

Research article

Impact of ASEAN Plus Five Free Trade Area: Trade Creation and Trade Diversion

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Abstract: One of the ways to reduce international trade barriers is through the Free Trade Area (FTA). Collectively, ASEAN already has five FTAs with trading partners outside Southeast Asia. This study intends to analyze the effect of free trade agreements between ASEAN and China, South Korea, Japan, India, and Australia – New Zealand (ASEAN+5 FTA). The implications of an FTA are explained using the concepts of trade creation and trade diversion through economic integration. The trade gravity model is expanded with three dummy variables to determine whether trade creation and trade diversion occur in the formation of each of these FTAs. Static panel data regression is used to analyze the effect of Free Trade Agreements on intra-regional trade flows, export flows to non-members, and import flows from non-FTA members. The fixed effect model is applied to overcome endogeneity problems, while the PPML estimator is chosen to get the best estimation results amid heteroscedasticity and zero trade flow problems that usually occur in trade flows. Estimation results show that the trade creation effect occurs only in ACFTA and AIFTA, while other FTAs harm member countries through trade diversion. Therefore, further evaluation and efforts regarding the use of FTAs are needed to achieve the goals of FTAs.

Keywords: ASEAN, gravity, ACFTA, AKFTA, AIFTA, AJCEP, AANZFTA, PPML

JEL Classification: F12, F14, F17

Abstrak: Reduksi hambatan perdagangan internasional dapat dilakukan salah satunya melalui kesepakatan perdagangan bebas (FTA). Secara kolektif, ASEAN telah memiliki lima FTA dengan mitra dagang di luar Asia Tenggara. Penelitian ini bermaksud menganalisis pengaruh perjanjian perdagangan bebas antara ASEAN dengan China, Korea Selatan, Jepang, India, dan Australia – Selandia Baru. Dampak suatu FTA dijelaskan berdasarkan konsep *trade creation* dan *trade diversion* akibat integrasi ekonomi. Model gravitasi perdagangan diperluas dengan tiga variabel dummy untuk menentukan apakah terjadi *trade creation* dan *trade diversion* dalam pembentukan masing-masing FTA tersebut. Regresi data panel statis digunakan untuk menganalisis pengaruh FTA terhadap arus perdagangan intra-regional, ekspor ke nonanggota dan impor dari nonanggota FTA. Model *fixed effect* diterapkan untuk mengatasi masalah endogenitas, sedangkan estimator PPML dipilih untuk mendapatkan hasil estimasi terbaik di tengah permasalahan heteroskedastisitas dan *zero trade flows* yang biasa terjadi pada arus perdagangan. Hasil estimasi menunjukkan bahwa *trade creation* hanya terjadi pada ACFTA dan AIFTA, sedangkan FTA lainnya merugikan negara anggota *trade diversion*. Dengan demikian, perlu ada evaluasi dan upaya lebih lanjut dalam memanfaatkan FTA untuk mencapai tujuan dari FTA.

Kata Kunci: ASEAN, gravitasi, ACFTA, AKFTA, AIFTA, AJCEP, AANZFTA, PPML

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1. INTRODUCTION

International trade through export and import activities plays an important role and has a positive effect on the economy of many countries (Krugman et al., 2018). Trade provides benefits by enabling countries to export goods whose production uses abundant local resources as well as import goods whose production utilizes scarce local resources. International trade also contributes positively to economic growth by increasing the accumulation of human capital so that it can specialize in producing goods that it can manufacture efficiently, thereby increasing efficiency and scale of production (Haq & Luqman, 2014). The volume of international trade shows an increasingly large trend and is still dominated by trade in goods rather than services (UNCTAD, 2020). Globalization drives this trend, leading to the openness of countries and at the same time creating interdependence due to the integration of various aspects of the economy, for example, integration through international trade (Surugiu & Surugiu, 2015). However, most countries still apply protections and some barriers to the free flow of international trade to protect certain interests within the country. A common obstacle to trade is tariffs. It is a tax imposed on cross-border trade goods from or to a country (Salvatore, 2014).

One way to cut trade barriers is through free trade area (FTA) agreements. Once trade barriers are removed, the flow of goods between countries becomes freer. All parties benefit from this, as all resources can be used more efficiently. Reducing barriers to trade in capital goods allows poor countries to access capital goods produced in rich countries, thereby lowering the relative price of investment and increasing investment levels and capital-to-output ratios (Mutreja et al., 2018). An FTA includes a joint commitment to reduce and/or eliminate tariffs in all member states but maintains a tariff regime for imports from countries that have not joined the treaty. The World Trade Organization (WTO, 2022) reports that there are currently 354 FTAs in force implemented globally in bilateral, regional, and multilateral forms. FTAs do not always have positive impact. One reason is that FTAs can trigger trade diversion rather than trade creation and disrupt the general effect of the WTO. Ignoring FTA heterogeneity, standard result in the literature for the gravity equation shows that countries with FTA has increased trade by 55 % compared to those without trade agreement (Kohl et al., 2016). It took about a decade for the FTA to fully impact on trade, although it is not monotonous, the impact of free trade agreements on international trade is positive (Egger et al., 2022).

