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Determinants of Vietnam's Exports to RCEP Countries: A Gravity Model Analysis

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Abstract:
This paper investigates the determinants of Vietnam's exports to members of the Regional Comprehensive Economic Partnership (RCEP) Free Trade Agreement, using a panel data set from 14 countries over the period 2005-2018. The analysis is based on the gravity model with different explanatory variables that potentially affect the export performance of Vietnam, in addition to standard gravity regressors. The study employs different estimation techniques and formal tests to decide which model is the most appropriate for analysis. Based on the outcome of the F-test, Breusch-Pagan's Lagrange Multiplier test, and Hausman test, it is clear that the Random Effect Model is favored over Pooled Ordinary Least Square and Fixed Effect Model. The empirical results of the study reveal that Vietnam's exports to RCEP markets might be positively affected by the GDP of economies, control corruption ability of the importing countries, and common border sharing. The distance between countries is reported to restrain the export performance. These findings are quite consistent with existing literature on the gravity model of bilateral trade. Against the expectation, the effect of exchange rate on exports is negative; the coefficients of Vietnam's integration to Free Trade Agreements and corruption control ability are not statistically significant.

Keywords: Exports, gravity model, panel data, Vietnam, RCEP

1. Introduction

International trade plays an increasingly important role in the economic growth and development of nations. International trade promotes economic growth through the specialization of production and the division of international labor, economies of scale, and the efficient allocation of resources based on comparative advantage(Wei, Wang, & Liu, 2010). By connecting countries' markets, international trade – both in terms of exports and imports – provides an important channel for the spillover of knowledge and technology among trading partners.

Over the past years, Vietnam has displayed remarkable achievements in economic development by accelerating its integration into the world economy, and increasing participation in international and regional trade agreements. One of them is the Regional Comprehensive Economic Partnership (RCEP). The recently-signed RCEP Agreement includes 10 ASEAN member countries and five countries to which ASEAN has signed Free Trade Agreement: Australia, China, Japan, Korea, and New Zealand. The agreement that comes into effect will create a market of 2.2 billion consumers, account for about 30% of global GDP, and become one of the largest free trade areas in the world. With RCEP, Vietnamese enterprises will participate in the regional production and value chain, benefiting from transaction costs cuts and a more friendly business environment through the harmonization of existing regulations. Signing FTAs in general and RCEP, in particular, is a great opportunity to promote bilateral trade relations between Vietnam and its partners. Bilateral trade development is the foundation to strengthen deep-seated economic cooperation among member countries.

Over the recent decades, RCEP countries have continuously been the main export markets of Vietnam that share approximately 50% of Vietnam's total export value. However, the proportion of exports to these markets compared to Vietnam's total exports has tended to decline in the past few years(Figure 1).
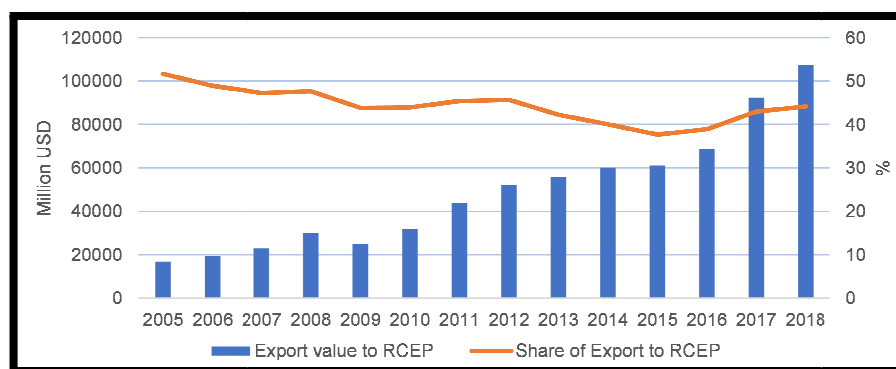
Figure 1: Vietnam's Exports to RCEP Markets 2005-2018
Source: Trademap ITC

In the context of economic recovery in the region and the world after the Covid-19 pandemic, further promoting bilateral trade relations with RCEP member countries on a new level is very necessary. This fact requires Vietnam to properly evaluate the factors affecting exports to trading partners in the new context, as a basis for making reasonable policies to achieve development goals and integrate into the world economy.

