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## ARTÍCULO

### Analysis of the Determinants of Indonesia's Exports with ASEAN Countries and Seven Trading Partner Countries Using the Gravity Model

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**Abstract:** This study aims to analyze the influence of GDP, population, distance, similarity index of economic size, and exchange rate on Indonesian exports with ASEAN countries and 7 trading partners (Japan, South Korea, India, China, Australia, New Zealand, Pakistan). This study uses the Generalized Method of Moment (GMM) method. The results of this study indicate that there is an influence between the independent variable and the dependent variable. This is indicated by the variable Indonesian GDP, the GDP of trading partner countries, the population of trading partner countries, the similarity index of the economic size of the two countries has appositve and significant effect on Indonesian exports, while the variable distance between the two countries and the Indonesian currency exchange rate against the currency trading partner countries have a negative and significant effect on Indonesia's exports in the period 2008 to 2017.

### 1. INTRODUCTION

Every country needs to have a relationship with other countries in several important matters relating to state affairs. One of them is in terms of trade. The deficit of a country in meeting the needs of its people causes a boost to international trade. According to Nuradi (2017) international trade can be interpreted as an activity to increase consumption due to the increasingly diverse choices of products, so that investment is higher, commodity prices and prices of production factors decrease. Trade flows that are increasingly developing and free have led to the emergence of various forms of international trade, such as bilateral, regional and multilateral trade which are expected to create better trade by reducing or eliminating trade, tariff and non-tariff barriers to gain gains of trade which can increase economic growth through a trade balance surplus (Indraswati, 2017; Helmar et al., 2018; Cancar, 2018; Armijos-Bravo, 2019; Aydin, 2019; Akkaya, 2019; Maake & Tranos, 2019; Auriacombe & Vyas-Doorgapersad, 2019).

Evidence of the development of free trade in the world with the creation of various free trade organizations or commonly known as the Free Trade Area (FTA) which emerged in 1993, namely the European Union (EU) with 17 member countries, besides that there is also a free trade agreement in North American countries. known as the North America Free Trade Agreement (NAFTA), which consists of the United States, Mexico, and Canada (Sembiring et al., 2017; Athiyaman & Magapa, 2019; Dunga & Mafini, 2019; Bonal et al., 2019; Hadi, 2019). There are also around 109 free trade agreements with at least one country in the Asia Pacific region, but the data has not been counted with 148 agreements in the process of approval, and 189 bilateral agreements out of 257 that are in the process of approval and preparation. The ASEAN Free Trade Area (AFTA) is the first FTA that was signed in 2002 in the Asia Pacific region (Baldwin and Shafiqhi, 2020; Brzica, 2018; Afonso & Silva, 2019; An et al., 2019; Akin Arikan, 2019).

No.	FTA Regional	FTA Entry into Force	Indonesia Entry into Force
1	ASEAN Trade in Good Agreement (ATIGA)	1993	1993
2	ASEAN-China FTA	2004	2004
3	ASEAN-Korea FTA	2007	2007
4	ASEAN-India FTA	2010	2010
5	ASEAN-Australia-New Zealand FTA	2010	2010
No.	FTA Bilateral	Entry into Force	
1	Indonesia-Japan EPA	2007	
2	Indonesia-Pakistan PTA	2013	

Sources: Directorate General of Customs and Excise, Ministry of Finance, 2015

Table 1.1 shows the development of the ASEAN FTA with other countries which also applies to Indonesia. With the incorporation of Indonesia in ASEAN and its involvement in the FTA, the flow of Indonesian trade can also be said to be increasing.

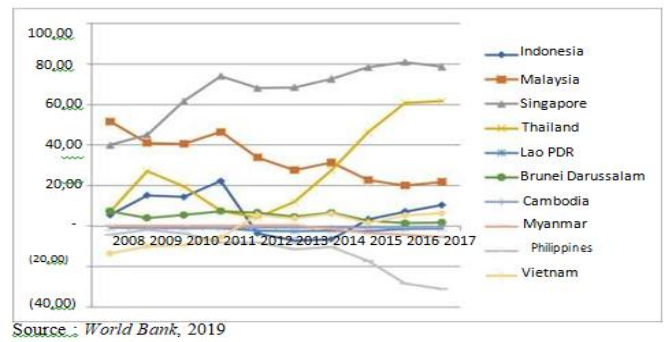


Figure 1.1 ASEAN Trade Balance

Figure 1.1 shows that in 2017 Indonesia's trade balance experienced the highest surplus since 2012. In 2008 to 2011, Indonesia's export performance showed an increasing trend until 2012, Indonesia's exports decreased and imports increased, this is what caused Indonesia's trade balance to experience deficit.

