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An examining factors influencing international export and import relationships in context of Vietnam's free trade agreements

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Abstract: Vietnam's trade balance was positive with the United States, the Netherlands, Hong Kong, the United Kingdom, the United Arab Emirates, and Austria. However, it was negative in several countries, including South Korea, China, Taiwan, Thailand, Singapore, and Argentina. This paper aims to investigate the asymmetric effects of several macroeconomic factors on Vietnam's trade balance in the post-global financial crisis era. This paper aims to capture better the nuanced effects of free trade agreements on Vietnam's trade balance. Using regression methods like Pooled OLS, Random Effect Model, Fixed Effect Model, and Hausman Taylor, it analyzes factors affecting bilateral trade with Comprehensive Economic Partnership for East Asia nations. These factors include gross domestic product (GDP), population, distance, exchange rates, national borders, and Free Trade Agreements. Findings suggest that GDP, population, and exchange rates significantly influence Vietnam's trade relationships, but free trade agreements have not yielded the expected results. This study's novelty lies in its exploration of comprehensive regression analysis, offering valuable insights into Vietnam's trade dynamics.

Keywords: Free Trade Agreement; Trade; Import; Export
JEL Classification: F10; F13; F14; F17

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Introduction

The global economy heavily relies on international trade, facilitating countries to specialize in producing goods and services where they hold a comparative advantage and exchanging those where efficiency is lacking (Suranovic, 2020). This interdependence enhances overall efficiency and prosperity, with Vietnam emerging as a vibrant economy in recent years, driven significantly by international trade (T. et al., 2024). Actively engaging in various international trade agreements, Vietnam aims to broaden its trade connections, attract foreign investment, and integrate further into the global economic landscape (LE et al., 2022). These agreements provide expanded market reach, foster economic expansion, and open avenues for local enterprises to extend beyond national boundaries, stimulating domestic production, attracting foreign direct investment (FDI), and generating employment opportunities ((Dao & Ngo, 2023). Moreover, international trade plays a crucial role in diversifying Vietnam's industrial landscape, mitigating dependence on a few sectors, enhancing resilience

against economic disruptions, and leveraging comparative advantages for global competitiveness (Vu et al., 2024).

Vietnam's trade balance reflects positive and negative balances with various countries, underscoring the need for strategic policymaking to address imbalances (World Bank, 2021). Policymakers have strategies to address these imbalances effectively, such as managing exchange rates, diversifying exports, and promoting import substitution. Analyzing the relationship between exchange rates and trade balance offers valuable insights while monitoring sector-specific trends and fostering innovation in critical industries, which can further drive sustainable trade growth. Combining regression methods for panel data analysis, such as Pooled OLS, Random Effect Model, Fixed Effect Model, and Hausman Taylor, can provide comprehensive insights into Vietnam's trade dynamics (Adams & Balogun, 2020).

(V. M. H. Nguyen et al., 2023) investigate how FTAs and foreign direct investment (FDI) influence Vietnamese trade flows, focusing on agreements with the United States and Japan, which have notably expanded exports and imports. (Tran & Vo, 2022)examines the determinants of Vietnamese exports to the European Union (EU) market using a gravity model, analyzing factors such as GDP, population, infrastructure, trade openness, and distance. (Hong NGUYEN et al., 2021) Explores the impact of various FTAs on Vietnam's trade, noting that bilateral and regional agreements have increased trade flows, with bilateral deals showing a more significant effect. (Oanh, 2017) use a vector autoregressive (VAR) approach to study the impact of FTAs on Vietnam's agricultural exports, finding a positive and significant effect, especially for high-potential products. Similarly, (Wong et al., 2021) analyze the ASEAN-China Free Trade Agreement (ACFTA) using a gravity model, concluding that it has substantially boosted Vietnam's exports and imports to China. Lastly, (Hong NGUYEN et al., 2021) investigate the relationship between exchange rates and Vietnam's trade balance, employing panel data analysis and highlighting the significant impacts of exchange rate fluctuations, particularly on exports.

