

## **The Impact of Regional FTA on Export of Manufactured Goods: The Implementation of Gravity Model in Indonesia**

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### **Abstract**

Indonesian exports have not shown their best performance since Indonesian exports are still based on raw commodities instead of manufactured commodities, causing Indonesia to experience a negative trade balance. Therefore, this study aims to investigate the impact of the six regional FTAs applied in Indonesia and related trade factors on Indonesian exports of manufactured goods with 40 partner countries using the gravity model during 2002-2019 as a means of evaluation. The result indicates that the regional FTA positively impacts Indonesian exports of manufactured goods. It also indicates that the regional FTA only causes a trade creation effect. Furthermore, the Gross Domestic Product (GDP) of two countries, economic distance, trade openness, and the effective real exchange rate of partner countries significantly affect Indonesian exports of manufactured goods. Thus, it can be concluded that regional FTAs in both countries, along with economic growth of Indonesia and partner countries, economic distance, trade openness, and real effective exchange rate of partner countries, are advantageous for Indonesian trade policy to increase the exports of manufactured goods.

**Keywords:** Export of manufactured goods, Gravity model, Regional FTA

**JEL Classification:** F40, L60, O24

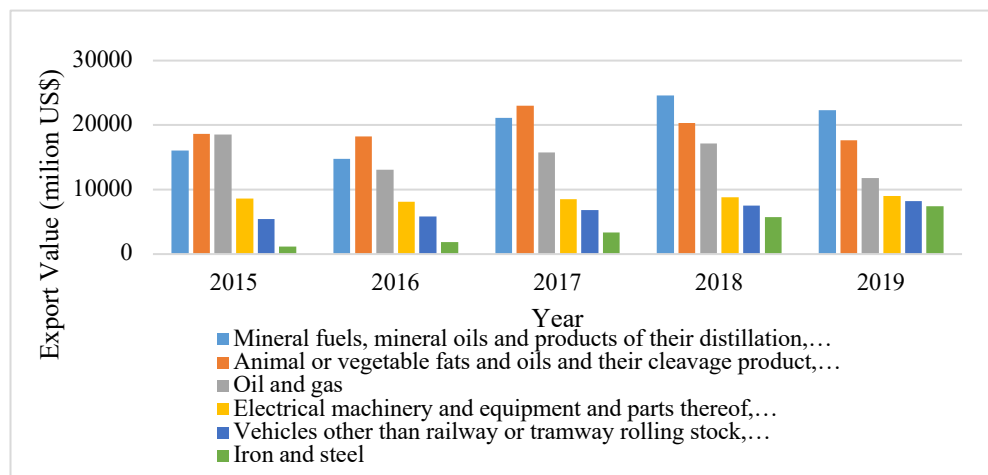
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### **INTRODUCTION**

The trade balance deficit still overshadows the Indonesian economy. Indonesia still recorded a trade deficit during the last two years: US\$8,698.7 million in 2018 and US\$3,592.7 million in 2019, respectively (Kementerian Perdagangan, 2021). Indonesian exports are still based on raw commodities or materials. The statistical data from the Ministry of Trade (2021) shows that in the last five years, Indonesia's highest export commodities were still dominated by mineral fuels such as coal, fats, and animal or vegetable oils, mostly made from palm oil and oil and gas. The high value of raw material exports has a less significant effect on overcoming the trade balance deficit (see Figure 1).

The performance of raw material exporters is closely related to the commodity price swing (International Monetary Fund, 2012). This makes the exports of raw materials considered to save Indonesia's trade balance just in the short term. When commodity prices are high, the export value of these raw

materials is also high. However, the dependency on exports of raw materials can disadvantage the domestic industry because the domestic finished product can lose competitiveness from imported finished products made from previously exported raw materials. Advanced countries will process raw materials imported from developing countries, produce finished products with added value, and then re-export them at higher prices. Rich countries will obtain the largest share of the value and all of the good jobs (Fung & Korinek, 2013). In addition, the natural resources as raw materials are limited. Without diversification and further processing, the continuous exports of raw materials will make the country run out of natural resources and worsen economic sustainability (Charlier & Guillou, 2014).