The fundamental objective underlying the free trade policy is to achieve economic growth, especially in developing countries (Hadili et al., 2021). This goal is also to be achieved by all member countries of the Association of South East Asian Nations (ASEAN) through the FTA. This is proven by the enactment of several FTAs between ASEAN and a number of countries outside the Southeast Asian region. Particularly in Indonesia, (Kusuma (2017) found that this policy has a positive and significant effect on economic growth through ACFTA. Internally, intra-ASEAN free trade agreements have been ongoing since 1992 with the agreement of the ASEAN Free Trade Area (AFTA). AFTA has pushed its members towards a global economy through a simultaneous increase in intra-regional/intra-block trade (Okabe & Urata, 2014) and without causing a trade diversion effect on both exports and imports with nonmembers (MacPhee & Sattayanuwat, 2014). Accelerating trade liberalization in ASEAN is necessary to ensure regional competitiveness in the global market (Chen & Lombaerde, 2019). However, recent research by (Nguyen (2019) shows that AFTA does not have a significant impact on the trade flows of its members.

Externally and collectively, there are five FTAs currently underway between ASEAN and several partner countries. The free trade agreements include the ASEAN-China FTA (ACFTA), ASEAN-Korea FTA (AKFTA), ASEAN-Japan Comprehensive Economic Partnership (AJCEP), ASEAN-India FTA (AIFTA), ASEAN Australia-New Zealand FTA (AANZFTA), and ASEAN-Hongkong FTA (AHFTA). AHFTA is not yet feasible for ex-post economic evaluation because the FTA has just been agreed and not all member countries have implemented a reduction in technical trade barriers. These cooperations do not include individual FTAs agreed by each country in ASEAN with other countries outside Southeast Asia. Figure 1 shows ASEAN's export performance to some major destination countries. The value of intra-ASEAN trade is still the largest, but the growth of exports to China has increased the most

massively. Since 2005, ASEAN exports to China have quadrupled from 52 billion US\$ to 219 billion US\$. China has become ASEAN's largest trading partner, shifting positions from the United States and Japan. In general, there is an increase in exports for each flow, whether with trading partners in FTAs or not.

The positive impact of economic integration between ASEAN and FTA partners should be obtained through increased trade flows between members. The economic integration literature states that the positive effects of FTA can be seen after knowing the net effects of trade creation and trade diversion that occur (Yang & Martinez-Zarzoso, 2014). Viner (1950) was the first to put forward the concept of trade creation and trade diversion. Trade creation occurs when a portion of the domestic production of FTA members is replaced by lower-cost imports than other members (new trade appears between member countries as a result of the removal of intra-regional trade barriers), while trade diversion occurs when more efficient imports of non-FTA members are replaced by imports from member countries. Thus, FTAs are beneficial when inefficient domestic production is substituted with more efficient imports from FTA partners without stopping or reducing the most efficient imports from around the world (Nguyen, 2019).

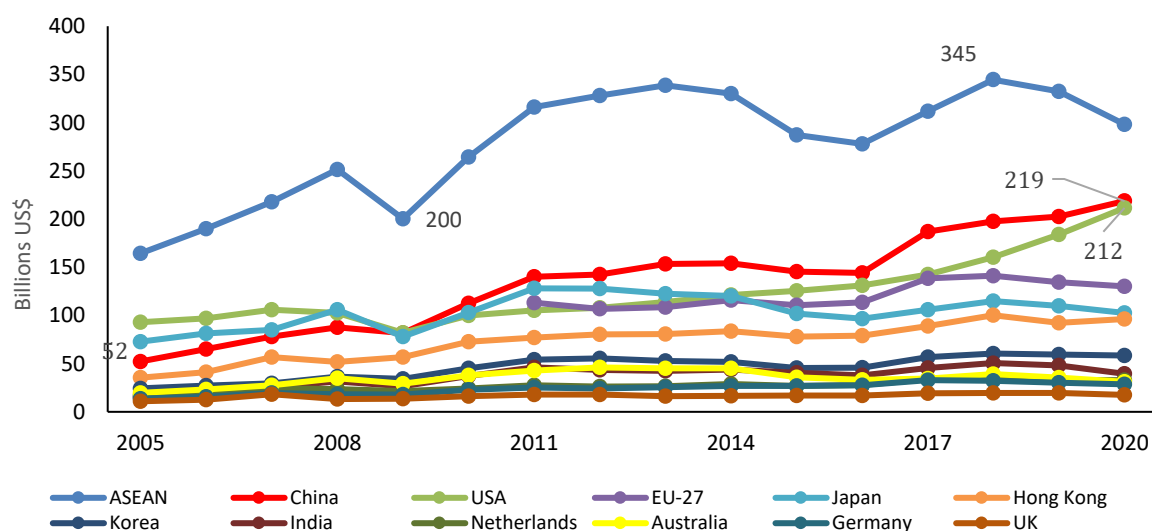


Figure 1. ASEAN export flows, 2005-2020 (billion US\$)
 Source: ASEANStat. (2022)