In the context of Vietnam's free trade agreements (FTAs), a substantial body of research analyzes various factors influencing international export and import relationships. Previous studies have shed light on the impacts of FTAs, exchange rates, and sector-specific trends. However, a notable gap exists in understanding the factors influencing international export and import relationships. To address this gap, it is imperative to conduct research that delves into the relationship between various factors influencing international export and import relationships. This critical analysis contributes to our understanding of poverty alleviation strategies. It offers pertinent insights for policymakers and academicians, informing future studies and policy decisions to foster sustainable development and economic growth in Vietnam.

Research Method

This paper investigates the impact of exchange rate fluctuations on Vietnam's trade balance post-global financial crisis. Using regression methods like Pooled OLS, Random

Effect Model, Fixed Effect Model, and Hausman Taylor, it analyzes factors affecting bilateral trade with Comprehensive Economic Partnership for East Asia nations. These factors include GDP, population, distance, exchange rates, national borders, and Free Trade Agreements. The dataset comprises observations from 16 CEPEA (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Vietnam, China, Japan, South Korea, India, Australia, and New Zealand) countries over 24 years reflecting the trade dynamics between Vietnam and its partners. Data on two-way trade, exchange rates, GDP, and population are sourced from the IMF and the World Bank, while the distance between countries is calculated from Hanoi to other CEPEA capitals. Additionally, a dummy variable tracks the signing of free trade agreements, enabling a comprehensive analysis of Vietnam's trade situation and policy impacts.

Table 1 Operational Variable

Variable Abbrev.	Definition of Variable	Source	Unit of Measurement
GDP	Gross Domestic Product	World Bank	USD
Population	Total Population	World Bank	Number of People
Distance	Distance between Vietnam and Partners	Calculated	Kilometers
Exchange Rate of Partner Countries	Average Annual Exchange Rate of Partner Countries against USD	IMF	Exchange Rate
Exchange Rate of Vietnam	Average Annual Exchange Rate of Vietnam against USD	IMF	Exchange Rate
FTA	Free Trade Agreement Status	Government Data	Binary (0 or 1)
Border	Border Proximity	Government Data	Binary (0 or 1)

One of the research methods that many economists have applied to analyze two-way trade between countries is the gravity model. This model tests the trade between Vietnam and the Comprehensive Economic Partnership for East Asia.

The gravity model is based on the principle of Newton's law of gravitation. The gravitational force exists between the two objects, followed by their masses, as shown in the formula $F_{ij}=G.\frac{M_iM_j}{D_{ij}^2}$

F_{ij} is the gravitational force between two objects, D_{ij} is the distance, M_i, M_j is the mass of two objects, and G is the gravitational constant.

The theory of gravity was first applied in international trade by Jan Tinbergen in 1962, and many economists applied this theory to analyze the flow of bilateral trade between countries. According to (Krugman, 1979), the standard gravitational model is used as follows: $T_{ij}=A.\frac{Y_iY_j}{D_{ij}}$

Where A is constant, T_{ij} is the total trade flow from country I to country j, Y_i and Y_j represent the size of the economy of nation I and nation j (are usually gross national income (GNP) or gross domestic product (GDP), and D_{ij} is the distance between country I and country j.

The basic gravity model is expressed as logarithms:
$LnT_{ij} = \alpha+\beta_1.LnY_{ij}+\beta_2.LnD_{ij}+\sum_{k=1}^{k}\gamma_k z_{ijkt}+\varepsilon$

Where T_{ij} is trade flow, Y_{ij} is the GDP of countries i and j, D_{ij} is the distance between country i and country j, and z_k is a dummy showing the two countries of the same language, border, and continent are colonies of each other, signed FTA, and are invalid numbers.

(Ball & Linnemann, 1967; Bergstrand, 1985; Deardorff, 2011; Eaton & Kortum, 1997) Approached and demonstrated that the weight model derives from the H-O theory in the absence of factors affecting the trade.