This study aims at investigating the factors that affect Vietnam's exports to RCEP markets by giving empirical evidence of economic effects of market size, geographical distance, exchange rate, border, free trade agreements, using a gravity model approach. The rest of the paper is structured as follows: Section 2 gives an overview of existing literature in the field of study; Section 3 presents the methodology and data description; Section 4 analyses the empirical results and proposes some discussion; and the conclusion is drawn in Section 5.

2. Literature Review

In the trend of increasingly strong globalization, the process of international economic integration of countries has become an important policy issue. Accordingly, studies on regional economic integration and bilateral trade relations of countries have become the subject of attention not only to scientists, but also policymakers. For quantitative analysis, the model most widely used in bilateral trade research is the gravity model. First used by Tinbergen (1962), the gravity model is often employed in the analysis of trade flowsand scales. Although it was initially suspected that this model was not built on any basic economic theory, several studies gave strong theoretical foundations for the gravity model. Helpman (1987) pointed out that the gravity model could be deduced from the imperfect competition model with increasing economic returns to scale while Bergstr and (1985) gave evidence that the gravity model was likely derived from a general equilibrium model with certain assumptions. Deardorff (1998) supported the notion that the gravity model is linked to Heckscher-Ohlin theory. Various studies using gravity model have provided experimental results that are both statistically and economically significant and could explain almost all trade flows (Rose, 2005). The studies examine the impact of international economic integration, national border issues, currency unions, languages, cultures, institutions, other measures of trade costs, etc., on the flow of bilateral trade are also often approached from the gravity model (Kabir, Salim, & Al-Mawali, 2017). Baier, Bergstrand, and Feng (2014) even argued that the gravity model dominated studies in the international trade field.

Wei et al. (2010),in a study on bilateral trade among 19 OECD countries during 1980-1998, concluded that the size of economies and the geographical distance between countries were still important factors that affected trade flows, reinforcing the value of the gravity model in international trade-related estimates and tests. In addition, based on new theories of trade, foreign direct investment (FDI), and economic growth, this study has also shown the importance of FDI, research activities R&D, and innovation to bilateral trade. A study by Martinez-Zarzoso and Nowak-Lehmann (2003) on the flow of trade between EU and MERCOSUR indicated that exchange rate is an important factor affecting bilateral trade, in addition to income and infrastructure of economies, while Foster, Poeschl, and Stehrer (2011) pointed out that preferential trade agreements would have a positive effect on trade and that this effect would be proportional to the size of economies.

In research of factors influencing trade between Africa and China, Guan (2020) estimated the gravity model and concluded the GDP of an African country and China has a negative impact on exports and a positive impact on imports between it and China. The model estimates also help identify other factors affecting the Africa-China bilateral trade, namely: population, real exchange rate, economic recessions, and regional trade agreements. Concerning the trade relation between China and ASEAN, Xuan, Thi, Thuy, Quang, and Van (2020) also employed the gravity model and pointed out that, in terms of aggregate trade, China's economic scale promotes both export and import sectors between China and ASEAN countries. Positive effects were also found for the coefficients of common language and border sharing.

Linders, Slangen, de Groot, and Beugelsdijk (2005)studied the intangible costs of international trade by extending the basic gravity model with measures of cultural distance, institutional quality, and institutional gap. By analyzing trade flows between 92 countries, this study found that the institutional gap between countries hurts bilateral trade while the cultural gap acts as a driving force. The institutional quality of the exporting and importing countries, when separately estimated, was found to boost bilateral trade between the two countries.

