ASSESSING THE IMPACT OF FACTORS ON VIETNAM'S KEY SEAFOOD PRODUCT EXPORTS: A CASE STUDY OF THE EUROPEAN UNION MARKET

PhD. Nguyen Huu Cung* - PhD. Dang Trung Tuyen**
MSc. Nguyen Thi Hong* - Dang Phuong Linh****

Abstract: ***This paper aimed to determine the impact of factors on Vietnam's key seafood product exports to the European Union. A gravity model was employed to analyze the panel data of 27 EU member nations in the partnership with Vietnam during the period of ten years from 2011 to 2020. After study, the findings showed that the key seafood exports of Vietnam to its European partner countries are determined by GDP, the GDP per capita between Vietnam and EU countries, the population of EU countries, the distance, and the real effective exchange rates. Of which, the GDP per capita is the factor with the strongest impact, followed by the GDP of the member countries. The remaining factors also have an impact but with low coefficients (the highest is only 0.86). Based on the obtained results, the article has made two suggestions to further promote the export of these products to the EU market: Dominating and stabilizing a domestic market; Enhancing product quality to make Vietnamese seafood become a common to high-end product in the EU market to take advantage of the free trade agreement between Vietnam and the EU that has just taken effect.***

• Keywords: *EU, Gravity model, key seafood, seafood exports, Vietnam.*

JEL codes: D29, F14, F23, F62

Date of receipt: 29th Oct., 2024
Date of delivery revision: 10th Nov., 2024
Date of receipt revision: 12th Dec., 2024
Date of approval: 24th Jan., 2025
DOI: https://doi.org/10.71374/jfar.v25.i1.27

1. Literature review

The gravity model has long been regarded as the bedrock of international commerce. The concept was initially offered as a simple parallel between Newton's Law of Gravity and the variables influencing bilateral trade flows. The volume of commerce between countries i and j is thought to be directly related to economic size and inversely proportional to geographical distance (Timbergen, 1962).

$$T_{ij} = \propto \frac{Y_j Y_i}{D_{ij}}$$

In which,

T_{ij}: Trade turnover between two countries i and j

Y_i: The magnitude of the country's economy i

Y_j: The magnitude of the country's economy j

D_{ij}: Geographical distance between country i and j

Despite its practical effectiveness, the gravity model needed a theoretical underpinning. Linneman (1966) is said to be the first to establish a theoretical framework for the gravity model, demonstrating that the gravity model may be derived from the partial equilibrium model. Factors that demonstrate nation i's entire potential supply, country j's potential aggregate demand, and factors that obstruct the flow of commerce between countries explain trade flows between countries i and j. After that, the gravity model is obtained by balancing supply and demand. Subsequently, numerous scholars expanded on Linerman's concept and gave the comprehensive models that are now widely used.

The existing literature on the application of the gravity model to services trade is so far quite limited. Ngan Thi Pham, Tu Thanh Nguyen, and Phung Phi Tran Thi (2016) utilized a gravity model to identify and assess the effect of factors influencing Vietnamese seafood export turnover to the European and North American market. The data of 26 nations was collected from 2006 through 2015. After study, authors showed Vietnamese seafood exports to various markets were impacted by GDP of importing and exporting nations, population, and currency rates. The exchange rate is connected to exports, although geographical distance has the opposite impact. Otherwise, these nations' seafood import taxes will have little effect on Vietnam's seafood exports to the US and Europe.

** VNU School of Interdisciplinary Sciences and Arts*
*** VNU University of Economics and Business, Hanoi; Corresponding author: tuyendt@vnu.edu.vn*
**** East Asia University of Technology, Hanoi*

Mai Thi Cam Tu (2016) developed a gravity model that uses data from 2005 to 2014 to provide an overview of the present state of Vietnam-Japan seafood exports. The acquired findings revealed that the amount of seafood, investment capital in transportation and information storage, and per capita income have a positive effect (+) on the value of Vietnam-Japan seafood exports while the influence of seafood pricing, trade partnership agreements, and rates on that is negative. Nguyen Binh Duong (2014) and Vu Thanh Huong (2018) utilized the gravity model's estimated findings to calculate the elasticity coefficient, which represents the change in trade flows when tariffs are altered, and then anticipate the change in trade flows.