In conjunction with the weight model developed by (Schnatz, 2009) as well as other scholars, the writer constructed a weight model for the analysis of trade relations between Vietnam and the other countries in the Comprehensive Economic Partnership for East Asia as follows:

Export patterns (1)
$LnTex_{ijt} = \alpha+\beta_1.LnY_{ijt}+\beta_2.LnP_{ijt}+\beta_3.LnD_{ij}+\beta_4.LnEx_{it}+\beta_5LnEx_{jt}.+\beta_6.border+\beta_7FTA+\varepsilon$

Import patterns (2)
$LnTex_{ijt} = \alpha+\beta_1.LnY_{ijt}+\beta_2.LnP_{ijt}+\beta_3.LnD_{ij}+\beta_4.LnEx_{it}+\beta_5LnEx_{jt}.+\beta_6.border+\beta_7FTA+\varepsilon$

Where T_{ij}: Two-way trade of Vietnam (i) and partner country (j) at the time (t); Tex_{ij}: Export turnover of Vietnam (i) and partner country (j) at the time (t); Tim_{ij}: Import turnover of Vietnam (i) and partner country (j) at the time (t); Y_{ijt}: Total GDP of Vietnam (i) and partner country (j) at the time (t); P_{ijt}: The total population of Vietnam (i) and partner country (j) at the time (t); D_{ij}: The distance between the capital city of Vietnam (i) and the capital of the partner country (j; Ex_{it} and Ex_{jt}: The average annual exchange rate at the time (t) for Vietnam dong (i) and the partner country currency (j) against the US dollar; Border: The counterfeit, the countries bordering Vietnam: Laos, Cambodia, China, border equals 1, the remaining countries are equal to 0; and FTA: Dummy, FTA = 0 if FTA is not signed between Vietnam and that country, one means FTA signed.

The dependent variable pertains to trade and can represent total trade, export, or import turnover. Total trade reflects the overall value of goods and services exchanged between countries, while export turnover measures the value of goods sold to other nations. Import turnover quantifies the value of goods purchased from foreign sources. These metrics offer insights into a country's trade activity, economic competitiveness, and balance position. The explanatory variables analyzed in this study encompass key aspects influencing bilateral trade between Vietnam and the Comprehensive Economic Partnership for East Asia countries. Total GDP reflects nations' economic capacity and market size, with a positive coefficient expected to drive increased trade volumes. Population size impacts production and consumption, potentially fostering trade growth depending on employment policies and product specialization. Geographic distance, typically yielding a negative coefficient, influences trade costs and market dynamics. Exchange rates play a pivotal role in trade flows, while FTA dummy variables signify the impact of trade integration. Proximity, represented by border variables, fosters favorable trade exchanges, while FTAs reduce trade barriers, enhancing import and export activities.

There are three primary models for estimating panel data: pooled ordinary least squares (pooled OLS), random effect model (REM), and fixed effect model (FEM). Pooled OLS treats time and space as the same, which makes it less accurate for models where variables vary across countries and time, such as Vietnam's trade relations. FEM and REM address the time and space elements, with the Hausman test commonly used to choose between them. While the fixed effect model (FEM) eliminates variables such as distance and boundaries that do not change over time, the random effect model (REM) does not account for unobservable correlations between variables and errors. Hausman and Taylor's approach addresses this by indicating endogenous and exogenous variables. They consider variables such as gross domestic product (GDP) and exchange rates endogenous, while variables such as distance and population are exogenous. Free Trade Agreements are considered exogenous for simplicity. Adjusting these variables overcomes errors in both the FEM and REM, providing an optimal method for estimating the weight model.

Result and Discussion

The results of the research will begin with a descriptive analysis. The descriptive statistics will reveal several noteworthy features of Vietnam's trade landscape. While Vietnam's GDP mean of 18.364 is relatively close to the average GDP of its partner countries' mean of 18.264, there is a notable variation in the population mean of partner countries' mean of 16.841 and distance mean of 8.723. Export-import quantities mean 8.988 exhibit a broad range, suggesting fluctuations in demand. The exchange rate mean of 3.563 also displays considerable variation, potentially impacting trade costs. The data also indicate considerable variation in the 3.563, which may impact trade costs. The data on FTAs and borders indicate the presence or absence of these factors for each partner country. These initial observations provide a foundation for further analysis using regression models to explore how these variables influence Vietnam's overall export performance.