Indonesia's trade balance deficit in the period 2012 to 2014 was caused by the decline in the value of exports of several key commodities, such as oil and gas. In addition, imports for consumer goods and raw materials as well as capital goods have increased (Sugiharti et al., 2020). In 2015, Indonesia's exports could not be increased, because the price of non-oil and gas commodities on the world market fell (Irawan, 2018). Even so, the trade balance can record a surplus, this is due to government policies that can suppress imports, so that in 2017 Indonesia's trade balance was recorded at USD 10.3 billion.

At the ASEAN level, Indonesia's trade balance surplus is in fourth place below Malaysia with a surplus of USD 21.85 billion. Singapore was recorded as the country with the highest trade balance surplus in the Southeast Asian region, reaching USD 78.59 billion followed by Thailand with a trade balance surplus of USD 61.65 billion. Meanwhile, the Philippines was listed as the country with the largest trade balance deficit in Southeast Asia in 2017, which reached USD 31.13 billion.

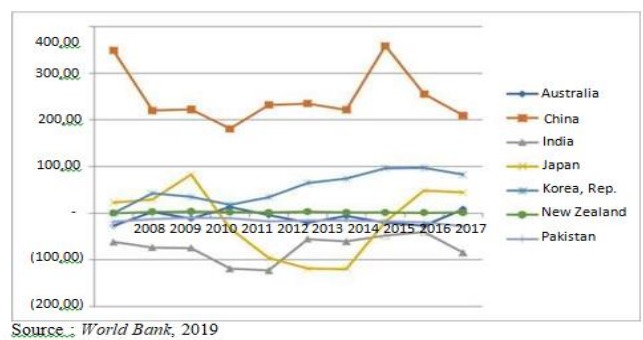


Figure 1.2 Trade Balance of 7 non-ASEAN Trade Partner Countries

Figure 1.2 shows the trade balance of Indonesia's non-ASEAN trade partner countries in this study. China has the highest trade balance when compared to other countries. In 2015 there was a very significant increase in the trade balance, reaching a surplus of 358.84 billion USD. This is due to decreased Chinese imports compared to the previous year. In 2016 and 2017 the trade balance experienced a decline, due to declining exports and imports of China.

Japan's trade balance surplus once surpassed South Korea's, however after 2010 Japan's trade balance experienced a deficit of up to -3.3 billion USD, this was due to the fact that although Japanese exports increased, Japanese imports also increased. The deficit occurred because Japan's import demand for crude oil and liquefied natural gas increased amid rising world oil prices. However, Japan's trade balance in 2016 returned

positive due to Japanese exports which were higher than imports.

South Korea has always experienced a surplus due to increasing exports, especially for semiconductors, oil, cars. However, in 2017 it experienced a decline due to an increase in imports of raw materials and capital goods, this was due to an increase in demand for luxury foreign vehicles. Meanwhile, India and Pakistan in the period 2008 to 2017 always had a negative trade balance, this was because the demand for imported goods was always higher than exports in those countries.

This study aims to analyze what factors affect Indonesia's exports with ASEAN countries and trading partner countries, besides this study also wants to prove that even though the UK trade agreement with the European Union has failed, in other cases international trade agreements can prove successful, benefiting both countries in cooperation. This study is considered important because there is an element of novelty that has never been done before, for example for the countries studied, namely ASEAN member countries and the seven countries that have trade agreements with ASEAN. In addition, this study also uses the Generalized Method of Moments (GMM) dynamic panel method where previous studies mostly still used static panels.

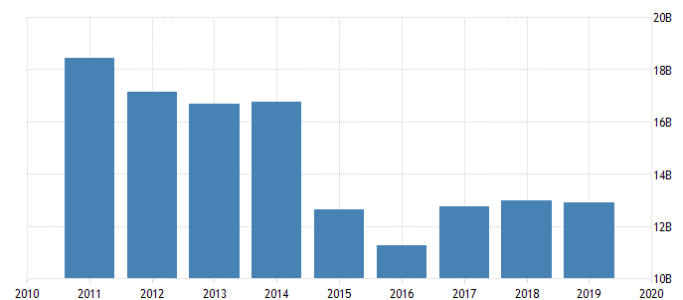
Foreign trade is widely recognized as an important factor for the economic growth of any country, as there is hardly any economy that does not have any associated with foreign parties (Irshad, 2017). The world's economy is now practically intertwined and open with the international world, and with growing international trade the economy of countries is likely to create an economic association that influences the countries, and the traffic of services and goods is likely to form trade among the countries. In this regard, the growing importance of international trade has been observed among different economies, as this activity promises to enhance the welfare of country's people, and play a pivotal role in bringing prosperity in the country (Kahfi, 2016). The prevalence of the economy abroad and at home develops a mutually influential association among the countries in the process of the exchange of services and goods between them. Therefore, the export has emerged as an important component of economic growth, as this activity can supply the state's budget through foreign currencies and income that can be used to enhance the infrastructure and develops an attractive environment for investment. Apart from that, most of the countries are also emphasizing on improving their exports to develop the market of domestic product, as it plays an important role in increasing competition, which eventually allows the country to raise their producing and exploit new technologies in their production process (Ha, CHUNG, & SEO, 2016).

