Effect of trade liberalization on ASEAN-China exports: A gravity model approach

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ABSTRACT

This study aimed to analyze the impact of trade liberalization between ASEAN and China on ASEAN and China export using the gravity models approach. The liberalization of trade openness is measured by the ratio of the total exports of ASEAN countries and China. The data used are annual panel data consisting of the ten ASEAN member countries and US states from 2010 to 2021. The difference with previous research is the object of research which analyzes specifically related to the free trade agreement carried out between ASEAN member countries and China which is analyzed using the Gravity model. The results of the estimation ASEAN models is the variable openness ASEAN countries against the China positive influence on ASEAN exports. China openness toward ASEAN variables did not significantly affect ASEAN exports. Results of the estimation China model shows the openness variable ASEAN against US no effect on China exports. Variable China openness toward ASEAN positive effect on China exports. Of the two models of the estimated proved that trade liberalization ASEAN - China influence on ASEAN exports and China exports. The implication of the study in free trade agreement that ASEAN countries is more focused on the sector of agriculture product, food, textile and some extractive industries.

1. Introduction

In the era of globalization, every country cannot be separated from economic integration, which has an essential role in trading activities (Ekanayake et al., 2010). The more integrated countries are the more open (liberal) they are to other countries (Kariyasa, 2003). RCEP dominated by China and TPP dominated by the US has the potential to become a new world power (Burmansyah, 2014). In the other side economic intergration has positive and negative impact on the economy. Schaak (2015) found that The ASEAN-China Free Trade Agreement (ACFTA) has a negative impact to international agricultural trade. Countries that are members of the Southeast Asian region created the Association of Southeast Asian Nations (ASEAN). founded in 1867 as a regional cooperation agreement. ASEAN consists of ten countries: Brunei Darussalam. Philippines. Malaysia. Indonesia. Cambodia. Laos. Myanmar. Singapore. Thailand. and Vietnam. For improving trade relations. ASEAN has agreed on free trade with China in the ASEAN-China Free Trade Agreement (ACFTA) framework.

Frederick et al (2015) found that free trade agreements such as The Central American Free Trade Agreement (CAFTA) has been a mixed blessing for economic development but need diversify for their product to enhance export sustainability. Another finding from Armstrong (2015) that the Australia-United States Free Trade Agreement (AUSFTA) resulted in a fall in Australian and US trade with the rest of the world, that agreement led to trade diversion. For the China in the ASEAN-China

Free Trade Agreement (ACFTA), study from Rong & Yingli (2022) has a significant role in promoting the domestic production of ASEAN countries. Shohibul et al (2016) suggested in free trade agreement that ASEAN countries is more focused on the sector of agriculture product, food, textile and some extractive industries and technologies, while the partner countries is more focused on heavy industry, technology, equipment, construction and services.
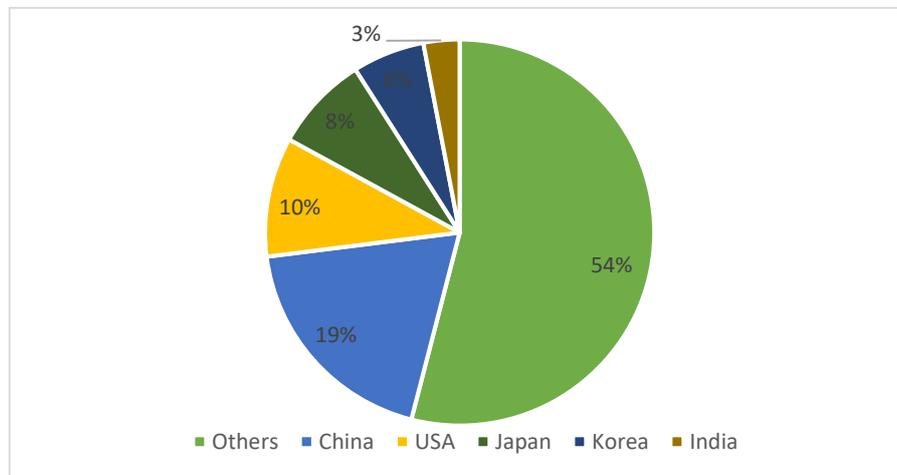