Table 2 Descriptive Analysis

Variable	Description	Mean	Standard Deviation (SD)	Minimum	Maximum
EXIM	Export-Import Quantity	8.988	2.211	-216	13.979
GDP	Vietnam's GDP	18.364	691	17.255	19.318
GDPi	Partner Country GDP	18.264	2.252	12.994	23.746
POPi	Partner Country Population	16.841	1.636	12.716	21.055
Dist	Distance to Partner Country	8.723	705	6.766	9.657
ER	Exchange Rate	3.563	2.851	-607	10.618
FTA	Free Trade Agreement with Vietnam (Yes/No)	*	*	0	1
Border	Shares a Border with Vietnam (Yes/No)	*	*	0	1

The results of the Hausman test indicate a significant difference between the non-systematic regression coefficients. This is evidenced by a chi-square statistic of 66.42 with a p-value of 0.0000, which rejects the null hypothesis (Ho) that there is no difference between the coefficients estimated by the fixed effect model (FEM) and the random effect model (REM). Consequently, the most appropriate models for estimation are the fixed effect model (FEM) and the Hausman-Taylor (HT) model. This indicates that the panel data analysis should use the fixed effect model and the Hausman-Taylor regression approach to obtain more accurate and consistent estimates.

Table 3 Pooled OLS, FEM, REM, and HT regression results of the exported model

Dependent variable: Total export turnover				
Independent variables	**Pooled OLS**	**FEM**	**REM**	**HT**
GDP	1,5594 (17,72)*	0,4608 (2,68)*	1,1827 (8,14)*	0,5503 (3,27)*
Population	-0,8874 (-7,38)*	12,4842 (6,66)*	-0,1429 (-0,38)	10,5144 (6,11)*
Distance	-0,5139 (-3,18)*	----	-0.3526 (-0,72)	-0,4571 (-0,10)
Exchange Rate of Partner Countries	0,0221 (0,70)	-0,0435 (-0,46)	0,0570 (0,74)	-0,0367 (-0,39)
Exchange Rate of Vietnam	1,2615 (2,77)*	0,6518 (1,30)	2,6980 (7,08)*	1,0247 (2,14)**
FTA	0,8892 (3,69)*	0,1747 (1,07)	0,3619 (2,09)**	0,2106 (1,30)
Border	1,0771 (4,40)*	----	0,8789 (0,99)	-3,2062 (-0,38)
constant	-13,9783 (-3,51)*	- 235.5788 (-7,90)*	- 33,1070 (-4,91)*	-199,9498 (-4,44)*
R-square	0,6617	0,0593	0,6127	

(*) Significant at 1%; (**) Significant at 5%; (***); Significant at 10%

The results of the Hausman test with the null hypothesis (Ho) indicate no difference between the non-systematic regression coefficients. The chi-squared statistic value is 20.46 with Prob>chi2 = 0.0010. Therefore, it leads to the conclusion that the Fixed Effect Model (FEM) and Hausman-Taylor (HT) are the most appropriate models for the import model. This indicates that, in the context of the import model, the Fixed Effect Model (FEM) and Hausman-Taylor (HT) are the more appropriate models for panel regression analysis.

Table 4 Pooled OLS, FEM, REM and HT regression results of the impotred model

Dependent variable: Total import turnover				
Independent variables	**Pooled OLS**	**FEM**	**REM**	**HT**
GDP	1,4032	0,8819	1,2253	0,9795
	(16,35)*	(5,55)*	(9,17)*	(6,49)*
Population	-0,6013	6,2112	-0,0017	4,0662
	(-5,15)*	(3,59)*	(-0,00)	(2,95)*
Distance	-0,6437	----	-0,7480	-0,6564
	(0,1576)*		(-1,33)	(-0,27)
Exchange Rate of	0,0010	-0,2768	-0,1454	-0,2678
Partner Countries	(0,03)	(-3,16)*	(-1,92)***	(-3,07)*
Exchange Rate of	2,4318	2,3541	3,3276	2,7578
Vietnam	(5,50)*	(5,11)*	(9,68)*	(6,66)*
FTA	0,3153	-0,0231	0,0614	0,0172
	(1,34)	(-0,15)	(0,40)	(0,12)
Border	0,1690	----	0,4458	-0,7274
	(0,71)		(0,43)	(-0,17)
constant	-24,5682	-142,8316	-38,5603	-103,5746
	(-6,35)*	(-5,19)*	(-5,08)*	(-3,61)*
R-square	0,6699	0,1610	0,6127	