Besides the huge significance of exports for the economic growth of countries, many challenges are also found to be associated with trade policy. According to (Hoang, Truong, & Dong, 2020), several countries are at the intersection with their trade policies and are not sure about which direction to follow for major strategic issues related trade policies. Indonesia is among the major developing countries that has been facing several challenges related to their trade policies. Since 2012, the export value of Indonesia has been decreasing, which is viewed as the major concern for the country as this decline has occurred after country made history through doubling the value of its export over a period of five years in 2011 (Azizatunnishak, 2018). The financial crisis in 2011 was considered as one of the major causes of a significant decline in the value of country's export.

Indonesia is an important member of the Association of South East Asian Nations (ASEAN), as it is regarded as one of the strongest economies in the region based on the GDP of 35%, and a fastest growing economies in the region of South East Asia (Tampubolon, 2020). The ASEAN region is positioned as the

eight largest economy in the world, and a dynamic market with having around 640 million consumers. Therefore, ASEAN markets hold huge opportunities for the countries like Indonesia for accelerating social progress and economic growth through increasing export. However, the country has been facing several challenges with respect to exploiting the advantages of exports in ASEAN countries. As mentioned in the study of (Rotinsulu, Sumual, & Kumaat, 2019), the export performance of Indonesia to ASEAN countries has significantly declines to a deficit or a negative number, which implies that the country's exports are lesser than its imports in ASEAN countries. In this regard, the significant decline in the exports of Indonesia to ASEAN countries has been observed during the period of 2005 to 2017. Hence, this study aims to identify the factors that can influence the Indonesia exports to ASEAN countries.

Indonesia has been experiencing a decline in its exports to different ASEAN countries. The significant decline in Indonesia's exports to Singapore has been observed from 2011 to 2019. As mentioned in the Figure 1, the exports of Indonesia to Singapore has experienced a decline from 18 bn in 2011 to 12 bn 2019 (Trading Economics, 2020). On the other hand, the exports of Indonesia to Malaysia have showed upward trends, as their exports averaged \$709.95 million from 2014 to 2019, and it has reached to 972.06 in 2019 (Trading Economics, 2020). Apart from the ASEAN countries, Indonesia has other important trading partners like Japan, China, Australia, South Korea etc. As per the report of (Nusa Daily, 2020), the total export value of Indonesia to China has reached to \$23.3 bn in 2020, as it increased by 6.4 in comparison with the value of exports in the previous year. On the other hand, the imports of Indonesia from China have declined as it has reached to \$25.4 bn in 2020. However, the country is still experiencing a trade deficit with China of \$2 billion. Similarly, the country has also been experiencing the trade deficit with other countries, which has become challenging for the country to strengthen its economic growth through achieving trade balance with ASEAN countries and other major trade partners.



The determinants of exports have been widely discussed in the previous literature, however in the context of Indonesia, there is found to be a lack of evidence regarding the factors that can influence the country's export to ASEAN countries and other major trading partner countries. Therefore, the key rationale of this study is to fill this research gap by identifying the determinant of Indonesia's export to the ASEAN countries and other seven other trading partners countries. In this regard, the 7 trading partners of Indonesia that are included in this research investigation includes South Korea, Japan, China, India, New Zealand, Australia, and Pakistan.

## 2. LITERATURE REVIEW

The determinants of exports have been comprehensively discussed in the previous literature. As per the commonly accepted view, exports are considered as highly crucial for the economic growth of any country. According to (Sunde, 2017), exports are viewed as those international trade activities that offer benefits in terms of increasing domestic demand, which eventually influences the growth of large industries with flexible social institutions and stable political structures. The

study conducted by (Monteiro, Soares, & Rua, 2017), argues that country's export performance can be determined through identifying the demand from other countries. Hence, in order to assess the export performance of any country, it is important to take all the factors into consideration from both demand and supply side in order to avoid the element of bias, which usually occurs while examining the performance of developing countries on the basis of one side only. Some of the common factors that are identified in the previous literature are discussed below:

### **2.1. Relationship between Gross Domestic Product and Export**

Gross Domestic Product (GDP) is widely recognised as one of the most important determinants of export, which refers to the total value of final goods and services that have been produced by the factors of production in a certain time period in a country (Muda et al., 2020; Bomani, et al., 2019; Adle, & Akdemir, 2019; Antoni et al., 2019; Bello, & Steyn, 2019; Adanali, & Mete, 2019; Adell et al., 2019). The amount of GDP can show the size of a country's economy, both exporting and importing countries. The GDP of a large exporting country indicates the greater the country's ability to produce and export to other countries (Mahadika, Kalayci, & Altun, 2017). A large importing country GDP indicates a large importing community income, a large income can have an impact on the large demand for imported commodities, so that the GDP of the importing country can also increase exports in exporting countries (Cora & Wen, 2020).