Several studies have revealed the resulting impact on ASEAN-owned FTAs and found mixed findings. Yang and Martinez-Zarzoso (2014) found that the reduction and elimination of tariffs on the ACFTA scheme have encouraged an increase in intra-regional and extra-regional trade. Taguchi (2015) found something similar and added that trade creation also occurs in AKFTA and AJCEP albeit with a smaller magnitude. Different results were obtained by Agung et al. (2019) who found that AKFTA had a negative and significant impact on Indonesian imports. Pure trade creation occurs in AIFTA (Singh, 2021), but the opposite was discovered by Khurana and Nauriyal (2017) who found contraction in AIFTA intra-block trade. On the other hand, AANZFTA also does not present trade creation for its members (Gharleghi & Shafighi, 2020).

This study intends to present the latest empirical evidence on the impact of FTAs owned by ASEAN. A thorough analysis of each FTA will be carried out simultaneously in this study. To capture the overall effect, the trading gravity model is expanded with three dummy variables so that the overall trade creation and trade diversion effects of each FTA can be revealed. The use of three dummy variables simultaneously is the best method to determine the effect (Khurana & Nauriyal, 2017; Nguyen, 2019; Yang & Martinez-Zarzoso, 2014). Not all previous studies applied these three dummy variables simultaneously, thus failing to reveal the net effect or the overall effect of ASEAN-owned FTAs. This study uses the latest estimation techniques based on the Poisson Pseudo Maximum Likelihood (PPML) estimator to get the best estimation results amidst common problems with international trade data when executed using conventional methods according to OLS.

The next part of the study consists of the following. Part 2 contains an explanation of the literature on the trade gravity model accompanied by some previous studies. Section 3 outlines the samples and data sources, methodologies, and econometric approaches to the gravity model used. Section 4 presents the main empirical results and discussions. Finally, Part 5 contains the conclusions of this study.

2. RESEARCH METHODS

2.1. Data collection

This study used panel data compiled from cross-section data in the period 2000 to 2020. The cross-sectional data is 35 sample countries consisting of 10 ASEAN countries, 6 FTA partners, and the rest are ASEAN's largest trading partners. The use of panel data can increase the efficiency of the estimation results and allow the application of country-pair fixed-effect to overcome the problem of endogeneity of trade policy variables and flexible, comprehensive, and accurate estimates of the cost effects of constant bilateral trade (Yotov et al., 2016). Data on the value of exports in nominals used as dependent variables are obtained from the International Monetary Fund (IMF), the GDP of each country is obtained from the World Bank, while other gravity model variables are obtained from the CEPII database (Mayer & Zignago, 2011). The FTA dummy variable is arranged based on the year of participation of member states in each FTA concerning the WTO database. Table 1 summarizes the types and sources of data used in this study.

Table 1. Types, data sources, and countries of research samples

Variables	Descriptions	Source
X_{ijt}	The dependent variable, export of country i to country j in year t (million dollars)	IMF
Y_{it}	GDP of country i (exporter) in year t (million dollars)	World Bank
Y_{jt}	GDP of country j (importer) in year t (million dollars)	World Bank
$AC_I; AC_X; AC_M$	ACFTA dummy variables in year t are for intra-block, export to nonmember, and imports from nonmembers, respectively	WTO
$AK_I; AK_X; AK_M$	AKFTA dummy variables in year t are for intra-block, export to nonmember, and import from nonmembers respectively	WTO
$AJ_I; AJ_X; AJ_M$	AJCEP dummy variables in year t are for intra-block, export to nonmember, and import from nonmembers respectively	WTO
$AI_I; AI_X; AI_M$	AIFTA dummy variables in year t are for intra-block, export to nonmember, and import from nonmembers respectively	WTO
$AANZ_I; AANZ_X; AANZ_M$	AANZFTA dummy variables in year t are for intra-block, export to nonmember, and import from nonmembers respectively	WTO
Country List		
ASEAN	Brunei Darussalam; Cambodia; Indonesia; Laos; Malaysia; Myanmar, Philippines; Singapore; Thailand; Vietnam	
FTA Partner	China; South Korea; Japan; India; Australia; New Zealand	
Others	Argentina; Brazil; Belgium; Canada; France; Germany; Hongkong; Italy; Mexico; Netherlands; Qatar; Russia; Saudi Arabia; South Africa; Swiss; Turkiye; Uni Arab Emirates; United Kingdom; United State	

Source: Authors' calculations

2.2. Model Specification

The gravity model is a powerful method in the literature on international trade (Shepherd, 2016). Its specific use is to apply it to assess the impact of implementing an FTA. This model tests whether the impacts presented are as expected, this is important for the formulation of further adjustment policies in the affected sectors and to exploit benefits that have not yet been fully realized (Plummer et al., 2011). Equation (1) is a gravity model that is generally used in international trade literature. In its most basic form, the trade gravity model postulates that bilateral trade will increase with the size of the economies of the two countries and is negatively correlated with the distance that separates them (Krugman et al., 2018). In addition to distance, trade costs can also be affected by the geographical conditions of the border, the official language spoken, and the relationship of the colonies between the two countries. This formulation is typical of the gravitational model literature, where each of these factors significantly affects bilateral trade (Shepherd, 2013).