**Figure 1.** The Value of Indonesia Export Commodities in 2015-2019

**Source:** Statistics Portal of the Ministry of Trade (Kementerian Perdagangan, 2021)

Indonesia has made efforts to tackle the trade deficit by making a trade policy, focusing on the import and export sides, particularly by supporting export growth in the manufacturing industry sector. It is intended to reduce the dependence on exports of raw materials and switch the exports commodities to semi-finished or finished goods. It has an impact on increasing the value-added of export commodities in aggregate (Ing et al., 2017).

The Indonesian government has taken various strategic steps to boost the value of the export of manufactured goods. The government launched the Making Indonesia 4.0 roadmap as an initiative to accelerate industrial development by setting five industrial sectors as a priority focus, namely the food and beverage industry, textile and apparel industry, automotive industry, chemical industry, and electronics industry (Ing et al., 2017). In addition, the government's leading initiatives to trigger the exports of manufactured goods are the utilization of Free Trade Agreements (FTA) with partner countries, the acceleration of FTA negotiations, and the initiation of new FTAs following the industrial needs (Sood, 2021).

FTA is the form of economic integration wherein all barriers are removed on trade among members, but each nation retains its barriers to trade with nonmembers (Ing & Urata, 2015). This international trade integration has been reflected in bilateral and regional FTAs since the early 1990s (Yang & Martinez-Zarzoso, 2014). Indonesia also followed the scheme of the agreement through membership in regional and bilateral with 12 FTAs that were successfully

implemented from 2005 to 2021. The benefit of FTA liberalization for business and industry is that the industrial economic potential becomes more open by maximizing opportunities in accessing foreign markets and increasing their productivity (Obradovic, 2012). Furthermore, globalization positively affects economic growth through better allocation of resources and productivity (Sardiyo & Dhasman, 2019). For producers and industry players, the use of the FTA affects the ease of obtaining raw materials and supporting materials for production, both in terms of access and price due to the reduction or exemption of import duty rates. Besides, there will be an expansion of market access to sell manufactured goods to other countries. This can impact the increase of value-added and the improvement of the country's trade balance.

Regional Trade Agreements (RTAs) are increasing in number and changing their nature. It covers a more extensive set of policy areas at the border and behind the border, which are considered as deep agreements. The agreement reduces or even eliminates tariffs and defines many rules in economic scope. It can improve policy cooperation across countries if it is efficiently designed, thereby increasing international trade and investment, economic growth, and social welfare. RTAs are currently at the center of many policy debates and are likely to shape trade and economic relations in the coming years (Bown, 2017; Rensmann, 2017).

This study employs the gravity model as a comprehensive model in explaining the factors that can affect the trade of manufactured goods, including exports, where this model is commonly used in research to measure the impact of FTAs, as applied in several previous studies by Kien (2009); Mareta (2018); Yang and Martinez-Zarzoso (2014). Since it was first found, this model has been popularly used by researchers, and it is continuously being developed by including one to two FTA variables in the model equation to see its effect on bilateral trade, especially the effects of trade creation and trade diversion. Analysis with the empirical gravity model can successfully explain numerous types of intra and extra-regional flows, including the flow of trade in goods (Yotov et al., 2016).

Several studies have been conducted regarding the impact and benefits of FTAs that Indonesia has participated in, but the majority of research related to FTAs discusses the impact of FTAs on all tradable goods in general. Moreover, almost all scholars related to the impact of FTAs on Indonesian trade are carried out specifically on one particular FTA instead of on several or multiple FTAs that Indonesia participated. Thus, by exploiting multiple FTAs and gravity models, this research will provide a comprehensive and objective picture of the effect of the FTA implementation with other trading partner countries. Furthermore, this study was conducted to investigate the effect of implementing regional FTAs in Indonesia as an independent variable on exports of Indonesian manufactured goods to trading partner countries as the dependent variable. By adopting a gravity model in measuring the regional influence of the FTA, this study also considers several other independent variables that can also affect exports, namely the size of the partnering country's economy expressed by GDP, distance modified by economic distance, trade openness, and the effective real exchange rate. This research is also conducted to provide input for policymakers regarding the implementation of existing regional FTAs.