### **2.2. Relationship between Distance and Export**

The geographic distance of the capital between the two trading partner countries is an important indicator of the export performance of countries. According to (Murphy-Braynen, 2019), distance can be interpreted as an obstacle in conducting international trade because distance can present transportation costs in international trade. Similarly, in accordance with the study of (Handoyo & Permata, 2019), distance can be seen from two sides, namely on the cost of service which is the cost for each shipment of goods and on the side of value of service which is the value of the commodity itself. Distance has a negative relationship with international trade because the farther the distance between the two countries, the higher the transportation costs that are charged so that the price of goods will be higher and can reduce the demand for these goods (Baker & Yuya, 2020)

### **2.3. Relationship between Population and Export**

The population of a country can affect the trading activities of a country. The higher the population of a country, the higher the demand for goods in that country (Baker & Yuya, 2020). The population can be seen from the supply and demand side, if on the supply side what happens is when the population of the exporting country increases, the productivity of domestic goods and services will also increase so that the supply will also increase and then what happens is the demand for these products will decrease. and have an impact on the decline in trade. When viewed from the demand side, when the population of the importing country increases, the demand for goods and services from the exporting country will increase so that it can increase trade (Kusumawardani & Mubin, 2019).

### **2.4. Relationship between Index of Equity in Economic Size and Export**

The similarity in economic size index can have a positive effect on trade, because countries that have almost the same economic size will trade more (Esquivias et al., 2017). Another finding in the study of (Fosu, 2019), explained that if two countries that have almost the same economic size can cause

greater intra-industrial trade, this is also influenced by the ratio of the same labor to capital and the size of the economy of the trading partner countries. Moreover, it has been argued that most world trade, especially between industrialized countries, is a product exchange which includes intra-industrial trade.

### **2.5. Relationship between Exchange Rate and Exports**

Exchange rates can affect the price of a domestic good and service against the price of foreign goods and services. The exchange rate is defined as the price of a country's currency when exchanged for another country's currency (Baker & Yuya, 2020). Exchange rates are categorized into two types, namely real exchange rates and nominal exchange rates. The real exchange rate is defined as the domestic price of goods between two domestic market players who trade their products in another country, while the nominal exchange rate is defined as the relative price of the currencies of the two countries (Cora & Wen, 2020), As per the same study, the exchange rate will continue to fluctuate so that it can affect the trade balance. Moreover, when the value of the currency appreciates (increases relative to the currencies of other countries), the goods produced in that country become more expensive, while foreign goods become cheaper, so imports will increase. On the other hand, when the value of the currency depreciates, the goods produced in that country is likely to be cheaper while foreign goods is likely to be more expensive, so that it will increase the exports. According to Narayan and Nguyen (2016), exports of a country will experience a decline if the exchange rate of the country's currency against the currencies of trading partners appreciates.

## **3. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT**

### **3.1. International Trade Theory**

International trade theory is a theory that examines the level of dependence of a country with other countries. This theory analyzes trade in goods, services, and payments between one country and another (Jones, 2018). A special policy was made to regulate this trade for the welfare of the countries involved, because the economic dependence between these countries will also affect and be influenced by political, social, cultural, and even military relations. The theory of international trade, apart from studying international trade, also examines international trade policies, the foreign exchange market, balance of payments, and macroeconomics in the open economy (Feenstra, 2018). As per the concept of international trade theory, irrespective of the fact that country holds an absolute advantage over other, the country can still attain benefits from the specialisation. The theory of international trade offer explanation for the international trade patterns and the sharing of gains from trade. This theory signifies the importance of liberal trade for the economic growth of the countries.

#### **3.1.1. Theory of Comparative Advantage**

According to (Moloi & Marwala, 2020), the ability of any economy to produce certain type of services or goods at a lower opportunity cost in comparison with its other trading partners is regarded as comparative advantage. The theory of comparative advantage introduces the concept of opportunity cost as an important component for analysis in making a selection among different options for production. Moreover, in accordance with the theory of comparative advantage, if a country is less efficient at producing both commodities than other, but is still able to conduct trade that can benefit both countries, then the first country can specialize in producing and



exporting commodities that have less absolute loss and import commodities that have less absolute loss (French, 2017). Moreover, the comparative advantage theory signifies that specialisation in accordance with the comparative advantage is a prerequisite for exploiting benefits from trade. Therefore, any applicable interference with this process like support from the government to industries in which a country can attain natural comparative advantage can reduce these benefits (Fan, Li, & Pan, 2019).

**3.1.2. Absolute Excellence Theory**

Smith in 1776 said that trade between the two countries was based on absolute advantage. When a country is more efficient at producing a commodity than other countries, that country can benefit from specializing in producing commodities that have an absolute advantage (Dean et al., 2020). Thus, the resources owned by the two countries can be utilized in an efficient manner so that the output of the two commodities produced will also increase. The increase in output can be a measure of the profit from specialization in production for the two trading countries. By trading, the total output of all people in a country can be maximized.