(*) Significant at 1%; (**) Significant at 5%; (***); Significant at 10%

The regression analysis reveals significant findings regarding the impact of GDP, population, and the exchange rate of the Vietnamese dong against the US dollar on both export and import activities. Precisely, a 1% increase in GDP corresponds to a 0.55% increase in exports and a 0.98% increase in imports, resulting in a total trade increase of 0.87%. Notably, economic growth appears to exert a more pronounced effect on imports than exports, indicative of a time lag between economic expansion and enhanced export capacity. This observation aligns with recent research by(Luo & Qu, 2023; and Shinwari et al., 2023), which emphasizes the presence of a time lag between economic growth and the strengthening of export capabilities. The study's findings are consistent with the actual trade dynamics between Vietnam and the Comprehensive Economic Partnership for East Asia during the study period.

A positive influence of population dynamics on exports and imports is observed, mirroring the overall trade trend (Haini et al., 2023; Luo & Qu, 2023; Vijil et al., 2024). However, this influence is more potent on exports. This phenomenon can be attributed to population growth, which drives domestic production, fostering trade surpluses and boosting exports to other countries. Vietnam's export structure, primarily comprised of labor-intensive products, further amplifies this effect. In contrast, imports primarily consist of materials

and machinery sourced from the Comprehensive Economic Partnership for East Asia, leveraging Vietnam's labor advantage. This finding is corroborated by recent research conducted by(Dimnwobi et al., 2021; Rahman et al., 2020), underscoring the role of population growth in driving export diversification, particularly in labor-intensive product categories. This aligns with the observed trade dynamics in Vietnam.

The exchange rate of a partner country relative to the US dollar significantly influences import activity. This indicates that exchange rate fluctuations impact the partner country's export structure. When exchange rate fluctuations are unfavorable, countries may curtail exports to Vietnam and other destinations. This finding is consistent with recent research conducted by(Dell'Ariccia, 1998; Hong NGUYEN et al., 2021), which emphasizes the pivotal role of exchange rates in firms' import decisions. The research underscores the ability of exchange rates to constrain import activities.

The import-export model generally indicates that the Free Trade Agreement has no discernible impact on these two activities. However, to gain further insights into the effects of the ASEAN Free Trade Agreement (AFTA) and trade liberalization agreements between ASEAN and expanded countries, the authors excluded the Free Trade Agreement variable from the export and import models. Instead, they introduced two dummy variables: "ASEAN" and "other agreements." The "ASEAN" variable is set to zero for non-ASEAN countries when the ASEAN Free Trade Agreement (AFTA) between Vietnam and other ASEAN countries is inactive, shifting to one when AFTA becomes effective. The "other agreements" variable remains zero for ASEAN countries and during periods when ASEAN lacks free trade agreements (FTAs) with expanded countries, switching to one when such agreements are active. This finding is consistent with recent studies by (Duong et al., 2021 Ennadifi et al., 2023 Geda & Yimer, 2023 Jagdambe & Kannan, 2020). These studies offer valuable insights into the impacts of Free Trade Agreements (FTAs) on Vietnam's trade dynamics, providing a framework for comparison with the present study's methodology.