Huy Quang Nguyen, Huong Thi Lan Tran, Hoan Quang Truong, and Chung Van Dong (2020) used a gravity model to investigate the drivers of Vietnam's global seafood exports from 2000 to 2018 at the aggregate and specific levels of the fisheries industry. According to the estimation, the size of the Vietnamese economy and the economic levels of its importing partners affect Vietnam's seafood exports. The Association of Southeast Asian Nations, the European Union, and North America are stated to boost Vietnam's seafood exports on a global scale. At the sub-sector level, North America has a positive influence on Vietnam's seafood exports (fresh, chilled, or frozen), while having a cross-regional negative impact on crustacean exports, molluscs and aquatic invertebrates, and aquatic fish and invertebrates (prepared or preserved).

2. Methodology

2.1. Estimation model and research hypothesis

The study used the Vu Thanh Huong breed model (2018) to quantify the impact of factors influencing the growth scale of seafood exports to member nations. However, the study's model has been modified. In addition to upgrading the research data and increasing the sample size, the exchange rate variable is included in the study to examine the influence of the exchange rate on the export turnover of important seafood products in Vietnam. The following is the exact model:

$$\ln Exjit = \beta_0 + \beta_1 \ln GDP_{jt} + \beta_2 \ln GDP_{it} + \beta_3 \ln PGDP_{jt} + \beta_4 \ln D_{ji} + \beta_5 \ln R_{jit} + \beta_6 \ln TAR_{jit}$$

Where:

Ln: Hyperbolic logarithm

j: Trade partner countries

i: Vietnam

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$: Include individual regression coefficients of each factor in the model

Table 2: Variables and expected signs in the model

Variable	Variable explanation	Unit	Expectation sign	Author
GDP_{ji}	Gross domestic product of country (area) j and Vietnam	USD	+	Ekrem Erdem and Saban Nazlioglu (2014) Mohamed A. Elshehawy, Hongfang Shen, Rania A. Ahmed (2014) Vu Bach Diep, Nguyen Thi Phuong Thao, Ngo Hoai Thu (2018).
$PGDP_j$	Per capita income of the country (region)	USD	+	Paulo Camacho (2013) Nguyen Ngoc Quynh, Pham Hoang Linh, (2018).
D_{ji}	Distance between Vietnam and country (area) j	Kilometers	-	(Timbergen, 1962), M.Ebaidalla A.Abdalla (2015) Sotja G. Dlamini, Abdi-Khalil Edriss, Alexander R. Phiri, Micah B. Masuku (2016)
R_{ji}	Exchange rate (VND/EUR)	VND/EUR	+	Lanuza Díaz et al (2013) Huy Quynh Nguyen (2014) Luong Anh Thu, Sun Fang và Sham Sunder Kessani (2019)
TAR_{ji}	Average import tax of country (area) j on goods of Vietnam.	%	-	Murat Genç và David Law (2014) Vũ Thanh Hương (2018) Nguyen Thi Thu Thuong, Doan Thi Hong Thinh, Nguyen Tien Long, và Dinh Hong Linh (2021)

Source: Author's personal collection

2.2. Data

2.2.1. Selection of seafood products

The study uses the HS classification of the World Customs Organization to identify the main aquatic products of Vietnam. Under the HS system, aquatic products fall into two groups: HS03 (Fresh, chilled, and frozen products, fillets, whole) and HS16 (Processed or preserved aquatic products).