The gravity model has also been used commonly in studies on the international trade pattern of Vietnam. Do (2006)estimated the factors affecting bilateral trade between Vietnam and 23 European countries using a panel data set

from 1993 to 2004. The main findings of the study showed that the market size and real exchange rates between Vietnam and its trading partners played important roles in bilateral trade. In contrast, the study found no evidence of the trade effects of geographical distance and country history. Nho and Huong (2014)also conducted research to examine the determinants of the trade in services between Vietnam and the European Union countries in the period 2002-2011. Estimated results from the gravity model indicated that the flow of trade in services between Vietnam and the European partner countries was related to the gap of GDP per capita between the two countries, the real bilateral exchange rate, the colonial relation and membership of the Council of Mutual Economic Assistance.

Hoan (2020) examined the determinants of Vietnam's exports to the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) by applying the gravity model to a panel data set over the period 2003-2016. In addition to the standard variables of the gravity model, this study has added to the model a variety of factors: exchange rate, bilateral tariffs, the income gap between the two countries, and FDI. The estimated results showed that Vietnam's exports to the CPTPP were strongly influenced by three factors: economic size, exchange rate, and income gap. Concerning the impact of tariffs on Vietnam's trade in CPTPP, Le (2021) indicated that tariff reductions promote the export and import turnover of Vietnam. The trade openness of countries and the real effective exchange rate between Vietnam's and CPTPP countries' currencies also have positive impacts on Vietnam's trade. Instead of aggregate trade, H. M. Nguyen, Quan, Le, and Tran (2020)focused on the trade of goods within the same industry between Vietnam and countries in CPTPP. It was concluded that Vietnam's intra-industry trade is positively associated with the GDP of countries and negatively correlated with the trade openness, dissimilarity in per capita income, and geographical distance between trading partners.

Regarding trade flows between Vietnam and RCEP member countries, T. D. Nguyen (2018) examined the effect of trade agreements on Vietnam's exports to RCEP markets using a gravity model approach. It was reported that the effect of trade liberalization proxied by tariff preferences on exports of Vietnam varied across industries. While the exports of garments and footwear products were positively influenced by the tariff preference, there was no evidence of a similar effect in the exports of the agriculture sector.

In Vietnam, while there have been a few studies that examine the determinants of exports to countries and regions all over the world, it is hard to find relating literature in the case of Vietnam's exports to RCEP,despite the important contribution of this regional trade area to international trade and world economy. Therefore, there is a major research gap to fill by studying the factors affecting Vietnam's exports to RCEP markets.

3. Methodology

3.1. Model Specification

To quantitatively analyze the factors affecting Vietnam's exports to RCEPcountries, the author uses the gravity model. In its basic form, the formula for estimating export turnover from country *i* to country *j*is shown as follows:

$$E_{ij} = \alpha Y_i Y_j / D_{ij} \tag{1}$$

where α is constant; E_{ij} is export turnover from country *i* to country *j*; Y_i isthe GDP of country*i*, Y_j isthe GDP of country*j*, and D_{ij} is the distance between the two countries.Accordingly, given that other factors are the same, exports from one country to another will be proportional to the product of the GDP of the two countries, and inversely proportional to the geographical distance between them.

In some cases, the gravity model is estimated more generally using the following formula:

$$E_{ij} = \alpha_0 Y_i^{\alpha_1} Y_j^{\alpha_2} D_{ij}^{\alpha_3} \tag{2}$$

This equation shows that there are three determinants of exports between two countries: the GDP of two countries and the distance between them without specifying that trade is proportional to the GDP output and inversely proportional to the distance. Instead, α_1, α_2, α_3 are selected to match the actual data.

In empirical studies, the gravity model is often expressed in the form of logarithms, written as follows:

$$\ln E_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + \varepsilon_{ij} \tag{3}$$