### **The Concept of Gravity Model**

A bilateral trade flow between two countries can be calculated by the “gravity equation” concept. The gravity equation is very commonly used in analysis and research on international trade. This model is also often used to assess the impact on market access and the effect of FTAs on international trade. The gravity equation was first developed by adopting Newton’s theory of gravity, with the same analogy as planets (Yotov et al., 2016). Bilateral trade flows are affected by the proportion of the trading countries’ size and distance, just as two planets will attract each other in proportion to their size and distance. Generally, the gravity model can predict bilateral trade flows based on the size of each country’s economy and the distance between the two countries. The theoretical basis for the gravity model as a tool for measuring is provided in Equation 1.

$$M_{ijk} = \alpha_k Y_i \beta_k Y_j \gamma_k N_i \delta_k N_j \epsilon_{dij} U_{ijk} \dots\dots\dots (1)$$

Explanation:

- $M_{ijk}$  = the flow of trade in goods or factor  $k$  from country  $i$  to country  $j$ .
- $Y_i$  and  $Y_j$  = the income of countries  $i$  and  $j$ .
- $N_i$  and  $N_j$  = the population in countries  $i$  and  $j$ .
- $d_{ij}$  = the distance between countries  $i$  and  $j$  which is usually measured geographically between the capital of the country or the largest city in each country.
- $U_{ijk}$  = a lognormally distributed error degree.

The gravity model has been empirically recognized in the literature and trade research in analyzing the impact of trade-economic policies, one of which is FTA on trade flows. In addition to the impact of FTAs, researchers usually investigate the impact of things other than FTA, such as culture, history, and geographical factors. Hence, researchers developed using various dummy variables that modify the gravity model, such as FTA variables, colonialism factors, national borders, languages, currencies, and more. However, among these variables, the most important variable used to measure the impact of the FTA policy is the FTA dummy variable, which states the existence of FTA between country  $i$  and country  $j$ . This methodology was then developed to estimate the effect of trade creation and trade diversion on trade.

### **RESEARCH METHOD**

To measure the gravity model in this study, panel data regression, a combination of cross-section data and time series, is used since panel data can increase estimation efficiency and address the problem of endogeneity of government policy on trade (Yotov et al., 2016). The population of this study is the value of exports of Indonesian manufactured goods to the world as a whole, and the sample in this study is the value of exports of Indonesian manufactured goods to 40 selected Indonesian trading partner countries based on the consideration of the highest export value of Indonesian manufactured goods. The forty partner countries that are the objects of this research consist of 15 regional FTA member countries and 25 non-regional FTA member countries. These countries are Brunei Darussalam, Cambodia, Laos, Myanmar, Malaysia, Singapore, Thailand, the

Philippines, Vietnam, the People's Republic of China (PRC), South Korea, Japan, India, Australia, New Zealand, the United States, Germany, the Netherlands, the Union of United Arab Emirates, United Kingdom, Hong Kong, Saudi Arabia, Belgium, Italy, France, Brazil, Turkey, Spain, Mexico, Canada, Switzerland, South Africa, Egypt, Pakistan, Bangladesh, Russia, Poland, Nigeria, Sri Lanka, and Iran.

The model used in this research develops the gravity equation to investigate the effect of the implementation of regional FTAs in Indonesia along with the size of the partnering country's economy, distance, trade openness, and the effective real exchange rate on exports of Indonesian manufactured goods to their 40 trading partners countries as follows Equation 2.

$$EM_{ijt} = \alpha + \beta_1 GDP_{it} + \beta_2 GDP_{jt} + \beta_3 EDIST_{ijt} + \beta_4 \ln\_REER_{jt} + \beta_5 TO_{jt} + \beta_6 FTA1 + \beta_7 FTA2 + \mu_{ij} \dots (2)$$

Explanation:

$EM_{ijt}$  = export value of Indonesian manufactured goods (i) to trading partner countries (j) in year t in billion US\$

$GDP_{it}$  = value of Indonesia's GDP in year t in billion US\$

$GDP_{jt}$  = GDP value of trading partner countries (j) in year t in billion US\$

$EDIST_{ijt}$  = economic distance between Indonesia and trading partner countries(j)

$REER_{jt}$  = effective real exchange rate of trading partner countries (j) in year t

$TO_{jt}$  = trade openness index of trading partner countries (j) year t

$FTA1$  = dummy variable FTA (trade creation)

$FTA2$  = dummy variable FTA (trade diversion)