Table 3: Vietnam's major exported seafood products

No.	Types	Product Description	HS code
1	Pangasius	Fresh, chilled, and frozen, fillets, whole	030272, 030324, 030432, 030429, 030462
2	Tuna	Processing or preserving	160414
		Fresh, chilled, and frozen	030194, 030195, 030231, 030232, 030233, 030234, 030235, 030236, 030239, 030341, 030342, 030343, 030344, 030345, 030346, 030349, 030487
3	Shrimp	Processing or preserving	160520, 160521, 160529, 160530
		Fresh, chilled, and frozen	030611, 030612, 030613, 030615, 030616, 030617, 030619, 030621, 030622, 030625,030626, 030627, 030629, 030631
4	Molluscs	Processing or preserving	160551, 160552, 160553, 160554, 160555, 160556, 160557, 160558, 160559
		Fresh, chilled, and frozen	030721, 030722, 030729, 030771, 030772, 030779, 030741, 030742, 030743, 030749, 030751, 030752, 030759, 030791, 030792, 030799

Source: General Department of Customs.

2.2.2. Metrics for gravity model

The empirical study is evaluated using panel data from Vietnam and the European Union from 2011 to 2020. All of the numbers are taken from reliable sources, specifically:

- Data on seafood export turnover in USD are obtained from the United Nations trade statistics database (Comtrade), and the International Trade Center (ITC).

- The French Center for Prospects and International Information provides data on geographical distances in kilometers between nations (CEPII).

- Data on country import tax rates are derived from the WITS database and the WTO Centre.

- Exchange rate data is obtained from the International Monetary Fund (IMF).

Estimation methods for panel data can be of three types: pooled ordinary least squares (Pooled OLS), fixed effects models (FEM), and random effects models (REM). Each model has its own set of benefits and drawbacks. The Pool model is appropriate if each entity has no specific features since it offers a straightforward approach, providing the coefficients do not vary over time and cross units. For FEM models, the regression model may isolate the impacts of the independent effects that do not vary over time from the independent variables, allowing the true effects of the independent variables on the dependent variable to be estimated more correctly. However, FEM cannot estimate variables that do not change over time. Meanwhile, REM will be chosen if the entity's individual attributes are random and unrelated to the independent factors. The residuals of each entity will be considered as a new explanatory variable in REM, and they will be used to measure agents that do not change over time. As a result, the research will rely on the features of the model's data series to pick the right model.

3. Findings

The study employed the Breusch-Pagan test to pick between Pooled OLS and REM to estimate the model based on the features of the data series. The results of the tests suggest that the Random Effects model is appropriate (Appendix 8).

The Hausman test is then used to assess the fit between FEM and REM. The test findings indicate that the Random Effects model should be used. Based on the data, we may infer that Prob>chi^2 = 0.5514 > = 0.05, implying that the model used in the study is the REM model. (See Appendix 7.)

This study used the Generalized Least Square (GLS) approach to address the aforesaid faults of variable random variance and autocorrelation, and the estimated results are provided in the table 4.

With P (T-statistics) 0.05 GDPj, GDPi represents the EU and Vietnam's economic size, $PGDP_j$ represents the EU member nations' economic development level, and D_{ji} indicates geographical distance. The exchange rate R_{ji} is statistically significant with this model at 0.1 level. However, the signs of these variables diverge, with Dji having a positive value, and GDPi and $PGDP_j$ having a negative sign, which differs with the model's expectations.

Table 4: Regression results have corrected the model's defects for the EU market

Variable	Coefficient	Standard deviation	t-Statistic	Prob
C	4.264648	6.816957	0.63	0.532
GDP_j	1.659919***	0.337538	49.18	0.000
GDP_i	-0.8654729***	0.2163527	-21.59	0.000
$PGDP_j$	-2.303571***	0.1067143	-21.59	0.000
D_{ji}	0.8319328***	0.1207101	6.89	0.000
R_{ji}	0.6093129*	0.3542107	1.72	0.085
TAR_{ji}	0.4255059	2.567962	0.17	0.868

*Note: ***, **, *: statistically significant for α = 1%, 5% and 10% respectively*