Figure 1. ASEAN Trade Presentation with Trade Partners 2018

Figure 1 shows the percentage of ASEAN's total goods trade with partners in 2018. The formation of ACFTA at the end 2001 in Bandar Sri Begawan. Brunei Darussalam. ACFTA took effect in Indonesia at the beginning of January 2010. The traffic of goods and services with a large capacity moves quickly from one place to another country as if there is no limit because there is no tariff (regular track) (Kusuma, 2017). The most significant percentage of ASEAN's total trade is with China which has a total trade value of 223 Billion USD. or 19 percent of the total ASEAN trade to all its trading partners. The total value of ASEAN-China trade has had an average growth of 11 percent in the last five years.. Table 1 show ASEAN's main trading partners outside the region are America. Japan. Korea. and India (Dewi et al., 2019). The implication of this research is that the central government can build and increase the level of trade openness with fellow ASEAN countries and China by reducing barriers to entry for the products. Therefore, with the developments that have occurred, it is still very relevant to discuss the impact of this trade cooperationduction of goods and services so that export and import activities can increase in volume. Based on Figure 1 shows increased trade transactions between ASEAN and trading partner countries show that the level of cooperation and openness is getting higher. ASEAN's total trade in 2018 was 1.4 Trillion USD.

Study from Tran et al (2020) that trade relations between China and ASEAN countries rapidly grown over times with significantly important concentration on the segments of high and medium technological products and has potential for the expansion of mutual trade between China and some members of ASEAN such as Brunei, Laos and Malaysia and less potential for other members of ASEAN. Alleyne et al (2020) full enactment in 2010 of ACFTA resulted in more sustainable trade from ASEAN members towards China for both industry and country levels and increased in export efficiency during ACFTA agreement. Another study from Paladini & Cheng (2015) using trade gravity equations that ACFTA has been responsible for the growing trade imbalance between China and Indonesia. During ACFTA there are some positive and negative trade balance for members of ASEAN. Trade balance during ACFTA has inconclusive result but study from Yang & Martinez-Zarzoso (2014) indicate that ACFTA leads to substantial and significant trade creation and has a positive relationship between exports and ACFTA for agricultural sectors and manufactured goods. Ong & Habibullah (2012) suggested that a successful of ASEAN-China economic coorperation would only work if there is continuous macroeconomic interdependence between the partnership.

The difference with previous research is the object of research which analyzes specifically related to the free trade agreement carried out between ASEAN member countries and China which is analyzed using the gravity model. The contribution of the study to the literature is linkages between trade liberalization and exports since the implementation of the ACFTA. Gnangnon (2022) states that trade liberalization play role important on export diversification for services sector, the study has considered that supply-side factors affect services export diversification. Another study from Gnangnon (2019) that multilateral liberalization is positively associated with export product

diversification. Gnangnon (2019a) found that multilateral trade liberalization generates higher export performance and convergence in export performance in developing countries. Contrary from Ratnaike (2012) that trade policy to be a largely insignificant determinant of export performance but domestic competitiveness and world demand play role and most consistent drivers of export performance.
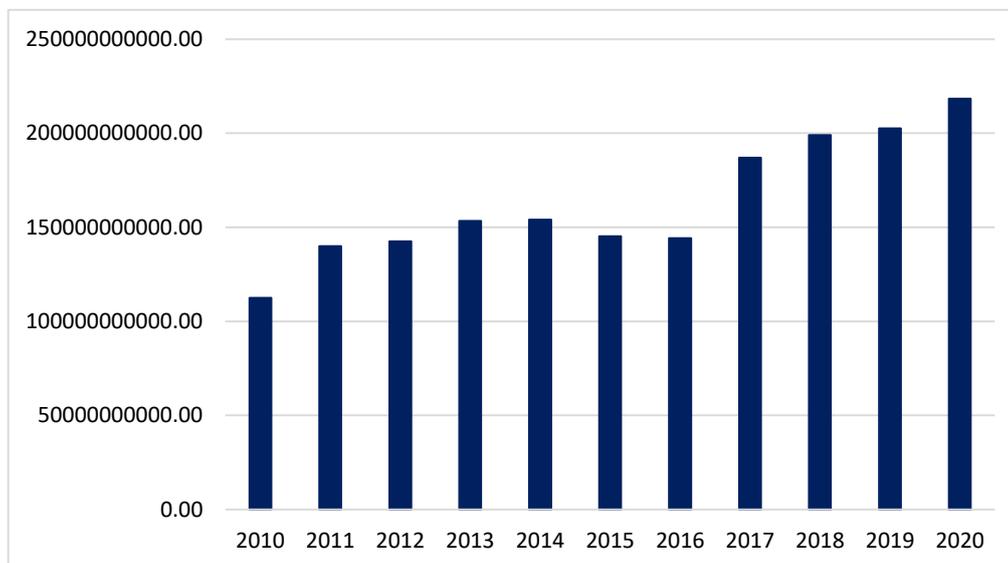
Figure 2. Export ASEAN to China

