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The Impact of New-Generation Free Trade Agreements on the Sustainable Export of Vietnam's Key Agricultural Products: Evidence from a Gravity Model

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ABSTRACT

Vietnam has participated in an extensive network of Free Trade Agreements (FTAs), including new-generation ones such as the CPTPP, EVFTA, and RCEP. These agreements expand market access but also introduce complex regulatory standards. This study examines the effects of major FTAs on Vietnam's key agricultural exports – rice, pangasius fish, mango, lemon, and star apple – during 2005–2024. A gravity model estimated with the Poisson Pseudo-Maximum Likelihood (PPML) method is used to address data heteroskedasticity and zero-trade values. The analysis combines product-level export data with partner-country economic indicators and the timing of FTA enforcement. Results show that FTA impacts differ markedly across agreements and commodities. Regional frameworks such as the ASEAN Economic Community (AEC) and the RCEP are associated with statistically significant positive effects on some products, particularly pangasius and mango. In contrast, high-standard FTAs such as the EVFTA and CPTPP show negative or insignificant coefficients for rice and pangasius exports. Overall, the findings indicate that tariff preferences alone do not ensure export growth. The realized effects depend on product characteristics and the ability to meet technical and quality standards. The study adds empirical evidence to understanding how Vietnam's agricultural trade responds to new-generation FTAs.

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KEYWORDS:

New-generation FTAs; Sustainable Export; Agricultural Products; Gravity Model; CPTPP; EVFTA.

1. INTRODUCTION

In the era of global economic integration, Vietnam has become one of the world's most open economies through its active participation in a wide network of FTAs. Among these, the new-generation agreements – such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the EU-Vietnam Free Trade Agreement (EVFTA), and the Regional Comprehensive Economic Partnership (RCEP) – are particularly significant. These agreements represent a major evolution from traditional trade pacts, extending beyond tariff reduction to encompass high-standard and comprehensive provisions in areas such as sustainable development [1], e-commerce, intellectual property rights, and investment dispute settlement mechanisms [2].

Agriculture, a foundational pillar of Vietnam's economy and the main source of livelihood for millions, is now at a critical juncture. The sector plays a key role in export performance and rural employment but continues to face persistent challenges, including fragmented production structures, limited value addition, and weak compliance with international standards. As tariff barriers are gradually removed under new-generation FTAs, the competitiveness of agricultural exports increasingly depends on the ability to meet stringent non-tariff measures, particularly Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) requirements.

Existing studies on Vietnam's FTAs have primarily focused on macro-level assessments of trade liberalization [3]. While these analyses provide valuable insights into the overall economic effects of integration, there remains a lack of quantitative evidence on how different FTAs influence specific agricultural products. New-generation FTAs, with

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distinct provisions on rules of origin, SPS standards, and geographical indications, are likely to generate heterogeneous impacts across commodity sectors – an issue that aggregate analyses cannot capture. In addition, global disruptions such as the 2008 financial crisis and the COVID-19 pandemic have underscored the need to reassess the real effectiveness of these agreements in sustaining agricultural exports under external shocks.

The objective of this study is to provide a systematic and quantitative evaluation of how new-generation FTAs affect the sustainable export performance of Vietnam's key agricultural products. To achieve this, the research employs the Gravity Model, a well-established analytical framework for examining international trade flows [4], estimated using the PPML method to account for zero-trade values and heteroskedasticity [3], [5].

By analyzing detailed panel data, the study aims to clarify the magnitude and direction of each FTA's impact on different agricultural sectors and to identify the conditions under which these agreements yield positive or adverse effects. The findings are expected to provide evidence-based insights that support policymakers, enterprises, and farmers in formulating strategies to effectively utilize FTAs and enhance the sustainability of Vietnam's agricultural trade.

The paper is structured as follows. Section 2 presents the theoretical framework and research methodology. Section 3 reports and discusses the empirical results. Section 4 outlines key policy implications derived from the findings. Section 5 concludes with the main insights and suggestions for future research.