$$X_{ijt} = \beta_0 Y_{it}^{\beta_1} + Y_{jt}^{\beta_2} + dist_{ij}^{\beta_3} + contig_{it}^{\beta_4} + lang_{jt}^{\beta_5} + col_{ijt}^{\beta_6} + e_{ijt} \tag{1}$$

Where, X_{ijt} is the export value of country i to country j in year t , Y_{it} (Y_{jt}) is the GDP of the exporter (importer) in year t , $dist_{ij}$ is the distance between the two countries, $contig_{ij}$ is a dummy variable that is worth 1 when the two countries are next to each other, $lang_{ij}$ is a dummy variable of 1 value when both countries use the same official language, col_{ijt} is a dummy variable of 1 value if both countries have the same colony history and e_{ijt} is the error term.

Viner (1950), who first introduced the concepts of trade creation and trade diversion, argued that the effect of trade liberalization after the establishment of an FTA is ambiguous and depends on whether the trade creation effect or the trade diversion effect is dominant. Some studies suggest using of three dummy variables simultaneously in the trade gravity model to thoroughly test whether there is trade creation and trade diversion in exports and imports (Yang & Martinez-Zarzoso, 2014). Including three dummy variables in the gravity model makes it easier to determine the net or overall effect of trade creation which is the difference between trade creation, export trade diversion, and import trade diversion (MacPhee & Sattayanuwat, 2014).

This method is a correct identification and drawing conclusions related to trade creation and trade diversion is carried out by testing the coefficient signs of the three dummy variables. Thu and Van Trung (2015), Khurana and Nauriyal (2017), and Nguyen (2019) follow the same specifications for trade creation and trade diversion and apply them to the panel data.

Table 2. Possible effects of ftas based on signs of dummy variable coefficients

Coefficient	Export Effect		Import Effect	
	$\delta_x > 0$	$\delta_x < 0$	$\delta_m > 0$	$\delta_m < 0$
$\delta_i > 0$	ITC and XTC (pure TC)	$\delta_i > \delta_x$: ITC and XTD $\delta_i < \delta_x$: XTD	ITC and MTC (pure TC)	$\delta_i > \delta_m$: ITC and MTC $\delta_i < \delta_m$: MTD
$\delta_i < 0$	XE	XC and XTD	ME	MC and MTD

Source: MacPhee and Sattayanuwat (2014) and Yang and Martinez-Zarzoso (2014)

Table 2 summarizes the various possible impacts resulting from economic integration through FTAs based on three dummy variables. δ_i , δ_x , and δ_m denotes coefficient of FTA dummy variables for intra-block, export to nonmembers, and import from nonmembers, respectively. If δ_i and δ_x are positive, then there is intra-block trade creation (ITC) accompanied by an increase in exports from FTA member countries to nonmembers (XTC). This can be called pure trade creation. However, if the positive coefficient of δ_i is accompanied by the negative of δ_x then there is trade creation and diversion at the same time. FTA is profitable as long as the absolute value of δ_i is still greater than the negative of δ_x . On the other hand, if the absolute value of the coefficient $\delta_i < \delta_x$ then the effect

of export trade diversion (XTD) exceeds the trade creation that occurs, this means that there are losses for FTA member countries. Import trade creation (MTC) and import trade diversion (MTD) apply the same, namely by comparing the coefficient between δ_i and δ_m . While ME and XE indicate extra-block import and export expansion, respectively, MC and XC signify contraction.

The main problem with the estimation of trade gravity models is the presence of heteroskedasticity and zero trade flows. Heteroskedasticity arises because the gravity model consists of a large amount of cross-section and time-series data in which there are flows of trade between small countries that tend to vary less than trade between large countries which varies greatly (Kabir et al., 2017). Zero trade flow can be caused by systematic rounding errors or there is no trade at all because it is far away and/or the country is small (Bacchetta et al., 2012). When the gravity model is executed in the log-linear form then this poses a problem because the natural logarithm of zero is undefined. Silva and Tenreyro (2006) proposed the use of a Poisson Pseudo Maximum Likelihood (PPML) estimator to address both issues and found that the performance of the PPML estimator was not affected when the proportion of the dependent variable with the zero trade was very large. In addition, PPML estimators provide stronger and more consistent results than other econometric techniques in the presence of heteroskedasticity. The conventional method of estimating the gravity model is in log-linear form so equation (1) becomes as follows.

$$\log(X_{ijt}) = \beta_0 + \beta_1 \log(Y_{it}) + \beta_2 \log(Y_{jt}) + \beta_3 \log(dist_{ij}) + \beta_4 contig_{ij} + \beta_5 lang_{ij} + \beta_6 col_{ij} + e_{ijt} \quad (2)$$