Table 2.1 Absolute Advantage

		USA	England
Wheat	(sack/work hours)	6	1
Cloth	(meter/work hours)	4	5

Source: Dean et al., (2020)

Table 2.1 explains that in one working hour the United States can produce six sacks of wheat and the UK only produces one sack of wheat. In other cases, in one working hour the United States can produce four meters of cloth and Britain can produce five meters of cloth. Thus, it can be concluded that the United States has an absolute advantage in producing wheat compared to Britain, while Britain has an absolute advantage in producing fabrics when compared to the United States.

**3.1.3. Modern Trade Theory**

Swedish economists named Hecksher and Ohlin were the first to introduce this modern international trade theory, the theory is used to explain the theory of international trade which has not been explained in previous international trade theories. This theory explains that differences in production factors owned by each country can influence the difference in the opportunity cost of a product from one country to another, so that this will lead to international trade.

The basic concept of the Heckscher-Ohlin theory is if the commodity being traded is a collection of factors (land, labor, and capital). The mathematical model for the case of two countries (home and foreign), two goods (computers and shoes), and two factors (capital and labor) was developed by Samuelson in the year 1941 so that it is also known as the Heckscher-Ohlin Samuelson (HOS) model. The basic assumptions in the HOS model are the same cross-country technology, the same tastes and homotheties across countries, different factor endowments, and perfect competition (free trade in goods, but not factor trading).

In Figure 2.1, it is explained that on the left side there is an indifference curve for the two countries. It is assumed that if country 1 is a country with abundant labor, X is a sign for commodity x with L-intensive goods, then it can be seen in the figure that the production line for country 1 is more inclined on the x-axis. In country 2, which is assumed to be a country with abundant capital, Y is a sign for commodity y with K- intensive, then it can be seen in the figure that the production boundary line of country 2 is more inclined on the y-axis.

The H-O theory assumes that the two countries face the same indifference curve because they have the same tastes. In the indifference curve 1 is tangent to the production boundary line of country 1 at point A and the production boundary line of country 2 at point A'. This point represents the equilibrium point in production and consumption in the absence of trade or PA <PA' which indicates if country 1 has a comparative advantage over goods X and country 2 has a comparative advantage on goods Y.

In Figure 2.1 it can be seen that country 1 focuses more on producing commodity X and country 2 focuses more on producing commodity Y. Each country will produce until it reaches point B in country 1 and point B' in country 2 so that it can intersect with the relative price line in PB point. Country 1 will export commodity X to get commodity Y and consume it at point E, while country 2 will export commodity Y to get commodity X and consume it at point E'.

**4. RESEARCH METHODOLOGY**

In following study, econometrics analysis was conducted which means the research framework and research design of the study was qualitative research design. The aim of the study was to empirically investigate determinants of Indonesia's with ASEAN countries and seven trading partner countries using the gravity model. The data of ASEAN countries and seven trading partners including Singapore, Malaysia, Thailand, the Philippines, Myanmar, Brunei Darussalam, Vietnam, Laos, Japan, South Korea, India, China, Australia, New Zealand, and Pakistan, was collected for the period of 2008 to 2017. Meanwhile, the data was collected from World Bank, UN Comtrade (United Nation Commodity Trade), and CEPII (Center d'Études Prospectives et d'Informations Internationales).

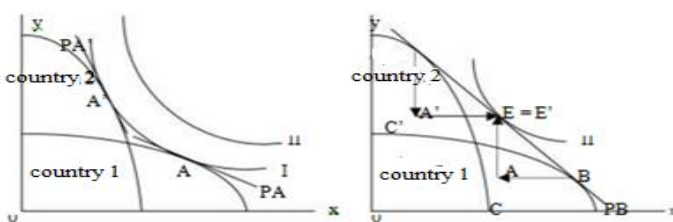
Furthermore, for empirical analysis, multiple ordinary least square (OLS) was a preferable method but due to the fact that following study consisted time series data with multiple cross-sections which made the data panel data. Hence, simple regression was not applicable over the type of data but rather panel regression was to be used for the empirical analysis. However, econometrics analysis the problem of endogeneity prevails usually, it is not possible for the conventional statistical models to account for the endogeneity problem (Phillips, and Han, 2019). Hence, under such conditions, scholars prefer to move forward to the generalized method of moments (GMM). It is because, the GMM model is found to be more robust than maximum likelihood (ML) since it uses specific moments of the random variables rather than whole distribution (Luck and Wolf, 2016). Similarly, following study also involved complex level econometric models and panel data, where probability of having endogeneity problem and violation of assumptions was inevitable, hence GMM dynamic panel model was being used for the econometrics analysis. Meanwhile, the equation of the GMM dynamic panel model is as follows

$$EXP_{it} = \alpha EXP_{it-1} + \beta_1 X_{it} + \dots + \beta_1 X_{it-1} + \dots + \pi_i + \gamma_{it}$$