II. THEORETICAL AND EMPIRICAL REVIEW OF FTA IMPACTS

The analysis of the economic impacts of Free Trade Agreements (FTAs) is built upon a multifaceted theoretical and empirical foundation, which has evolved significantly from its foundational concepts to reflect the complexity of modern trade agreements. This review delves into the primary theoretical pillars, from classic concepts of economic integration to contemporary developments related to the features of new-generation FTAs, while also surveying prominent empirical findings, particularly from studies employing the Gravity Model.

Classical Theories and the Dynamic Effects of Economic Integration

The analytical foundation for assessing FTA impacts is rooted in the classic customs union theory pioneered by [6], a seminal work that laid the groundwork for understanding their static effects. Viner's theory introduces two core, countervailing concepts: trade creation and trade diversion. Trade creation, considered the welfare-enhancing effect, occurs when the removal of tariffs within an FTA leads to a shift in consumption from a high-cost domestic producer to a lower-cost producer within the bloc [6]. This reallocation of resources according to comparative advantage is considered a primary source of economic welfare gains from an FTA [7]. Substantial empirical evidence has since corroborated the existence of the trade creation effect. For instance, [8] utilized a gravity model to analyze the impact of the North American Free Trade Agreement (NAFTA) and found that the agreement significantly promoted trade flows among member countries through this mechanism.

Conversely, trade diversion describes a potentially welfare-reducing scenario where the formation of an FTA causes a member country to shift its imports from the lowest-cost global producer outside the bloc to a higher-cost producer within it, merely due to the preferential tariff treatment [6]. This can lead to a net welfare loss for the importing nation if the costs associated with trade diversion outweigh the gains from trade creation [9]. Although this effect is sometimes less scrutinized, its consideration is critical for a comprehensive assessment of an FTA's impact [3]. The net static welfare effect of an FTA is therefore contingent upon the relative magnitudes of these two effects and is not guaranteed to be positive.

Beyond these immediate, resource-reallocating static effects, subsequent economic thought has emphasized the importance of dynamic effects, which unfold over the long term and are often considered a more significant and sustainable source of benefits from economic integration [7]. One of the most significant dynamic effects is the potential for firms to exploit economies of scale. As firms gain access to a larger, integrated market, they can increase their scale of production, thereby lowering average costs and enhancing operational efficiency. Furthermore, the opening of markets and removal of protectionist barriers intensifies **competitive pressures** from firms across the FTA bloc [10]. This heightened competition compels domestic companies to innovate, improve managerial processes, and enhance product quality to survive and grow, thereby boosting the overall productivity of the economy.

Another critical dynamic effect is the potential to attract Foreign Direct Investment (FDI). A stable, transparent, and predictable trade and investment environment, guaranteed by the legal commitments within an FTA, reduces risk for investors and encourages multinational corporations to invest in member countries [11]. This inflow of FDI provides not only crucial capital but also facilitates the transfer of advanced technology, modern management practices, and labor skills, contributing to the enhancement of the host country's productive capacity. Notably, recent research suggests that new-generation FTAs, with their comprehensive chapters on investment protection and services liberalization, have a significantly stronger positive effect on FDI inflows compared to traditional agreements [12].

The Rise of New-Generation FTAs and Their Theoretical Implications

New-generation FTAs, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the EU-Vietnam Free Trade Agreement (EVFTA), mark a significant evolution in nature and scope compared to traditional trade pacts. They are not merely tariff-reduction agreements but rather comprehensive, deep, and high-standard accords that cover a wide range of previously peripheral or unaddressed areas [2]. This shift carries new theoretical implications and reshapes the analysis of trade integration's impacts. One of the most prominent features is the integration of Trade and Sustainable Development (TSD) chapters. [1] emphasizes that provisions on environmental protection and labor standards have evolved from being aspirational to becoming core, often binding, components of the EU's FTAs, reflecting an effort to link trade objectives with global sustainable development goals. The trade committees within these FTAs are also expected to serve as drivers for sustainability action [13].

Furthermore, new-generation FTAs establish detailed rules for areas of the modern economy like e-commerce and intellectual property rights (IPR). Provisions on the recognition of electronic contracts, the elimination of customs duties on electronic transmissions [2], and higher standards of IPR protection [14] are critical elements that create a conducive business environment for the digital economy and knowledge-based industries. The intricacy of these provisions, as seen in complex FTA negotiations like those between the EU and India, also highlights the challenges of harmonizing diverse interests and legal systems [15].