To estimate the determinants of Vietnam's exports to RCEP trading partners, this study uses the gravity model on panel data, which has the following form:

$$\ln EXP_{vit} = \beta_0 + \beta_1 \ln GDP_{vt} + \beta_2 \ln GDP_{it} + \beta_3 \ln DIS_{ivt} + \beta_4 \ln EXC_{ivt} \\ + \beta_5 COR_{vt} + \beta_6 COR_{it} + \beta_7 FTA_{ivt} + \beta_8 BOR_{ivt} + \varepsilon_{it} \tag{4}$$

in which EXP_{vit} is Vietnam's export turnover to country *i* in year *t,* expressed in millions of US dollars; GDP_{vt} and GDP_{it} are Gross Domestic Product of Vietnam and the importing country in year *t,* measured in millions of US dollars; DIS_{ivt} measures the geographical distance in kilometers between the capital city of Vietnam and country *i* in year *t*; EXC_{ivt} captures the cross exchange rate between Vietnam Dong and the currency of country *I* in year *t*; COR_{vt} and COR_{it} are corruption control index, which varies from -2.5 (very bad governance) to +2.5 (very good governance), of Vietnam and country *i* in year *t*; FTA_{ivt} is a dummy variable which takes the value of 1 if both Vietnam and country *i* are members of the same FTA in year *t* and takes the value of 0 otherwise; BOR_{ivt} is also a dummy variable that captures the common border effect, which equals 1 if Vietnam and country *i* share a common borderline on land and 0 otherwise; and ε_{it} is the error term. The summary of independent variables and expected signs is presented in Table 1.

Variables	Description	Expected Signs
GDP$_{vt}$	Gross Domestic Product of Vietnam in year t	+
GDP$_{it}$	Gross Domestic Product of country iin year t	+
DIS$_{ivt}$	Distance between Vietnam and country i	-
EXC$_{ivt}$	Cross exchange rate between Vietnam Dong and currency of country i in year t	+
COR$_{vt}$	Corruption control index of Vietnam in year t	+
COR$_{it}$	Corruption control index of country i in year t	+
FTA$_{ivt}$	Dummy variable of integration effect	+
BOR$_{ivt}$	Dummy variable of border effect	+

Table 1: The Summary of Variables and Expected Signs

With panel data, this study uses three estimators: pooled Ordinary Least Square (OLS), Fixed Effect Model (FEM), and Random Effect Model (REM). To choose between the OLS and FEM, the F-test is conducted. If the null hypothesis of the F-test (*H₀*: all fixed effects are jointly zero) is rejected, the fixed-effect model would be better than the pooled OLS. The selection between OLS and REM is based on Breusch-Pagan's Lagrange Multiplier - LM test. If the null hypothesis of the LM test (*H₀*: all individual-specific variances are jointly zero) is rejected, there have been unaccounted random effects in the pooled OLS estimator residuals, hence the random effect model would be preferred over OLS. In case the null hypotheses of both F-test and LM test are rejected, the Hausman test should be employed to decide whether the FEM or REM would be more appropriate. The rejection of the null hypothesis implies that the FEM is better; otherwise, REM would be the most suitable model for the research data.

3.2. Data

To examine the determinants of Vietnam's exports to RCEP countries, this study employs panel data that involves 14 trading partners over the period 2005-2018. Data are obtained from various reliable sources. Data on Vietnam's exports are collected from the database of the international trade center (Trademap–ITC). Data on the GDP of Vietnam and importing countries are sourced from World Development Indicators–WDI. Data on distances between countries are taken from the website TopoNavi (http://vn.toponavi.com). The cross-exchange rates between Vietnam Dong and the currency of importing country is calculated based on the exchange rate of each currency to US dollar that is collected from International Financial Statistics–IFS database. The participation of countries in FTAs is obtained from WTO. Data on corruption control index is retrieved from Worldwide Governance Indicators.

4. Results and Discussion

Based on the result of F-test, Breusch-Pagan's Lagrange Multiplier test, and Hausman test, Random Effect Model is the most appropriate model to estimate the determinants of Vietnam's exports to RCEP markets in the period of study. Therefore, the interpretation and discussion of the results will focus on the output of Random Effect Model. The result is displayed in Table2.