Where;  $i = 1, \dots, N$  and  $t = 2, \dots, T$

$EXP_{it}$  Exports of the country  $i$  at the time  $t$

$\alpha EXP_{it-1}$  Exports of the country  $i$  at the time  $t - 1$



Source: Salvatore (2014)

Figure 2.1 Illustrated HOS Theory

$\beta_1 X_{it} \dots \dots$  Other variables of country  $i$  at the time  $t$

$\beta_1 X_{it-1} \dots \dots$  Other variables of country  $i$  at the time  $t - 1$

$\epsilon_{it} = \pi_i + \gamma_{it}$  fixed effects error terms decomposition

The analysis model used in this thesis is a gravity model using the generalized method of moment panel data regression method. Gravity Model is a model used to analyze export relations but with a different geographical location. The model used in this thesis refers to the gravity model that has been modified in previous studies. The gravity model is a model of international trade which states that trade between the two countries can be positively influenced by the GDP of the two countries and is negatively affected by the distance between the two countries that conduct the trade. In international trade, the variable mass of objects is replaced by GDP, while the distance variable is defined as the distance from the two countries (Susetyo, 2017). The gravity model has been used in various sectors such as Foreign Direct Investment (FDI), migration and various other sectors related to international trade and is used as a tool to analyze free trade. The equation of the gravity model is as follows:

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

$T_{ij}$  is the value of trade between country  $i$  and country  $j$ ,  $Y_i$  is the GDP of country  $i$ ,  $Y_j$  is the GDP of country  $j$ ,  $D_{ij}$  is the distance between country  $i$  and country  $j$ . This equation says that three things determine the volume of trade between two countries, namely the size of the GDP of the two countries and the distance between countries, trade is directly proportional to the GDP of the two countries and inversely proportional to distance (Krugman, 2011).

## 5. RESULTS AND DISCUSSION

### 5.1. Data Analysis

The purpose of this study was to analyze the effect of GDP, population, distance, economic size equation index, and exchange rate on Indonesia's exports to ASEAN countries and 7 trading partners (Japan, South Korea, India, China, Australia, New Zealand, Pakistan). conducted in the period 2008 to 2017.

Table 4.1 Descriptive statistics

Variables	Total Observation	Mean	Standard Deviation	Min	Max
Export	160	6.6 billion USD	7.3 billion USD	3.9 juta USD	33,7 billion USD
GDP <sub>i</sub>	160	822 billion USD	161 billion USD	510 billion USD	1.015 billion USD
GDP <sub>j</sub>	160	1.260 billion USD	2.398 billion USD	5.4 billion USD	12.237 billion USD
Population	160	210 million	420 million	379 thousand	1.386 billion
Distribution	160	3.71 thousand	1.96 thousand	886	7.79 thousand
Exchange Rate (Kurs)	160	2,526.22 Rupiahs	3.600.12 Rupiahs	0.42 Rupiah	10,694.1 Rupiahs
SS	160	-1.60	0.98	-3.99	-0.71

Sources: UN Comtrade, World Bank, CEPII database data processed.

In table 4.1, you can see descriptive statistics from the data on the variables used in this study for the period 2008 to 2017. Indonesian exports have an average of 6.6 billion USD with a standard deviation of 7.3 billion USD and a minimum value of 3.9 million USD. and a maximum value of 33.7 billion USD. Indonesia's gross domestic product has an average of 822 billion USD with a standard deviation of 161 billion USD and a minimum

value of 510 billion USD and a maximum value of 1,015 billion USD. The gross domestic product of trading partner countries has an average of 1,260 billion USD with a standard deviation of 2,398 billion USD and a minimum value of 5.4 billion USD and a maximum value of 12,237 billion USD. The population of trading partner countries has an average of 210 million people with a standard deviation of 420 million people and a minimum value of 379 thousand people and a maximum value of 1.386 billion people. The distance between Indonesia and trading partner countries has an average of 3.71 thousand kilometers with a standard deviation of 1.96 thousand kilometers and a minimum value of 886 kilometers and a maximum value of 7.79 kilometers. The exchange rate of the Indonesian currency against the currencies of trading partner countries has an average of 2,526.22 rupiah with a standard deviation of 3,600.12 rupiah and a minimum value of 0.42 rupiah and a maximum value of 10,694.11 rupiahs. The similarity index of economic size between Indonesia and trading partner countries has an average of -1.60 with a standard deviation of 0.98 and a minimum value of -3.99 and a maximum value of -0.71.