Source: Calculated by authors

According to the suggested hypothesis, the variable GDP_j has a positive sign, whereas the variable $PGDP_j$ has a negative sign and is statistically significant at 1%. This illustrates a negative impact of EU GDP and GDP per capita on Vietnam's seafood exports. It may be stated that when the GDP of the partner nations rises, so does the economy, increasing demand for Vietnam's major seafood goods (the GDP of EU countries rose by 1%, while exports of four important seafood items rose by 1.66%). However, as affluence rises, so does the demand for certain fish items. This is comprehensible given that the majority of 4 seafood goods exported from Vietnam to EU nations are in the medium and low-end categories, and when income rises, buyers prefer to shift to more high-end products that are suited for consumers. In microeconomics, consumption law (When income climbed by 1%, important seafood exports declined by 2.3%).

With a confidence level of 1%, the variable GDP_i = - 0.865 is statistically significant. The variable GDPi, which represents the size of the Vietnamese economy, has a negative sign, which is inconsistent with the suggested model theory. For the distance variable D_{jv} = 0.832, there is statistical significance with 1% confidence, however, this variable has a positive sign that is not consistent with the proposed economic theory and has a negligible impact. This means that distance is not a hindrance to Vietnam's exports of four key products to the EU. The reason for this is that the import of key EU seafood products from Vietnam depends on consumer tastes more than distance. This can also be explained by the fact that the EU is an alliance of countries whose geographical distances are not too big.

The coefficient of the variable Rji = 0.609 has statistical significance with the 10% confidence level and has a positive sign that is consistent with the proposed trade theories. According to the estimated results, for every 1% increase, seafood exports increase by 0.609%. When this exchange rate increases, it can be about the export price of fish as the real exchange rate increases (ie, the VND depreciates and the EURO appreciates), in the EU market, the price of seafood imports from Vietnam. The currency in EUR will now be lower than before, EU consumers will tend to import seafood from the Vietnamese market more. In the Vietnamese market, the export price in VND has increased more than before and businesses tend to export more fish to the EU. Besides, when the exchange rate increases, the input costs for export production activities will also increase for Vietnamese enterprises (in VND), making seafood export prices higher. Therefore, when the exchange rate increases, the export volume of Vietnam's key seafood products to the EU market increases.

Conversely, the variable TARj in the EU market gravity model is not statistically significant. This indicates that there is insufficient information to infer that tariffs harm Vietnam's export of vital seafood goods. The reason for this is that the quality of Vietnam's principal export seafood goods has been improved.

4. Conclusion

Seafood is a crucial export commodity that contributes a significant amount of foreign money to Vietnam's economic growth and development. From 2011 to 2020, the European Union market was one of Vietnam's top importers of pangasius, tuna, shrimp, and molluscs. Vietnam has recently faced a number of obstacles, including competing with other countries, expanding growth, constraining capital, and so on. Based on the gravity model in international commerce, the research investigates the variables influencing Vietnam's export of important seafood items, including GDP, PGDP, distance, exchange rate. After studying, the results showed that among the influencing factors, GDP per capita of EU member countries has the largest and most negative impact on the export of Vietnam's key seafood products to the EU market with an impact coefficient of up to 2.3. This means that Vietnam's seafood products in the EU market seem to be only a secondary product because it receives a very strong negative reaction when the income of people here increases. The second largest influencing factor is the GDP of EU member countries. When the GDP of EU member countries goes up by 1%, the demand for imported seafood will increase with a coefficient of 1.66%. In addition to the two factors mentioned above, Vietnam's GDP and geographical distance also have an impact in many different directions but with the coefficient is not too large, only about 0.8. Obviously, in the Vietnamese market, seafood products are still considered luxury goods, so an increase in GDP leads to a rise of domestic demand for seafood, thereby reducing the amount of seafood exports. The exchange rate factor also has an influence with a coefficient of 0.6. Thus, when VND depreciates compared to the Euro, it will be a good opportunity for exports because this product will become relatively cheaper.