This study uses panel data analysis using the value of exports of Indonesian manufactured goods to 40 Indonesian trading partner countries data based on the SITC Rev. 2. Other independent variables used are the values of Gross Domestic Product (GDP) of Indonesia and trading partner countries which is the calculation basis of economic growth rate as the popular indicator of the macro performance of a country (Sujianto & Azmi, 2020). GDP expresses the size of Indonesia dan 40 trading partner countries' economy and is expected to positively correlate with the exports of Indonesian manufactured goods since it describes a country's production capacity, productivity, and consumption. Unlike the original gravity model that utilized geographical distance, this study exploits economic distance. The economic distance is the distance of Indonesia to their trading partner countries weighted by the ratio of GDP of the partner country and worldwide GDP, following WTO Practical Guide to Trade Policy Analysis (WTO, 2012). The coefficient of economic distance is expected to turn out with a negative sign as it is a proxy for transportation costs that affect export flows, where the more expensive transportation costs, the lower exports.

The effective real exchange rate of trading partner countries is expected to have a positive correlation as it indicates the purchasing power of partner countries. Besides, the trade openness index is calculated based on the ratio of total trade of a partner country and their GDP. It is expected to positively impact the export of manufactured goods since it shows how open a country is to trade, in this case, accepting exports from Indonesia. Additionally, the dummy variables FTA1 take the value of 1, if both Indonesia and partner country belongs to the same FTA and

0 otherwise, as this variable captures the trade among FTA members. The variable FTA2 captures the export flow from Indonesia as FTA member country to non-FTA member country so that it takes value of 1 if only Indonesia is the FTA member country and 0 otherwise.

Data on GDP and trade openness are obtained from the World Bank database. The geographical distance between Indonesia and partner countries is measured by the distance between the country's capitals in kilometers. It is obtained from the Center d'Etudes Prospectives et d'Informations Internationales (CEPII) database. Effective real exchange rate data is obtained from the Real Exchange Effective Rates database Bruegel Working Paper (Darvas, 2012). The period time used in this study is 2002-2019.

## RESULTS AND DISCUSSION

The regression model approach used in this study is the Random Effect Model (REM) based on the results of the Chow Test, Hausman Test, and Lagrange Multiplier Test. For the REM model, only two types of classical assumption tests are carried out, namely the normality test and the multicollinearity test, because REM uses the generalized least square (GLS) method so that the heteroscedasticity and autocorrelation assumptions are not violated (Gujarati & Porter, 2009). The results of the classical assumption test show that the data in the study are normally distributed, and there is no multicollinearity problem among the independent variables.

Hypothesis analysis statistically can be measured from the value of the F-Statistic test, T-statistic test, and the coefficient of determination ( $R^2$ ). The statistical descriptions of the variables used in this study are shown in Table 1 in the forms of mean, standard deviation, and minimum as well as maximum values.

**Table 1.** Summary Statistic

Variable	Obs	Mean	Std. Dev.	Min	Max
EMijt	720	1.397984	2.102324	0.0003332	13.02305
GDPit	720	675.4882	308.9098	195.6606	1119.191
GDPjt	720	1407.787	2842.557	1.758177	21374.42
EDISTijt	720	423.3975	283.6893	19.06639	1419.033
TOjt	720	0.8772297	0.7651182	0.0016742	4.4262
ln_REERjt	720	-0.0509606	0.2186498	-1.364185	0.7438403
FTA1	720	0.2652778	0.4417879	0	1
FTA2	720	0.5680556	0.4956911	0	1

The summary statistics of the variables in this study shown in Table 1 provide an initial overview and general information about the data used in this study. As an illustration, it shows the average value of Indonesia's GDP as much as US\$ 675.48 billion during 2002-2019, with the highest GDP value of US\$ 1119,191 billion in 2019. Furthermore, it can also be explained that partner countries have the highest GDP among the 40 countries in the United States in 2019.

The panel data regression in this study is divided into three models to analyze the impacts of basic gravity models and other important variables in influencing the dependent variable, the value of manufactured goods export. The first model covers the traditional gravity model, while the second model includes the influence of regional FTA in the model. The third model attempts to capture the

impacts of the development of the gravity model by incorporating variables currency exchange and trade openness. The results of the F-statistic test show that GDP, economic distance, trade openness, effective real exchange rates and FTA regional cooperation simultaneously have a significant effect on exports of Indonesian manufactured goods to trading partner countries. It is indicated by the value of Prob >  $\chi^2$  of 0.0000 or below 0.05. The results of the T-Statistic test on REM regression are described in Table 2 by including three research models.