The development of new-generation FTAs also underscores the central role of Non-Tariff Measures (NTMs). As tariffs approach zero, Technical Barriers to Trade (TBT) and Sanitary and Phytosanitary (SPS) measures become the primary determinants of market access, particularly for agricultural products [15]. Consequently, any analysis of new-generation FTAs must account for the compliance costs associated with these regulations, which can function as even more significant barriers than tariffs. Finally, these modern agreements often serve as an "anchor" for domestic institutional reform [16]. Commitments in areas such as competition policy, government procurement, transparency, and the conduct of state-owned enterprises often require member countries, especially developing ones, to modernize their legal frameworks and governance institutions to align with international best practices. While challenging, this process can significantly improve the overall business environment and foster long-term economic growth [16].

Empirical Approaches and the Role of the Gravity Model

To quantify these complex theoretical impacts, researchers have employed a variety of econometric methods, among which the Gravity Model has emerged as the dominant and most widely trusted empirical tool for ex-post (retrospective) analyses [17]. Originating from the pioneering work of [18], the model is based on a simple yet powerful intuition: the volume of trade between two countries is directly proportional to their economic sizes and inversely proportional to the geographical distance between them [4]. This model has demonstrated high empirical efficacy and was later given a solid theoretical grounding by economists such as [19] and [20], particularly through the introduction of "multilateral resistance terms" to account for trade impacts from third countries.

Over time, the basic gravity model has been augmented to include a wide array of additional variables to better capture the complexities of international trade. These variables include trade-facilitating factors such as sharing a common border, a common language, or past colonial ties, as well as trade-impeding factors like exchange rate volatility [8]. In the context of FTA analysis, dummy variables representing participation in trade agreements are incorporated into the model to estimate their average effect on trade flows [21]. The application of this model is diverse, ranging from measuring the impacts of specific FTAs like NAFTA [22] and the ASEAN Free Trade Area (AFTA) [23] to analyzing sector-specific impacts, such as in agriculture [24], [25].

One of the greatest challenges in estimating the gravity model lies in the econometric issues arising from the nature of trade data. Trade data, especially when disaggregated at the product level, often contain a large proportion of zero-trade flows and typically exhibit heteroskedasticity [26]. In an influential paper, [27] demonstrated that estimating the traditional log-linearized model using Ordinary Least Squares (OLS) leads to biased and inconsistent estimates in the presence of heteroskedasticity. Moreover, taking the logarithm of the dependent variable results in the exclusion of all zero-trade observations, causing a loss of important information and potentially leading to sample selection bias. To address these issues, they proposed the use of the Poisson Pseudo-Maximum Likelihood (PPML) estimator. The PPML method estimates the model in its multiplicative form, naturally accommodates zero values, and provides robust estimates even in the presence of heteroskedasticity [27]. Since its introduction, PPML has become the gold standard in modern empirical trade research [5], [28] and is the method of choice in this study to ensure the accuracy and reliability of the estimation results.

III. RESEARCH MODEL AND ESTIMATION STRATEGY

The Gravity Model

This study applies the gravity model to examine the determinants of Vietnam's agricultural exports and to estimate the impacts of FTAs on trade flows. The gravity model, initially introduced by [18], posits that bilateral trade

between two countries is directly proportional to their economic sizes and inversely proportional to the geographical distance between them [4]. The model has since been expanded to incorporate various explanatory variables that capture both trade-enhancing and trade-restricting factors.

The baseline specification is expressed as follows:

$$\ln(X_{ijt}) = \beta_0 + \beta_1 \ln(GDP_{i,t}) + \beta_2 \ln(GDP_{j,t}) + \beta_3 \ln(DIST_j) + \sum_{k=1}^{N} \gamma_k FTA_{jk,t} + \sum_{m=1}^{M} \delta_m EVENT_{m,t} + \theta Z_{jt} + \varepsilon_{ijt}$$

where X_{ijt} represents the export value of product *i* from Vietnam to country *j* in year *t*. $GDP_{i,t}$ and $GDP_{j,t}$ denote the economic sizes of Vietnam and its trading partners, respectively, reflecting supply capacity and market demand. $DIST_j$ measures the bilateral distance between Vietnam and country *j*, serving as a proxy for transportation and transaction costs. $FTA_{jk,t}$ is a set of dummy variables indicating whether a specific FTA is in effect, while $EVENT_{m,t}$ accounts for external shocks such as the global financial crisis or the COVID-19 pandemic. Z_{jt} is a vector of additional control variables, including factors such as common borders and shared languages.

