded that the independent variables (LnGDP, LnER, LnDIST, CR SPS, and CR TBT) simultaneous affect dependent variable (LnEX). The GDP importer variable (LnGDP) and the exchange rate variable (LnER) have a probability value of 0.000 or less than the significance level of 10% so that it can be concluded statistically that the GDP of the importing country and the exchange rate significantly affect the value of Indonesian coffee exports to the main export destination countries . The distance variable (LnDIST) has a probability value of 0.148 or a value greater than the significance level of 10% so that it can be concluded statistically that the distance does not significantly affect the value of Indonesian coffee exports to the main importer countries. The SPS variable (CR SPS) shows a probability value of 0.679 or greater than the significance level of 10% so that it can be statistically concluded that the SPS policy does not significantly affect the value of Indonesian coffee exports to the main importer countries. TBT variable (CR TBT) shows a probability value of 0.020 or less than a significance level of 10% so that it can be concluded statistically that the TBT policy significantly affects the value of Indonesian coffee exports to the main importer countries.

The estimation results in this study indicate that the GDP of the importing country has a positive and significant effect on the value of Indonesian coffee exports to the main importer countries. This research is in accordance with the theory of the gravity model which explains that GDP of the importing country has a positive influence on the flow of trade. When the importer's GDP increases, consumers will spend their money to consume more goods and have high potential to consume goods from other countries [10]. The positive effect of importer GDP on the value of Indonesian coffee exports is consistent with previous studies which state that the increase in the importer's GDP will increase the value of exports [5] [6] [12] [13] [14] [17] [18] [19].

The estimation results in this study indicate that the exchange rate has a positive and significant effect on the value of Indonesian coffee exports to the main importer countries. This research is in accordance with the theory which explains that when the exporting country's currency depreciates against the importer's country's currency, the price of the product of the exporting country is considered cheaper than the product of the importer country so that it will increase the export value of exporters [15]. The positive influence of the exchange rate on the value of Indonesian coffee exports is consistent with previous studies which state that an increase in exchange rates will increase the value of exports [2].

The estimation results in this study indicate that distance does not significantly affect the value of Indonesian coffee exports to the main importer countries. This research is not in accordance with the theory of the gravity model which

explains that distance describes the transportation costs that will be borne by the two countries. Further distance will cause greater transportation costs so that it will reduce the volume or value of goods traded by both distances. It can be stated that it does not affect export volume when consumer demand has a high value so that distance is no longer a barrier to trade.

The estimation results in this study indicate that the SPS policy does not significantly affect the value of Indonesian coffee exports to the main importer countries. The estimation results in this study are not in accordance with previous studies stating that the SPS policy has a negative effect on export value because the higher imposition of SPS policies will cause a decline in the value of exports. The coffee commodities examined in this study are not in the form of processed coffee products but in the form of coffee beans so that the product has no ingredients which can directly endanger consumers to be added to, such as in processed products. It can be concluded that the SPS policy imposed on export products is considered by the importing country not to be a barrier to the course of trade. The estimation results in this study indicate that the TBT policy has a positive and significant effect on the value of Indonesian coffee exports to the main importer countries. The positive influence of TBT policy is consistent with previous research which states that TBT policies help to improve one of the market failures, which is asymmetric information received by consumers regarding the quality of the products they import. Openness of information about products will increase consumer demand. when the importing country TBT increases, the probability of other countries' exports decreases (the negative effect on the export extensive margin), however, export volume from exporting countries increases (positive effect on the export intensive margin) [12] [13].

V. CONCLUSION

Importer's GDP reflects consumer demand. When the importer's GDP increases, consumers will spend their money to consume more goods and have a high potential to consume goods from other countries. When the exporting country's currency depreciates against the importer's country's currency, the price of the product of the exporting country is considered cheaper than the product of the importer's country so that it will increase the value of exports from the exporting country. TBT can help improve asymmetric information received by consumers regarding the quality of imported products so as to increase consumer demand and trigger an increase in export value. Geographical distance and SPS did not significantly affect Indonesian coffee exports to the main importer countries in 2003-2017.

The GDP per capita of an importer country increases the value of Indonesian coffee exports so that the government is expected to be able to expand exports to other countries, especially countries that have high economic growth values. The exchange rate has a positive effect on the value of Indonesian coffee exports so it is expected for the government to maintain the stability of the rupiah exchange rate so that the trade flows are going well. The geographical distance between Indonesia and the main importer countries does not significantly affect the export value, it is recommended that the government continue to improve the

quality of its export products so that the demand for importers in the country and distance is no longer a barrier to trade due to high demand. The government is expected to pay special attention to improving the technology, infrastructure and quality of export commodities (in this case is coffee) so that it can meet the requirements or policies related to SPS and TBT imposed by the importing country in the following years. Future studies are expected to use other approaches to measure non tariff measures (NTM), which is modeling approaches, the tariffs are equivalent or price wedges, subsidy equivalents, trade restriction indices, effective protection, and possible ways to move forward on NTMs.

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