**Table 2.** Results of Regression

Variables	(1) Basic Gravity Model	(2) Gravity Model and FTA	(3) Complete Gravity Model
GDPit	0.00103*** (8.2e-05)	0.000811*** (8.97e-05)	0.000832*** (9.35e-05)
GDPjt	0.000566*** (2.1e-05)	0.000558*** (2.07e-05)	0.000562*** (2.05e-05)
EDISTijt	-0.00130*** (19.5e-05)	-0.00117*** (20.52e-05)	-0.00117*** (20.42e-05)
TOjt			0.476*** (0.099)
ln_REERjt			0.234** (0.102)
FTA1		0.456*** (0.0811)	0.396*** (0.082)
FTA2		0.0802 (0.627)	0.0230 (0.063)
Constant	0.453 (0.189)	0.397 (0.191)	0.0167 (0.186)
Observations	720	720	720
R-Squared	0.653	0.667	0.751

Standard errors in parentheses  
Note(s): \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 2 illustrates that the flow of manufactured goods exports is increasingly influenced by the existence of variables other than the basic gravity model variables which are the trade openness variable of the partner country, the partner country's effective real exchange rate variable and the FTA dummy variable. It is shown that the coefficient of determination ( $R^2$ ) of the three models is rising with the highest value of 75.17%, which is generated in the complete gravity model.

The regression results in Table 2 also indicate that almost all independent variables in this model significantly affect the value of the exports of Indonesian manufactured goods, except for the dummy variable FTA2. The primary variable of GDP, both Indonesia's GDP and the GDP of trading partner countries, positively affect exports of manufactured goods, which is in line with existing expectations and theories. The economic distance variable also shows results that are in accordance with the existing theory that economic distance will negatively affect the export value of Indonesian manufactured goods. The effective real exchange rate has a significant and positive effect on exports of manufactured goods as expected. Furthermore, the trade openness variable of trading partner countries

(TOjt) also shows a significant effect in line with expectations and theory with the highest coefficient among other variables.

The main regional FTA variables, dummy variables FTA1 and FTA2, show the opposite results. The dummy variable FTA1 is a variable that describes the membership of Indonesia and trading partner countries in regional FTAs has a significant and positive correlation to the value of exports of manufactured goods following expectations. This also indicates that there is a trade creation effect on exports of manufactured goods caused by regional FTAs that are implemented by both countries. However, dummy variable FTA2 does not show a significant effect on exports of manufactured goods, in contrast with dummy variable FTA1 result. The FTA2 variable is a dummy variable that describes the trade between Indonesia as a member in regional FTAs and trading partner countries that are not involved in regional FTA membership. This shows that there is no sign of a trade diversion effect from non-member trading partner countries to FTA regional member trading partner countries.

One of the essential variables of many variables that explain the effect on the flow of trade is the size of a country's economy. The study results are in line with the results of the research by Mareta (2018) and Luthfianto et al. (2016), which state that the GDP of Indonesia and trading partner countries have a significant positive effect on exports of manufactured goods. Another factor that empirically affects exports of manufactured goods is economic distance. The results show that economic distance has a negative effect on exports of manufactured goods in accordance with expectations and the basic theory of the gravity model, which is also in line with the results of research by Mareta (2018), and Wahyudi and Anggita (2015). The economic distance variable has the concept that the more remote a partner country, which is indicated by a large geographical distance and a relatively low GDP, the higher transportation costs (Mareta, 2018). In turn, the high transportation costs will result in a decrease in trade flows, in this case, exports of manufactured goods.

Furthermore, trade openness significantly affects the export of manufactured goods is trade openness. Based on the test results, the trade openness of partner countries is known to positively impact the export value of Indonesian manufactured goods, which is in line with the results of research by Mareta (2018). The trade openness of a country can be seen as an indicator of the performance of existing trade policies in a country (Eicher et al., 2012). The better and more facilitative trade policies, including trade liberalization policies implemented in a country, the bigger potential a country can stimulate and trigger its trade activities. The financial sector is also one of the important factors that substantially influence the value of exports of manufactured goods. Based on the test results, the partner country's effective real exchange rate variable positively influences the exports of Indonesian manufactured goods, which is also in line with research by Wahyudi and Anggita (2015); Dao et al. (2015). The real effective exchange rate indicates the level of purchasing power of domestic products by trading partner countries (Wahyudi & Anggita, 2015).