### 5.2. The Results of Identification of Dynamic Panel Regression (Generalized Method of Moment)

This study aims to analyze the effect of GDP, population, distance, economic size equation index, and exchange rate on Indonesia's exports with ASEAN countries and seven trading partners, which was conducted in the period 2008 to 2017. This research uses the generalized method of moment (GMM) method. because the data used is combined data, namely time series and cross section. The data in this study are processed using Microsoft Excel 2010 and Stata 13 software.

Table 4.2 GMM System Estimator

Variables	Coef	P-value
L.X	0,504***	0,000
Y <sub>i</sub>	0,047***	0,003
Y <sub>j</sub>	0,436***	0,000
Pop <sub>j</sub>	0,040***	0,000
Dist	-0,700***	0,000
SS	0,323***	0,000
Kurs	-0,026**	0,017
AR (1)	0,155	
AR (2)	0,287	
Sargan Test	0,000	
Hansen Test	0,996	
Hansen Test (GMM)	0,949	
Hansen Test (DiffGMM)	0,993	
Hansen Test (IV)	0,994	
Hansen Test (DiffIV)	0,734	

Source: STATA 13, 2019 Output Results

Note: The regression estimate shows a significant \*\*\* below

level 1% ( $\alpha = 0.01$ ), \*\* significantly below the level 5% ( $\alpha = 0.05$ )

There are 6 variables used in the gravity model in this study, namely the variables (GDP of country  $i$  in year  $t$ ), (GDP of country  $j$  in year  $t$ ), (geographic distance between country  $i$  to country  $j$ ), (population of country  $j$  in year  $t$ ), (The similarity in the size of the economy between country  $i$  and country  $j$ ), (The exchange rate between country  $i$  and country  $j$  in year  $t$ ).

Table 4.2 shows the estimation results that the gravity model can explain Indonesia's exports from the export side by using the GMM sys method. In order to interpret the results of this method, it must be ensured that the value of each parameter used in the model can be estimated statistically.

### 5.3. Proof of Hypothesis

The hypothesis of this study states that the gravity equation can explain Indonesia's exports with 7 trading partner countries as indicated by the variable GDP of Indonesia, GDP of trading partner countries, population of trading partner countries, the size of the economy of the two countries has a positive and significant effect on Indonesian exports, while for the variable distance between the two countries and the exchange rate of the Indonesian currency against the currencies of trading partner countries has a negative and significant effect on Indonesia's exports in the period 2008 to 2017. This hypothesis is acceptable, because it is evident from the results of the analysis in table 4.2 that Indonesia's GDP, the GDP of trading partner countries, the population of trading partner countries, the similarity in the size of the two countries' economies has a positive and significant effect on Indonesia's exports, which means that when the GDP of the two countries, the population of trading partner countries, and the equal size of the economies of the two countries increase, Indonesia's exports will also increase. Meanwhile, the distance between the two countries and the exchange rate of the Indonesian currency against the currencies of trading partner countries have a negative and significant effect, which means that if the distance and exchange rate of the Indonesian currency against the currencies of trading partner countries increases, it will reduce Indonesia's exports to trading partner countries.

## 5.4. Discussion

Based on economic theory, trade (exports and imports) is one of the keys to a country's economic growth, in addition to consumption, investment and government spending. Historically, economic growth in developed countries has been supported by export growth so that these countries can control the share of world exports. In line with this, the government has determined exports as one of the locomotives of Indonesia's economic growth. For the Indonesian export target to be evaluated and the government to formulate efforts to increase exports, analyzing the factors that can affect Indonesian exports is very important.

Based on the problem formulations and hypotheses previously described, the aim of this study is to analyze the effect of GDP, population, distance, economic size equation index, and exchange rate on Indonesia's exports with ASEAN countries and 7 trading partners (Japan, South Korea, India, China, Australia, New Zealand, Pakistan) which was conducted in the period 2008 to 2017. This study used the generalized method of moment (GMM) method because the data used were combined data, namely time series and cross section. The use of dynamic panels is preferred over static panels, because in this research data there is still endogeneity, which means that the independent variable data used has a correlation with errors in the previous year. Meanwhile, static data panels cannot solve the endogeneity problem.

### 5.4.1. The Relationship between Gross Domestic Product and Export

Based on table 4.2, it can be seen that Indonesia's GDP shows a positive and significant value, which means that Indonesia's trade against trading partners will increase in intensity with the increasing size of the Indonesian economy. When there is an increase in Indonesia's GDP by 1%, Indonesia's exports to trading partner countries will increase by 0.047%, assuming other variables are considered constant. These results are in accordance with the gravity model which shows that a country's national income can affect the country's production capacity, so that it can export to other countries. These results are also in accordance with research conducted by Chakravartya and Chakrabarty (2014), Narayan and Nguyen (2015), Carporale and Sova (2015), Yuniarti (2007), Abidin and Sahlan (2013), they state that the GDP of the exporting country positive with

exports, because the higher GDP of the exporting country shows the ability of the country's productivity.