Magee (2008) stated that equations (1) and (2) contain a problem, namely that pairs of countries with strong cultural-historical ties tend to have greater trade value and the possibility of forming FTAs, then the interference variable is correlated with the dummy FTA variable and the coefficient estimation results can be biased. Inclusion variables whether a pair of countries have language similarities ($lang_{ij}$), share the same border ($contig_{ij}$), and the history of the colony (col_{ij}) will only solve some of these problems, while many other ties/factors affect bilateral trade and are unobservable. An alternative method to solve the problem is the use of the country-pairs fixed-effect (ω_{ij}). Nonetheless, the drawback of this method is that the country-pair fixed-effect will absorb all the bilateral variables that do not change all the time that also affect trade (Yotov et al., 2016). To capture the time trend and any shocks that affect global trade flows each year, the fixed effect in the year is also used in this study (γ_t). Thus, equation (2) becomes the following.

$$\log(X_{ijt}) = \beta_0 + \beta_1 \log(Y_{it}) + \beta_2 \log(Y_{jt}) + \omega_{ij} + \gamma_t + e_{ijt} \quad (3)$$

The impact of free trade between ASEAN and trading partner countries in the ASEAN+5 FTA scheme can be known through the effect of trade creation and trade diversion which is reflected in the three dummy variables in the gravity model, by including three dummy variables for each FTA, equation (3) becomes as follows.

$$\begin{aligned} \log(X_{ijt}) = & \beta_0 + \beta_1 \log(Y_{it}) + \beta_2 \log(Y_{jt}) + \delta_i AC_{I_{ijt}} + \delta_x AC_{X_{ijt}} + \delta_m AC_{M_{ijt}} + \\ & \delta_i AK_{I_{ijt}} + \delta_x AK_{X_{ijt}} + \delta_m AK_{M_{ijt}} + \delta_i AJ_{I_{ijt}} + \delta_x AJ_{X_{ijt}} + \delta_m AJ_{M_{ijt}} + \\ & \delta_i AI_{I_{ijt}} + \delta_x AI_{X_{ijt}} + \delta_m AI_{M_{ijt}} + \delta_i AANZ_{I_{ijt}} + \delta_x AANZ_{X_{ijt}} + \\ & \delta_m AANZ_{M_{ijt}} + \omega_{ij} + \gamma_t + e_{ijt} \end{aligned} \quad (4)$$

To overcome the problems of heteroscedasticity and zero trade flows, the PPML estimator will be used in this study. The PPML gravity model is estimated directly from its multiplicative form, where the dependent variable is measured in levels, not the linearization of the model using logarithms, so equation (4) becomes the following. The PPML estimator coefficients are very easy to interpret and follow the pattern according to the OLS estimator. Furthermore, because the PPML

estimator is a nonlinear model, it does not need to be tested with classical assumptions (Silva & Tenreyro, 2006).

$$\begin{aligned}
 X_{ijt} = \exp[\beta_0 + \beta_1 \log(Y_{it}) + \beta_2 \log(Y_{jt}) + \delta_i AC_{Iijt} + \delta_x AC_{Xijt} + \delta_m AC_{Mijt} + \\
 \delta_i AK_{Iijt} + \delta_x AK_{Xijt} + \delta_m AK_{Mijt} + \delta_i AJ_{Iijt} + \delta_x AJ_{Xijt} + \delta_m AJ_{Mijt} + \\
 \delta_i AI_{Iijt} + \delta_x AI_{Xijt} + \delta_m AI_{Mijt} + \delta_i AANZ_{Iijt} + \delta_x AANZ_{Xijt} + \\
 \delta_m AANZ_{Mijt} + \omega_{ij} + \gamma_t] + e_{ijt}
 \end{aligned}
 \tag{5}$$

3. RESULTS AND DISCUSSION

3.1. PPML fixed effect estimation results

Before estimating, the first step is to check whether there is a relationship between the independent variables. Table 3 reports the correlation matrix between variables which shows that the correlation coefficient value is below 0.8 so there is no strong correlation between independent variables. It is also seen that the GDP of exporters and importers is very positively related to trade flows, in this case, exports. This supports the basic intuition of the gravity model that the larger the country, the greater the trade.