Variable	OLS		FEM		REM	
	Coefficient	*p*-value	Coefficient	*p*-value	Coefficient	*p*-value
c	-24.105**	0.0170	-22.882***	0.0002	-25.155***	0.0002
$lnGDP_{vt}$	0.627*	0.0925	1.612***	0.0000	1.057***	0.0000
$lnGDP_{it}$	0.998***	0.0000	-0.209	0.4148	0.719***	0.0000
$lnEXC_{ivt}$	-0.122***	0.0007	-0.028	0.7524	-0.157***	0.0036
$lnCOR_{vt}$	-0.917	0.5477	-1.175	0.1777	-0.976	0.2619
$lnCOR_{it}$	0.450***	0.0006	1.707***	0.0000	0.750***	0.0007
$lnBOR_{ivt}$	1.725***	0.0000			1.263**	0.0441
FTA_{ivt}	1.254***	0.0011			0.038	0.8750
$lnDIS_{ivt}$	-0.723***	0.0008			-0.910*	0.0464
R^2	0.7131		0.9122		0.5489	
Adjusted R^2	0.7009		0.9033		0.5297	
F-test	0.0000					
BP's LM test	0.0000					
Hausman test	1.0000					
***: statistical significant at 1% **: statistical significant at 5% *: statistical significant at 10%						

Table 2: Regression Results

From the estimated results, it can be seen that most of the variables in the model perform well indicating that Vietnam's export flows to RCEP countries could be effectively explained by the gravity model.

The size of economies proxied by variables GDP_{vt} and GDP_{it} are found to have positive effects on Vietnam's exports. Specifically, for every 1% increase in the GDP of Vietnam, exports to RCEP region increases by 1.06% while a 1% increase in GDP of the importing country induces an increase of about 0.7% in the export flow of Vietnam. These coefficients are highly statistically significant at 1 percent level. The positive effect of GDP is quite consistent with the theoretical background. From the supply side, an increase in the GDP of Vietnam means that the production capacity of the economy increases, thus potentially increasing the exportability. Meanwhile, the growth of importing country's GDP implies an increase in the demand for goods that boosts the import demand from Vietnam.

The estimated coefficient of variable DIS_{ivt} that measures the geographical distance between the capital cities of two countries is also correctly signed and in line with expectation. It is conventionally stated in the gravity model that the shorter the distance between exporting and importing country, the better it is likely to attract each other. As seen from the result of this study, an increase of 1 percent in the distance would likely result in a decrease of nearly 1% in export value. The distance coefficient is at 5 percent level of significance.

The ability to control corruption in the importing country denoted by variable COR_{it} is reported to be positively associated with Vietnam's export performance. In more detail, when the control corruption index of the trading partner goes up by 1 point, the export turnover from Vietnam to this country tends to increase by 0.75%. While the coefficient of corruption control index in importing countries is economically and statistically significant, the corruption control index of Vietnam is economically and statistically insignificant.

The effect of exchange rate is surprisingly inconsistent with expectation. In theory, when Vietnam Dong depreciates, it will encourage Vietnam's exports. However, in this study, an increase in the exchange rate implies a depreciation of Vietnamese currency has the effect of reducing exports. It is, therefore, necessary to have further studies to go deep into the impact of exchange rates on export performance.

Concerning dummy variables, while the variable FTA_{ivt} is statistically insignificant, the border effect captured by the variable BOR_{ivt} is significant and consistent with the expectation that the sharing of borders would promote exports between countries. Specifically, the magnitude of the coefficient of border effect is quite large that could result in an increase of 1.26% in the export value of Vietnam to the country with a common border.

5. Conclusion

In an attempt to investigate the determinants of Vietnam's exports to RCEP countries, this paper employs the widely-used gravity model of trade flows with panel data from 14 trading partners over the period 2005-2018. The paper uses several estimation techniques as well as formal tests to choose the most appropriate model for research data. Overall, from the findings of the study, it could be concluded that the export flows from Vietnam to markets in the RCEP region are well explained by the gravity model and almost all the estimated coefficients for traditional variables are consistent with the results of previous studies. Accordingly, the size of the economies is found to stimulate the exports while the distance acts as a restriction. The institution quality proxied by corruption control index of the importing countries and common border effect is reported to positively impact the export performance. The exchange rate, however, is not as expected since the estimate obtained for this coefficient represents a negative effect of Vietnamese currency devaluation on export performance. Therefore, further studies should be devoted to a better understanding of this determinant.

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