Thus, it can be seen that the research has explored valuable findings and has given relevant stakeholders from farmers, fishermen, export businesses and the Vietnamese government important suggestions. Firstly, it is necessary to have policies and solutions to prioritize dominating the domestic market in the context that the trend of Vietnam's economy has been growing quite stably. Secondly, the quality of products needs to be enhanced by applying more deeply EU standards from fishing, farming, preservation, and processing to turn seafood products from secondary products into normal goods. Thereby, Vietnam's seafood exports can take advantage of economic development in the region as well as the incentives of FTA agreements.

References:

Abdulmenaf Sejdini and Ilirjana Kraja (2014), "International Trade of Albania. Gravity Model", European Journal of Social Sciences Education and Research, vol 2i1, p.220-228.

Alleyne Antoni and Lorde Troy (2014), "A gravity model approach to analyzing the trade performance of Caricom member states", Econometrics and International Development, Vol. 14-2-2014.

Bac Xuan Nguyen, (2010), "The Determinants of Vietnamese Export Flows: Static and Dynamic Panel Gravity Approaches", International Journal of Economics and Finance Vol. 2, No. 4; November 2010.

Ekrem Erdem and Saban Nazlioglu (2014), "Gravity Model of Turkish Agricultural Exports to the European Union", International Trade and Finance Association Working Papers, P.21-Year 2008.

Huy Quang Nguyen, Huong Thi Lan Tran, Hoan Quang Truong, Chung Van Dong, (2020), nghiên cứu "Patterns and determinants of Vietnamese seafood exports", Journal of southwest jiaotong university Vol. 55 No. 2 Apr. 2020.

Lanuza Díaz et al (2013), "A Gravity Model for the Exports of Nicaragua", Documentos de Trabajo 039 - ISSN 2409-1863, Banco Central de Nicaragua.

Linnerman, H (1966), An Economic Study of International Trade Flows, Amsterdam North_Holl& Publishing Company.

Luong Anh Thu, Sun Fang và Sham Sunder Kessani, (2019), "Factors influencing Vietnam's handicraft export with the Gravity model", Journal of Economics and Development Vol. 21 No. 2, 2019 pp. 156-171.

Murat Genç and David Law (2014), "A Gravity Model of Barriers to Trade in New Zealand", New Zealand Treasury Working Paper 14/05, New Zealand Treasury – New Zeland Government, 2014.

Ngan Thi Pham, Tu Thanh Nguyen, Phung Phi Tran Thi, (2016), "Factors affect exporting of Vietnam's fishery to US and Europe market. Realities and solutions"

Nguyen Thi Thu Thuong, Doan Thi Hong Thinh, Nguyen Tien Long, và Dinh Hong Linh, (2021), "Do technical barriers to trade measures affect Vietnam's tea exports? Evidence from the Gravity model". Int. J. Food System Dynamics 12 (2), 2021, 164-176.

Paulo Camacho (2013), "Portugal's Integration in World Trade: A Gravity Model", A research of DIAMINA'CET, ISCTE-IUL, 2013.

Thai Tri Do, (2006) "A gravity model for trade between Viet Nam and twenty-three European countries" Bolänge, 2006, p. 34.

Timbergen, J. (1962), Shaping the world economy: Suggestions for an international economic policy, New York.

Vu Thanh Hương (2016), The European-Vietnam Free Trade Agreement & Oppoturnities for Vietnam SMEs to enhance Export to EU, International Proceeding "Emerging Challenges: Partnership Enhancement – ICECH 2016", Hanoi, 11/11/2016, pp. 17-27, ISBN:m978-604-93-8961-0.

Vu Thanh Hương (2016), "Assessing potential impacts of the EVFTA on Vietnam's pharmaceutical import from the EU: an application of SMART143 analyslis", Springer Plus, (2016) 5: 1503, DOI: 10.1186/s40064-016-3200-7, pp 1-22.