Table 3. The result of correlation matrix

	Xij	Yi	Yj	AC_I	AC_X	AC_M	AK_I	AK_X	AK_M	AJ_I	AJ_X	AJ_M	AI_I	AI_X	AI_M	AANZ_I	AANZ_X	AANZ_M	
Xij	1																		
Yi	0.31	1																	
Yj	0.37	-0.01	1																
AC_I	-0.02	-0.05	-0.05	1															
AC_X	0.00	-0.08	0.08	-0.12	1														
AC_M	-0.03	0.08	-0.08	-0.12	-0.20	1													
AK_I	-0.04	-0.10	-0.10	0.74	-0.05	-0.05	1												
AK_X	-0.06	-0.16	0.13	-0.05	0.78	-0.18	-0.11	1											
AK_M	-0.06	0.13	-0.16	-0.05	-0.18	0.78	-0.11	-0.17	1										
AJ_I	-0.03	-0.06	-0.06	0.67	-0.05	-0.05	0.72	-0.03	-0.04	1									
AJ_X	-0.05	-0.10	0.11	-0.04	0.70	-0.16	-0.02	0.76	-0.15	-0.09	1								
AJ_M	-0.05	0.11	-0.10	-0.04	-0.17	0.70	-0.03	-0.15	0.76	-0.09	-0.14	1							
AI_I	-0.04	-0.08	-0.08	0.64	-0.04	-0.04	0.68	-0.03	-0.03	0.77	-0.02	-0.02	1						
AI_X	-0.06	-0.13	0.12	-0.04	0.66	-0.16	-0.02	0.72	-0.14	-0.01	0.80	-0.13	-0.08	1					
AI_M	-0.05	0.12	-0.13	-0.04	-0.16	0.66	-0.03	-0.14	0.72	-0.01	-0.13	0.80	-0.08	-0.13	1				
AANZ_I	-0.04	-0.09	-0.09	0.57	-0.01	-0.01	0.61	0.01	0.01	0.68	0.02	0.02	0.71	0.03	0.03	1			
AANZ_X	-0.06	-0.14	0.14	-0.04	0.60	-0.16	-0.02	0.65	-0.14	-0.01	0.73	-0.13	-0.01	0.77	-0.12	-0.09	1		
AANZ_M	-0.06	0.14	-0.14	-0.04	-0.16	0.60	-0.02	-0.14	0.66	-0.01	-0.13	0.73	-0.01	-0.12	0.77	-0.09	-0.14	1	

Source: Authors' calculations

Table 4 presents the estimation results based on the PPML estimator by applying the country-pair fixed-effect and year effect according to equation (5). The estimation results show that the coefficients of the exporter and importer GDP variables have a positive effect and are statistically significant on exports, respectively. In this case, an increase in exporters' GDP by 1% will increase exports by 0.52%. Vice versa, if the Importer's GDP increases by 1% then there will be an increase in export flows from country i to country j by 0.55%. This positive and significant relationship corresponds to the theory of the gravity model and various studies in the international trade literature in which GDP is a basic component as a proxy of economic measures that affect bilateral trade positively (Kabir et al., 2017). The larger the GDP, the greater the possibility of trade taking place.

Table 4. The result of the model estimation

Dependent Variable: X_{ij} (Export)				
Variables	Coefficient	Robust Std. error	Prob.	
<i>Constant</i>	-9.420***	0.870	0.000	
$\log(Y_{it})$	0.521***	0.039	0.000	
$\log(Y_{jt})$	0.555***	0.056	0.000	
AC_I	0.174**	0.069	0.012	
AC_X	0.193***	0.054	0.000	
AC_M	0.013	0.059	0.821	
AK_I	-0.050	0.071	0.476	
AK_X	-0.079**	0.037	0,029	
AK_M	0.011	0.046	0,810	
AJ_I	-0.250***	0.064	0.000	
AJ_X	-0.222***	0.036	0.000	
AJ_M	-0.075	0.053	0.154	
AI_I	0.088	0.087	0.312	
AI_X	0.119*	0.064	0.063	
AI_M	0.100	0.093	0.285	
AANZ_I	-0.237***	0.071	0.001	
AANZ_X	-0.029	0.082	0.721	
AANZ_M	-0.029	0.062	0.638	
Summary				
<i>Obs.</i>	24840			
R^2	0.981			
Type of Fixed Effect				
<i>Country - pair</i>	Yes			
<i>Year</i>	Yes			
Diagnostic test	F-statistic	Prob. value		
<i>SERIAL-test</i>	158.866	0.000		
<i>BP-test</i>	16468.51	0.000		

Note: 21-year dummy variables and 1190 country-pair dummy variables omitted for practical reasons; and *, ** and *** represent significance at 1%, 5% and 10% levels respectively

Source: Authors' calculations

The estimation results in Table 4 also show that the coefficient of the FTA dummy variable in each agreement has a different impact both in terms of direction, magnitude, and level of significance. This indicates that not all FTAs implemented by ASEAN have a positive impact according to Viner's hypothesis. Factors such as distance, economic size, trade barriers and costs, institutions, and pre-existing FTAs can also influence the effect of an FTA (Baier et al., 2019).

The study finds that only ACFTA and AIFTA provide incentives to increase trade flows. The rest of the FTAs show negative signs which indicates the occurrence of trade diversion or contraction. Generally, this can be due to China and India are ASEAN's trading partners with the largest GDPs, and this situation amplifies the potential positive impact of these FTAs. In addition, some ASEAN countries have carried out bilateral FTA cooperation with Japan, Korea and Australia-New Zealand respectively. These FTAs may weaken the effect that could occur on the next FTA. Table 5 summarizes the conclusions for the various effects induced by each FTA based on the coefficients of the FTA dummy variables.