The coefficients of particular interest are those associated with $FTA_{jk,t}$ which capture the average treatment effect of each agreement on Vietnam's agricultural exports after controlling for economic size, distance, and external events.

The PPML Estimation Method

To estimate the gravity model, this study employs the PPML estimator. The PPML method is widely regarded as the most reliable approach for modeling trade flows, as it effectively handles key econometric challenges such as heteroskedasticity and the presence of zero trade values. As demonstrated by [27] and confirmed in subsequent research [3], [5], log-linear estimation using Ordinary Least Squares (OLS) can produce biased and inconsistent results under heteroskedastic conditions, while also excluding zero-valued observations that are common in disaggregated trade data.

By estimating the gravity model in its multiplicative form, PPML retains all observations, including those with zero trade values, and provides consistent parameter estimates even when the error term exhibits non-constant variance. The method also allows for the inclusion of dummy variables for FTAs and global events without transforming them logarithmically, preserving their interpretability. Given these advantages, PPML has become the standard estimation technique in empirical analyses of international trade and is therefore adopted in this study to ensure robust and unbiased results.

Data and Variables

This study employs a panel dataset constructed from multiple official and international sources, covering the period from 2005 to 2024 for Vietnam's key agricultural products and their principal export markets. The dataset integrates trade, economic, and geographical information to estimate the gravity model and assess the effects of various FTAs on agricultural exports.

Data on export values (X_{ijt}) are obtained from the General Department of Vietnam Customs and the UN Comtrade database. The data are disaggregated by Harmonized System (HS) codes at the product–destination level, which allows for the identification of variations in export performance across specific commodities and trading partners. This structure provides the necessary granularity for evaluating the heterogeneous effects of FTAs on different product categories.

Gross Domestic Product (GDP) data for Vietnam and its trading partners are sourced from the World Bank's *World Development Indicators (WDI)* database. Vietnam's GDP is used to represent the export supply capacity, while the GDP of partner countries serves as a proxy for market demand and purchasing power. Together, these variables capture the economic scale effects central to the gravity model framework.

Geographical variables, including bilateral distance, shared borders, and common language, are drawn from the *Centre d'Études Prospectives et d'Informations Internationales (CEPII)* database. Distance is measured between the capitals of Vietnam and each trading partner and is used as a proxy for transportation and transaction costs that influence bilateral trade flows.

Finally, dummy variables for FTAs are constructed based on the effective implementation dates of each agreement between Vietnam and its trading partners, including the CPTPP, EVFTA, RCEP, AEC, and other bilateral arrangements. In addition, the dataset includes event dummies to control for major global economic shocks – such as the 2008 Global Financial Crisis and the COVID-19 pandemic – to account for their potential impacts on trade patterns during the study period.

This section presents the empirical findings derived from the econometric model and discusses their implications. It begins with an overview of the descriptive statistics, followed by an analysis of the regression results that interpret the effects of different FTAs on Vietnam's key agricultural exports.

IV. RESULTS AND DISCUSSION

Descriptive Statistics

The dataset covers Vietnam's major agricultural exports over the period from 2005 to 2024, including five representative products – rice, pangasius fish, mango, lemon, and star apple – and their corresponding trade flows to major partner countries. A preliminary examination of the data indicates notable heterogeneity across commodities in terms of export value, market concentration, and variability over time.