The regression analysis indicates that the signing of Free Trade Agreements (FTAs) with ASEAN countries does not significantly affect Vietnam's exports. However, the study reveals a positive impact on Vietnam's exports to countries that have signed FTAs with Vietnam. Notably, the data demonstrate a notable increase in export growth rates following the expansion of FTAs with these countries. For example, exports to countries such as India, New Zealand, and Korea have accelerated growth rates compared to previous years. This indicates that the expansion of FTAs with these partner countries has driven Vietnam's export growth. These findings underscore the importance of bilateral trade agreements in enhancing export opportunities and market access for Vietnamese products. They also highlight the potential benefits of diversifying trade partnerships and expanding the scope of FTAs to foster greater trade engagement and economic prosperity for Vietnam.

Table 5 Hausman Talor (HT) regression results of export and import model with dummy variables

Dependent variable: Total exports and total imports		
Independent variables	**Export model**	**Import model**
GDP	0,4621 (2,65)*	0,9880 (6,36)*
Population	11,8008 (6,43)*	3,9654 (2,76)*
Distance	-0,7347 (-0,14)	-0,7166 (-0,29)
Exchange Rate of Partner Countries	0,0179 (0,18)	-0,2747 (-2,97)*
Exchange Rate of Vietnam	0,8227 (1,69)***	2,7707 (6,63)*
ASIAN	-0,0075 (-0,04)	0,0479 (0,25)
Expanded FTA (with non-ASEAN countries)	0,4173 (2,02)**	-0,0144 (-0,08)
Border	-4,1531 (-0,45)	-0,7189 (-0,16)
constant	-217,8160 (-4,43)*	-101,5389 (-3,45)*

In contrast, for imports, the Free Trade Agreement does not affect entry into ASEAN or the enlarged countries. Indeed, the truth is that comprehensive economic partnerships for East Asia play an essential role in the supply side, so the existence of a Free Trade Agreement does not affect imports for domestic production (Duong et al., 2021; Ennadifi et al., 2023; Geda & Yimer, 2023; Jagdambe & Kannan, 2020). On the other hand, Vietnam imports mainly from the Comprehensive Economic Partnership for East Asia ancillary products and materials that are state-subsidized import tax, so the impact of the Free Trade Agreement on this item is negligible. In addition, most of the Free Trade Agreements with Comprehensive Economic Partnership for East Asia have openness levels that are not yet comprehensive, and the level of domestic protection remains high through taxation of imported consumer products. It can, therefore, be argued that the Free Trade Agreement does not affect Vietnam's imports from the Comprehensive Economic Partnership for East Asia during the study period.

Conclusion

The agreement above significantly influences trade between Vietnam and other member nations of the Comprehensive Economic Partnership for East Asia (CEPEA). Both GDP growth and population growth influence this impact. Concerning export and import activities, the impact of economic growth on imports is more pronounced than on exports. Additionally, in CEPEA countries, the gap does not affect trade between Vietnam and other intra-ASEAN countries. Furthermore, trade between Vietnam and neighboring countries does not align with the expected outcomes predicted by the model.

Moreover, fluctuations in the exchange rate of the Vietnamese dong against the US dollar influence export and import activities. The AFTA agreement does not affect export and import activities. At the same time, the signing of Free Trade Agreements between ASEAN and other enlarged countries has positively impacted Vietnam's exports. Imports are not affected by Free Trade Agreements. As a matter of course, the signing of Free Trade Agreements with the Comprehensive Economic Partnership for East Asia did not produce the expected results. Consequently, relevant ministries and agencies must assume responsibility for assisting enterprises in communicating, guiding, and assisting enterprises in producing the current Free Trade Agreement standards. In addition, businesses should seek accurate and complete information about Free Trade Agreements and consult with government agencies to take advantage of the opportunities provided by Free Trade Agreements.

This study is subject to certain limitations, primarily due to its scope and the methodology employed in panel data analysis. Additionally, it overlooks crucial factors like non-tariff barriers. Future research endeavors should prioritize refining these aspects to address these shortcomings and bolster the credibility of its findings. Specifically, future studies could examine the reasons behind the underwhelming outcomes of CEPEA agreements, investigate the mechanisms linking economic growth and population dynamics to trade, evaluate the effectiveness of Vietnam's FTAs, and explore the complexities of non-tariff barriers and technological advancements.

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