3.2. FTA Effect: Trade Creation and Trade Diversion

In the previous explanation, the net or overall effect of an FTA can be determined by testing the coefficients of the three dummy FTA variables, namely δ_i , δ_x , and δ_m . Table 5 shows an overview of the trade creation and trade diversion effects of each FTA owned by ASEAN. All the free trade agreements, only the ACFTA seems to produce a pure trade creation effect by encouraging increased intra-regional trade and exports to nonmembers. On the other hand, a significant negative

impact on intra-regional trading is shown by AJCEP and AANZFTA. All FTAs also do not have a significant influence on the imports of FTA members from nonmembers, both import trade diversion and import trade creation.

Table 5. Intra and extra-block FTA impacts

Type of FTA	Estimated Coefficient From PPML			Total Effect
	Intra-block (δ_i)	Export-block (δ_x)	Import-block (δ_m)	
ACFTA	0.174**	0.193***	0.013	Intra-block trade creation (+19.00%); Export trade creation (+21.29%)
AKFTA	-0.051	-0.080**	0.011	Export trade diversion (-7.69%)
AJCEP	-0.250***	-0.222***	-0.075	Intra-block export contraction (-8.40%); Export trade diversion (-24.86%)
AIFTA	0.088	0.119*	0.100	Export trade creation (+12.64%)
AANZFTA	-0.237***	-0.029	-0.029	Intra-block export contraction (-26.74%)

Note: *, ** and *** represent significance at 1%, 5% and 10% levels respectively

Source: Authors' calculations

Based on the estimated results, the trade agreement between ASEAN and China produced an overall positive trade effect without presenting trade diversion. The positive and significant coefficients on variables AC_I and AC_X indicate that the reduction and or elimination of tariffs in the ACFTA scheme has increased the total volume of trade, both inter-member trade and the expansion of exports from ACFTA members to nonmembers. In this case, intra-regional trade is 19.00% above the level predicted by the gravity model, simultaneously, the tendency to export to countries outside the ACFTA on average increased by 21.29% during the observation period.

This increase in trade is possible because FTA allows multinational companies to reduce production costs by sharing production processes among multiple member countries according to each country's comparative advantage. ACFTA has successfully combined the integrated markets of 10 smaller ASEAN economies and the huge Chinese market. Market expansion strengthens the attractiveness of member countries for investment and trade in order to generate more profits. This integration has the advantage of covering a region with abundant in cheap labour but also has a fast-growing market that no other FTA has. This combination makes China and ASEAN the perfect pair to form a central part of the factory of the world (Li et al., 2016). These results are in line with Yang and Martinez-Zarzoso (2014) who stated that the ACFTA presents a pure trade creation effect in terms of exports. Nevertheless, pure trade creation in terms of imports was not identified in this study considering that the coefficient of AC_M was positive but not statistically significant.

The PPML estimation results on the implementation of AKFTA do not provide sufficient evidence of the existence of trade creation for its members which is indicated by the negative AK_I coefficient but not statistically significant. The reduction or elimination of tariffs in the context of AKFTA is not sufficiently attractive or profitable for business actors in member countries. The decline in exports from AKFTA members to non-members occurred because AKFTA made member countries divert some of their exports to fellow members. The PPML estimator predicts a 7.69% decline in exports to outsiders due to the implementation of AKFTA. This condition makes AKFTA present an export trade diversion effect. This finding is in line with the results of a study by Mareta (2018) who stated that AKFTA is more likely to have a trade diversion effect on exports, as well as complementing the study by presenting an analysis on the import side with nonmembers even though the estimation results show that the coefficient of AK_M is not statistically significant which means that imports by member countries from nonmembers have not changed over the implementation of AKFTA.

The absence of an increase in trade flows in the AKFTA scheme could be due to the low utilization rate. Hayakawa et al. (2017) pointed out that not all countries necessarily show an increase in utilization rate over time. Low utilization rates mean that eliminating or reducing tariffs under an FTA will not deliver the expected economic benefits. In total, the utilization rate of

Malaysia and Thailand is the lowest (35%), while Myanmar has the highest rate of 96% and all the rates show erratic pattern. Some factors that determine utilization rates, namely the tariff margin, Rules of Origin (ROO) requirements, and trading volume. The larger the tariff margin and the simpler the ROO requirements for issuing a Certificate of Origin (COO), the more likely companies are to take advantage of the preferential tariff of FTA. In addition, the size of the transaction is also very important, as an increase in transaction volume leads to savings in tariff payments, even if the tariff margin is small (Hayakawa et al., 2014). Meanwhile, Wignaraja (2014) found that lack of information is the main reason for not using FTAs. Most companies have only heard of FTAs and do not use them because they do not know the details about the preferential tariffs, other clauses of FTA agreement or how they are used.