Figure 2 shows ASEAN exports to the US. where for ten years. there have been fluctuations in export volume. which are dominated by an increase in exports. especially since 2016. The fluctuations indicate the importance of evaluating the impact of ACFTA so that an evaluation or evaluation of the ACFTA goods trade agreement has been carried out. considering that its implementation has been running for more than ten years. Fifteen years. An FTA impact assessment needs to be carried out to determine whether the objectives of an FTA can be met (Plummer et al., 2010). This study aims to determine how the influence of liberalization in the opposing country is also essential to see whether the cooperation that has been carried out will increase gains or vice versa will experience high losses. It is not yet known how liberalization affects trade between ASEAN and China. so it is necessary to study how the effect of trade liberalization that has been going on between ASEAN member countries and China.

2. Method

This research is empirical research that uses secondary data. The data used is annual panel data consisting of cross-section data for ASEAN member countries. namely Indonesia. Singapore. Vietnam. Myanmar. Malaysia. Thailand. Lao PDR. Cambodia. Philippines. Brunei Darussalam. and China, for time-series used in this study from 2010 to 2020. The variables used in this study such as export, GDP riil, distance, population, trade openness, real exchange rate and foreign direct investment. This study uses secondary data from UNCOMTRADE, UNCTAD, geobytes.com, world bank and direction of trade statistics IMF. The research model used is the gravity model. This model is used to answer the research question of the impact of trade liberalization between ASEAN member countries and China. The gravity model states that the intensity of trade between countries will be positively related to the national income of each country and negatively related to the distance between them. The gravity model uses GDP as a trade pull factor and distance as a trade barrier factor. This study uses a gravity model that refers to the Yean & Yi (2014) as follows:

$$LnXij_{it} = \beta_0 + \beta_1 LnGDP_{it} + \beta_2 LnGDPj_t + \beta_3 LnNi_{it} + \beta_4 LnNj_t + \beta_5 LnDij_{it} \qquad (1)$$

$$+ \beta_6 LnOPij_{it} + \beta_7 LnOPj_{it} + \beta_8 RERij_{it} + \beta_9 LnFDI_{it} + \varepsilon_{it}$$

The first model analyze for ASEAN countries to China. Where $LnXij$ is export volume of ASEAN member countries to China; $LnGDP$ is real GDP of ASEAN member countries; $LnGDPj$ is the China's real GDP; $LnNi$ is the population of ASEAN member countries; $LnNj$ is the population of China; $LnDij$ is the distance from ASEAN member countries to China; $LnOPij$ is the openness from ASEAN member countries to China; $LnOPj$ is the China's openness to ASEAN member countries; $RERij$ is

the the real exchange rate of ASEAN member countries against China; $LnFDI$ is the Inflows of foreign direct investment in ASEAN; ε is the disturbance error for model 1 or model ASEAN countries to China; β_0 is the constanta and $\beta_1 - \beta_9$ is the coefficient of independent variables. Model 2 is for China model. The equation for model 2 as follows:

$$LnXji_t = \beta_0 + \beta_1 LnGDP_{it} + \beta_2 LnGDPj_t + \beta_3 LnNi_{it} + \beta_4 LnNj_t + \beta_5 LnDji_{it} \qquad (2)$$
$$+ \beta_6 LnOPij_{it} + \beta_7 LnOPj_{it} + \beta_8 RERij_{it} + \beta_9 LnFDIj_t + \varepsilon_{it}$$

Where $LnXji$ is the China's export volume to ASEAN member countries; $LnDji$ is the distance from China to ASEAN member countries; $LnFDIj$ is the Inflow of foreign direct investment in China; Ln is the notation for the logarithm; i for cross-section and t is for time-series data. The Chow test, Hausman test and Lagrange Multiplier test were performed to determine the best model for panel data regression. The three tests will determine the most appropriate model among the three models: the common effect. fixed effect. or random effect.

3. Results and Discussion

ASEAN Models

The estimation results using the data method panel to analyze the effect of the independent variable GDP, distance, openness, population, real exchange rate and FDI on exports ASEAN member countries and China exports. First is selection test to get the best model based on chow, hausman and lagrange multiplier test. Table 1 shows that value of the Chow test on the ASEAN model is 0.000 than H0 is rejected and the estimated fixed effect is better than pooled least squares. Based on Hausman's test. the probability value is 1.000. so H0 is accepted. and the random effect estimate is better used instead of estimating the fixed effect. Based on the LM test. the probability value is 0.039. so H0 rejected and random effect estimation is better than pooled least squares. It can be concluded that the random effect model technique is better than the fixed effect and pooled the least square in the ASEAN gravity model.