The impact of this regional trade agreement is always followed by the concept of trade creation and trade diversion. The results show that regional FTAs have a trade creation effect as indicated by the dummy variable FTA1, which has a significant and positive effect on exports of manufactured goods. The basic reason

behind the trade creation phenomenon is that regional FTAs eliminate or reduce existing trade barriers, including tariffs, so that they become a stimulus for business actors to increase trade or broaden their trade area with other parties in partner countries that are members of the regional FTA. Trade liberalization, as measured by free trade agreements and supported by rapid economic growth, will result in significant trade growth between countries with the same area or having the same trade cooperation (Mareta, 2018). The creation of new export flows to FTA partner countries is also caused by the increase in the number of regional FTAs and the consistent implementation of regional FTAs modalities for tariff reduction or elimination.

The effect of trade diversion is empirically insignificant in the flow of exports of Indonesian manufactured goods. According to Yang and Martinez-Zarzoso (2014), the absence of evidence of a trade diversion can be caused by variations in commodity tariffs in the commitment to reduce tariffs in international trade agreements, and there is no decrease in demand from non-Regional Trade Agreements (RTA) importing countries. Non-RTA countries still need supplies from exporting countries so that the demand for commodities by non-RTA countries does not decrease after the RTA and is not diverted to RTA countries.

Based on the regression results, regional FTAs need to be developed and expanded since regional FTA cooperation increases the value of Indonesian exports of manufactured goods by expanding the scope and the members of the regional FTAs. Furthermore, since the trade diversion is not significant, Indonesia can start to have trade cooperation with non-regional FTA countries to accelerate the chances for the export flow of manufactured goods for Indonesian exporters. Yet, careful measures need to be taken specifically on the other factors influencing international trade factors such as the economic growth of Indonesia and the importing country, the distance and transportation costs that will occur, the level of openness of the partner country, and the effective real exchange rate of the partner country so that the FTA policy will make maximum benefits for Indonesia's economy.

## **CONCLUSION**

The results indicate that the basic variables in the gravity model, namely the GDP of Indonesia and partner countries and the economic distance between the two countries, have a significant effect on exports of manufactured goods. However, with the addition of FTA regional cooperation variables and financial factors, namely trade openness of partner countries and the effective real exchange rate of partner countries, the ability of the independent variables to explain the dependent variable, which is the exports of manufactured goods, empirically increases. These two variables also have a significant and positive effect on the exports of manufactured goods. The significant impact of participation in regional FTAs is only the effect of trade creation, in which the existence of a regional FTA that is participated by Indonesia and partner countries causes an increase in the value of the exports of manufactured goods or the creation of a new flow of the exports of manufactured goods between Indonesia and the partner country. Therefore, the development of regional FTAs needs to be promoted and carried out more as Indonesia's participation as an exporting country and trading partner country in regional FTA cooperation is proven to grow the value of Indonesian exports of

manufactured goods based on the result of this research. This can be done by not only upgrading the existing regional FTAs but also expanding the scope and the members of the regional FTAs, just like how Indonesia has strongly supported the negotiation until the signing of the mega FTA, RCEP. Moreover, Indonesia also needs to push the utilization of existing FTAs by business sectors, traders, even the MSMEs so that they can expand their market access and improve their production performance by creating and trading more value-added goods.

It is recommended that the Indonesian government initiate the establishment of trade cooperation with other non-regional FTA partner countries to open up the opportunities for the export flow of manufactured goods for Indonesian exporters. However, this effort needs to be balanced with the identification and careful study of factors related to international trade, such as the economic growth of Indonesia and the importing country, the distance and transportation costs that will occur, the level of openness of the partner country and the effective real exchange rate of the partner country so that the FTA policy will make maximum benefits for Indonesia's economy.

The limitation of this research is the scope of the research. This research only assessed the impact of regional FTAs on the exports of manufactured goods in total. Further research is expected to explore other FTA elements besides regional FTAs, such as bilateral FTAs or multilateral FTAs that will enter into force in the future. In addition, future researchers can particularly investigate the impact of export on manufactured goods in more detailed sectors of manufactured commodities, such as textile products, electronic products, food and beverage products. Future research can also be carried out using a larger sample of countries to obtain more precise and comprehensive results with more variables that might influence the exports of manufactured goods such as foreign direct investment, cultural and language factors, national borders, and trade facilitation indicators.

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