The coefficients AJ_I and AJ_X which measure the level of trade in the AJCEP scheme show a negative and significant sign. This means that AJCEP causes contraction in intra-block trade flows as well as export trade diversion. This is surprising given that intra-block trade tends to increase more than predicted by the gravity model after the establishment of the FTA due to the reduction of trade barriers. Moreover, Japan is the second largest trading partner after China. In this case, intra-ASEAN trade with Japan is around 28.40% below normal trading levels as well as exports to non-members also fell by around 24.86% due to the export trade diversion effect of AJCEP. The results of this study are similar to the findings of Thu and Van Trung (2015) which indicate that AJCEP does not encourage increased trade among members because it creates trade diversion. The potential for trade creation that occurs in AJCEP may have been offset by the presence of very strong trade creation in ACFTA. That is why China is currently ASEAN's largest trading partner, shifting Japan's position since 2007. Another reason is that before the AJCEP was signed, bilateral FTAs such as Japan-Singapore, Japan-Malaysia, Japan-Thailand, Japan-Brunei, Japan-Indonesia, and Japan-Philippines had already entered into force. Therefore, some of the potential impacts of AJCEP may have been absorbed beforehand by these bilateral FTAs (Baier et al., 2019; Taguchi, 2015).

Similar results occurred in the implementation of AANZFTA where this study found that the AANZ_I coefficient was negative and significant. Intra-block trade between ASEAN and Australia-New Zealand in the framework of AANZFTA is 26.74% below the normal level of trade. This result is in line and at the same time complements the findings of Sattayanuwat and Tangvitoontham (2017) which states that trade flows between AANZFTA members and non-members occur more than trade between members. These results also complement these findings in terms of differences in estimation techniques where this study uses PPML by applying country-pair and year effects while Sattayanuwat and Tangvitoontham (2017) use country-specific and year effects but still get the same results where there is no trade creation effect on the formation of AANZFTA. As the case to AKFTA, Thangavelu et al. (2021) find very low utilization rate in AANZFTA. Indonesia, Philippines, and Vietnam have the highest rates, ranging from 26% to 34%. Meanwhile, other ASEAN members use AANZFTA in less than 20% of all existing trading opportunities. Some ASEAN countries (Malaysia, Singapore, Thailand) had bilateral FTA with Australia-New Zealand several years before the implementation of the AANZFTA. This bilateral FTA may reduce the incentive to use the AANZFTA, so the impact of new FTAs will be weaker for pairs of countries with existing agreements (Baier et al., 2019)

Export trade creation is found in the case of AIFTA. It is known by the positive and significant coefficient of AI_X. AIFTA tends to increase member exports to outsiders without causing impact on intra-block trade or imports from non-members. Bhattacharyya and Mandal (2016) stated that there is a weak correspondence between changes in trade trends among AIFTA members and changes in tariffs that have occurred. The maximum increase in India's imports from ASEAN occurred in special product categories where the reduction in tariffs is very low or there is no reduction in tariffs at all. The same trend also occurs in ASEAN countries. This could be one of the reasons for the absence of trade creation on intra-block trading. In addition, Bhattacharyya and Mandal (2016) also stated that ASEAN's import tariff profile is lower than India's. This condition may cause export creation in which ASEAN is more stimulated to export its products to other countries outside India while maintaining the number of existing exports to gain more profits. This result is slightly different from the findings of Singh (2021) who used the OLS estimator in measuring the impact of trade creation and trade

diversion from AIFTA. Singh (2021) found that trade expansion with nonmembers occurs not only in exports but also in imports. The results of the gravitational model estimation are indeed very sensitive to the methods/techniques, variables, and samples used (Yotov et al., 2016).

4. CONCLUSIONS

The impact assessment of economic integration is often related to Viner (1950) concepts of trade creation and trade diversion. The concept emphasizes that the implementation of economic integration, such as FTAs, does not necessarily have a positive impact on the welfare of member states. FTAs tend to be beneficial if trade creation exceeds the trade diversion that occurs. The effect of trade creation will be evident when the benefits of tariff elimination or reduction under a free trade agreement outweigh the costs incurred for the use of such FTAs.

This study uses the trade gravity model to reveal the impact that occurs on the implementation of free trade agreements owned by ASEAN in the ACFTA, AKFTA, AJCEP, AIFTA, and AANZFTA schemes. The use of three dummy variables in the gravity model was carried out to capture the effects of intra-block trade, exports to nonmembers, and imports from non-members of the FTA. The results of the study find that only ACFTA and AIFTA are proven to have a positive impact through the effect of trade creation, not only for its members but also for non-member countries through export expansion. On the other hand, all FTAs do not exert any effect on imports from non-members of the FTA. AJCEP and AANZFTA negatively affect intra-regional trade, while AKFTA present export trade diversion effects. These results indicate that ASEAN trade activities tend to be concentrated in China. This is also supported by the fact that China is currently ASEAN's largest trading partner, shifting the position of the United States and Japan.

There are several policy implications for this research. First, given that not all these FTAs bring benefits, each FTA member's government should properly assess the impact of economic integration, especially in key sectors. Continuous evaluation and improvement should be carried out. Recovery assistance must be given to domestic sectors that are adversely affected by their inability to compete with foreign products or companies. Second, there needs to be a joint effort among member countries to fix various technical provisions in the implementation of FTAs so that it is more attractive for business actors to take advantage of this trade facility. Moreover, various promotions, outreach, and education to the community, especially small medium enterprise, should be strengthened to make them aware of the potential benefits and know how to take advantage of FTAs. Finally, there must always be improvements in terms of infrastructure, technology, and human resources to support the ongoing implementation of FTAs.

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