Table 1. Result of Random Effect Model for First Model

Variables	ASEAN Gravity Model		
	PLS	**FE**	**RE**
C	502.433***	530.030***	515.432***
GDPI	1.342***	6.730***	1.322***
GDPJ	4.275	-1.426	3.678
DIJ	-3.042***	-0.532	-3.927
OPIJ	1.390***	1.343***	1.232***
OPJI	0.032	0.072	0.038
NI	-0.176**	-2.732	-0.190
NJ	-27.662***	-28.90332***	-28.120***
RERIJ	0.184***	0.018	0.188***
FDII	-0.151*	-0.158	-0.110
Another Result			
Observation	100	100	100
Adj R-squared	0.966	0.983	0.933
Prob (F-Stats)	0.000	0.000	0.000
Diagnostic Tools			
Chow test	0.000		
Hausman test		1.000	
LM test	0.039		0.039

Notes : *** Significant at α = 1% ; ** significant pada α = 5% ; * significant pada α = 10%.

Table 1 shows that China's real GDP does not significantly affect ASEAN exports. This is because the probability value is more than α=10 percent. It does not match the research hypothesis. which says that China's GDP as an importing country will affect ASEAN exports. GDP is an appropriate measure of a country's trade potential. and the GDP of a country's importing countries measures absorption capacity. The coefficient of Dij variables or the distance between ASEAN and the China is -3.927. From numbers. the distance relationship between ASEAN and the China with ASEAN exports is

negatively related. When Distance increase by 1 percent. ASEAN exports will decrease by 3.92 percent cateris paribus. This follows the research hypothesis and the theory of gravity model. which says that a country's trade is inversely proportional to distance. This result also follows previous research conducted by Yean & Yi (2014); Koh (2013) and Ekanayake et al (2010).

In this study used the openness of ASEAN to China and China to ASEAN variables as proxy for the trade liberalization and the result OPIJ (openness of ASEAN to China) variable is significant to the variable ASEAN exports and it means that ASEAN openness ratio to China increases by 1 percent. ASEAN exports will increase by 1.23 percent. Contrary to OPJ (openness China to ASEAN) variables does not significantly affect to ASEAN exports, it means that China's openness to ASEAN countries will affect ASEAN exports. This happens because of the difference in magnitude GDP in ASEAN member countries. with China as size in the calculation of the openness variable.

For the augmented gravity model, this study used the ASEAN Population variable on ASEAN exports. The estimation results show that the Population of ASEAN does not have a significant effect on ASEAN exports. The China population variable is significant to the ASEAN export variable, the Population coefficient in China is worth -28.120, it means that the relationship between the China Population variable and exports ASEAN is negative. Because if the China population increase by 1 percent. ASEAN exports will decrease by 28.120. The relationship between the variables Real Exchange Rate with ASEAN exports is positive. Because if the Real Exchange Rate increases (currency depreciation ASEAN member countries) by 1 percent. ASEAN exports will increase by 0.121 percent. The last variables for augmented gravity model is FDI and the result show that ASEAN FDI does not significantly affect ASEAN exports. It is unsuitable with the research hypothesis that FDI will encourage trading activity. The more FDI increases. the more encouraged production can increase the country's exports. The results of ASEAN FDI variables that do not affect exports ASEAN can be explained that 9 out of 10 ASEAN member countries is a developing countries whose investment is more focused on country development.

China Models

Table 2 shows the probability value of the Chow test, hausman test and LM test on the China model is consistent that random effect estimation technique is better to use than the fixed effect and pooled least square. The value of adjusted R-squared value in the random effect model is 0.873. This value can be interpreted that GDPi can explain 87.3% of the China Export variable. GDPj, Dji, OPij, OPji, Ni, Nj, RERij, and FDIj, while factors outside the model explain the rest. The coefficient of ASEAN's real GDP is 1.322. From these figures can be interpreted that the relationship that occurs between real GDP variables ASEAN with ASEAN exports is positive, it means that a country's trade will be directly proportional to the size of a country's economy.