The GDP of trading partner countries shows a significant and positive value. This means that if there is an increase of 1% of the GDP of trading partner countries, there will be an increase in Indonesian exports of 0.436%, assuming the other variables are considered constant. This result is in accordance with the gravity model which shows that high national income of trading partner countries is expected to cause consumers of trading partner countries to buy goods from exporting countries, thereby increasing imports from exporting countries.

### 5.4.2. The Relationship between Distance and Export

The distance variable has a coefficient value that matches the gravity equation model. The negative sign on the coefficient value means that trade will decline when the geographic distance between the two countries is further away because distance is a variable that represents the cost of transporting goods to the destination country. there is an increase in the geographical distance between Indonesia and trading partner countries by 1%, there will be a decrease in Indonesian exports by 0.700% assuming other variables are considered constant.

### 5.4.3. Population Relationship with Exports

A large population can indicate a large market potential as well. So that the population of importing countries can affect the number of goods to be exported by Indonesia, the higher the population of the importing countries, the demand for goods and services to be exported in that country will also increase (Salvatore, 2014). The coefficient value is positive and significant in the results of this study explain that the increasing population of trading partner countries will also increase Indonesia's trade on the export side to its trading partner countries. When there is an increase in the population of trading partner countries by 1%, there will be an increase in Indonesian exports by 0.040%, assuming other variables are considered constant.

### 5.4.4. The Relationship between the Index of Similarity in Economic Size and Exports

In the similarity index variable, the size of the economy shows a positive and significant coefficient value. When there is an increase in the equal size index of the economy between Indonesia and trading partner countries by 1%, there will be an increase in Indonesian exports by 0.323%, assuming the other variables are considered constant. The results of this regression imply that more trade flows will be in countries with relatively the same size of the economy, this is in accordance with the theory which states that countries with almost the same economic size will trade more (Helpman and Krugman, 1985; Ilyas et al. al., 2017).

### 5.4.5. The Relationship between Exchange Rate and Export

The negative coefficient value is significant in the exchange rate variable between Indonesia and trading partner countries, because if there is an increase in the rupiah against the currencies of trading partner countries by 1%, there will be a decrease in Indonesian exports by 0.026%, assuming other variables are considered constant. These results are in accordance with the theory which states that when the rupiah currency appreciates against the currencies of trading partner countries, the goods and services produced by Indonesia become expensive and goods produced by other countries become cheap so that export demand for Indonesian goods will decrease (Salvatore, 2014).

## 6. CONCLUSION AND IMPLICATIONS

## 6.1. Conclusion

Based on the descriptions that have been explained in the previous chapter and also the empirical data that has been analyzed, it can be concluded if this research is in accordance with the gravity model equation shown by:

1. In the period 2008 to 2017, Indonesia's Gross Domestic Product (GDP) and GDP of trading partner countries proved to have a positive and significant effect on Indonesia's exports on the export side. Indonesia's high GDP means that Indonesia can produce according to market demand, so that it can export to other countries. High GDP of trading partner countries is expected to cause consumers of trading partner countries to buy goods from exporting countries, thereby increasing imports from exporting countries.
2. The geographical distance between Indonesia and its trading partner countries is proven to have a negative and significant effect on Indonesian exports on the export side. This is because the further distance will increase the cost of transportation, so it will not encourage it to occur.
3. The population of Indonesia's trading partner countries is proven to have a positive and significant effect on Indonesia's exports in the period 2008 to 2017. The high population of trading partner countries illustrates high market potential, so this can increase Indonesia's exports to trading partner countries.
4. The similarity index variable in the size of the economy between Indonesia and its trading partner countries is proven in the period 2008 to 2017 having a positive and significant effect on Indonesian exports on the export side. This means that the flow of Indonesian trade will be dominated by a country with an economy that is relatively the same as Indonesia.

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5. The exchange rate of the rupiah against the currencies of trading partner countries in the period 2008 to 2017 had a negative and significant effect on Indonesian exports on the export side. These results can be interpreted that when the rupiah currency appreciates against the currencies of trading partner countries, the goods and services produced by Indonesia will become expensive and goods abroad will become cheap, so that it can reduce Indonesia's exports to its trading partner countries.

## 6.2. Implications

Based on the research results that have been described, there are several things that can be suggested as follows:

1. Based on the conclusion that the Gross Domestic Product (GDP) of trading partner countries can have a positive effect on Indonesia's exports to trading partner countries, Indonesia needs to expand its market share, especially with countries with high GDP so that the value of Indonesian exports can continue to increase.
2. Based on the conclusion that the variable geographical distance between the capital city of Indonesia and the capital of a trading partner country has a negative effect on Indonesian exports, therefore it is necessary to increase the quality and quantity of infrastructure, especially transportation to smooth the flow of Indonesian trade, such as airports, ports, roads and railways.
3. After seeing the results of the model used in this study, it is possible to develop a further model in the hope of obtaining better research results.



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