Table 2. Result of Random Effect Model for Second Model

Independent	China Gravity Model		
Variable	PLS	FE	RE
C	323.466***	1272.882***	423.100***
GDPI	1.2500***	-2.088***	1.732***
GDPJ	-4.429	-27.218***	-7.402***
DIJ	-4.342***	-26.332***	-5.750***
OPIJ	0.492***	0.345***	0.282
OPJI	0.320***	0.223	0.380***
NI	-0.476**	0.555	-0.728***
NJ	-5.677	-20.352*	-9.655**
RERIJ	0.034***	0.118	0.121***
FDII	0.005	0.108	0.070
Another Result			
Observation	100	100	100
Adj R-squared	0.978	0.983	0.873
Prob (F-Stats)	0.000	0.000	0.000
Chow test		0.000	
Hausman test			1.000
LM test	0.039		0.039

Notes : *** Significant at α = 1% ; ** significant pada α = 5% ; * significant pada α = 10%.

The results of the estimation of the ASEAN real GDP variable on China's exports can be seen in Table 2. The estimation results show that ASEAN real GDP variable is significant to China's export variable and the value of coefficient is 1.732 it means that the relationship that occurs between the ASEAN real GDP variable and China's exports is positive. Because if the real GDP of ASEAN increases by 1 percent. China's exports will increase by 1.73 percent. In line with theory of the gravity model. which says that a trading country will be directly proportional to the size of a country's economy. The China's GDP riil has the coefficient is -7.402 it means that the relationship between China's real GDP variable and China's exports is the relationship negative. Because if China's real GDP increases by percent. then China's exports will fall by 7.4 percent contras to the theory of the gravity model that says that a country's trade will be directly proportional to the size of a country's economy. The distance (DJi) between China and ASEAN significantly affect China's exports and it means that China's long-distance relationship with ASEAN and Chinese exports is negatively related. Because if the distance increase by 1 percent. China's exports will decrease by 3.687 percent that a country's trade inversely proportional to the distance. These result support previous study conducted by Yean & Yi (2014a).

In this study used the openness of ASEAN to China and China to ASEAN variables as proxy for the trade liberalization and the result OPIJ (ASEAN openness to China) variable is insignificant to the variable ASEAN exports This matter occurs because of differences in the amount of GDP in member countries of ASEAN. with China used as a measure in the calculation openness variable. Contrary to OPJ (China openness to ASEAN) variables is significantly affect to ASEAN exports, that China's coefficient of openness to ASEAN is 0.380. The numbers show that the relationship between China's openness variable to ASEAN with China's exports is positive. Because if the ratio of China's openness to ASEAN increases by 1 percent. China's exports will increase by 0.380 percent.

For the augmented gravity variables such as ASEAN population is significant to China's export variable and the value of coefficient is -0.728 it means that population of ASEAN increases by 1 percent China's exports will decrease by 0.728 percent. China population is significant to China's export variable and the coefficient is -9.655 it means that China's population and China's exports is negative. Because if China's population increases by 1 percent. China's exports will decrease by 9.655 percent. Another variables the real exchange rate variable is significant to China's export variable. This support the theory that that the real exchange rate has a positive effect on exports. But the China FDI is not significant to China's export and contrary to the theory that increasing FDI will encourage production that can increase the country's exports.

4. Conclusion

In the era of globalization, every country cannot be separated from economic integration, which has an essential role in trading activities. Free trade agreement between ASEAN countries and China has positive and negative trade balance for members of ASEAN countries. Trade liberalization play important role for export performance and this study analyze the linkages between trade liberalization and exports since the implementation of the ACFTA. For ASEAN's Model. the Openness variable as a proxy of trade liberalization between ASEAN and China positively affects ASEAN exports. The openness of ASEAN countries to China significantly affects ASEAN exports. while China's openness to ASEAN does not significantly affect ASEAN exports. China's openness to ASEAN does not considerably affect exports ASEAN due to differences in the amount of GDP in ASEAN member countries. with China used as a measure in the calculation of the variable openness. It is proven that the trade liberalization of ASEAN - China affects ASEAN exports.

For China's Model. the Openness Variable as a proxy for trade liberalization between ASEAN and China positively influences China's exports. The openness of ASEAN countries to China does not significantly affect China's exports. while China's openness to ASEAN significantly affects Chinese exports. ASEAN countries' openness to China does not significantly affect China's exports due to the difference in the size of GDP of ASEAN member countries with China used as a measure in calculating the openness variable. It is proven that liberalization ASEAN - China trade affects China's exports. The implication of the study in free trade agreement that ASEAN countries is more focused on the sector of agriculture product, food, textile and some extractive industries and the sector which can absorb a lot of labor.

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