Table 1. Descriptive Statistics of Key Gravity Variables

Variable	Observations	Mean	Std. Dev.	Min	Max
GDP_i	126,740	241,404.00	124,538.50	57,630.00	476,390.00
GDP_j	126,740	895,034.00	1,939,556.00	2,740.00	18,700,000.00
dis_int	119,104	237.25	274.55	6.69	1,188.00
$lnGDP_i$	126,740	12.22	0.63	10.96	13.07
$lnGDP_j$	126,740	12.49	1.63	7.92	16.75
lndist	119,104	5.00	0.99	1.90	7.08

Source: Authors' calculation

Note: GDP_i represents Vietnam's GDP as the exporting country; GDP_j denotes the GDP of the importing country; dis_int indicates bilateral distance. Variables prefixed with ln refer to the natural logarithm of the corresponding values.

The descriptive statistics for the export values (To_exports) of the five key agricultural products analyzed in this study are pressented in the table 2.

Table 2. Descriptive Statistics of Export Value (USD) by Product

Product	Observations	Mean	Std. Dev.	Min	Max
Lemon	7,435	39.42	459.49	0.00	17,073.00
Mango	4,540	46.90	962.40	0.00	48,699.00
Pangasius Fish	45,743	470.55	5,913.93	0.00	492,073.00
Rice	3,632	9,027.33	73,415.10	0.00	1,708,490.00
Star Apple	7,182	2,039.80	49,690.58	0.00	2,940,212.00

Source: Authors' calculation

Note: Export values are disaggregated by product and destination market at the HS-code level.

Overall, the descriptive statistics reveal substantial variation in export intensity across commodities. Rice and pangasius fish remain Vietnam's dominant agricultural exports, with diversified markets across ASEAN, China, the European Union, and North America. In contrast, fruit exports such as mango, lemon, and star apple are more concentrated within regional Asian markets, although gradual diversification toward high-standard destinations – including the United States, Australia, and the EU – has been observed in recent years.

The data also exhibit a large degree of dispersion and a considerable number of zero-trade observations, particularly for perishable fruit products exported to distant markets. This characteristic supports the use of the PPML estimation method, which is appropriate for handling heteroskedastic trade data and the presence of zero-value trade flows.

Regression Results

The results obtained from the PPML estimation of the gravity model are reported in Table 3. The regressions were estimated separately for five key agricultural products – rice, pangasius fish, mango, lemon, and star apple – over the period 2005–2024. The dependent variable is the export value at the product–destination level. Explanatory variables include the GDP of Vietnam and partner countries, bilateral distance, and dummy variables representing participation in different FTAs and major global events.

Table 3. Effects of FTAs and Events on Agricultural Exports (PPML Estimation Results)

Variables	(1) Rice	(2) Pangasius Fish	(3) Mango	(4) Lemon	(5) Star Apple
cftacptpp	-0.998* (0.576)	0.046 (0.237)	0.061 (0.456)	1.690*** (0.404)	-0.793* (0.459)
Evfta	-2.800*** (0.551)	-1.018*** (0.186)	0.636 (0.390)	-0.362 (0.583)	-0.094 (0.621)
rcep	0.086 (0.457)	0.067 (0.358)	2.175*** (0.739)	-0.442 (0.432)	0.530 (0.597)
aec	0.488 (0.401)	0.580** (0.248)	-1.772*** (0.611)	1.659*** (0.408)	1.128* (0.656)
Vnjkfta	-3.983*** (0.815)	-0.361 (0.221)	-0.334 (0.611)	-4.237*** (0.741)	-1.680*** (0.304)
vnkfta	-0.523 (0.480)	0.553 (0.376)	2.045*** (0.754)	-2.295*** (0.456)	0.969 (0.740)
Vncuta	-2.811*** (0.520)	-0.293 (0.256)	-	-3.177*** (1.092)	-
crisis_2008	48.012 (182.645)	-1.669 (62.340)	-1.442 (107.545)	-129.699 (107.424)	-65.864 (194.102)
covid_19	-24.872 (160.641)	43.407 (97.352)	357.214 (226.537)	13.442 (141.268)	53.310 (267.783)
covid_gdp_i	2.522 (12.700)	-3.303 (7.665)	-28.462 (17.982)	-1.024 (11.006)	-3.830 (20.934)
covid_gdp_j	-0.449 (0.327)	-0.053 (0.151)	0.569* (0.333)	-0.066 (0.221)	-0.294 (0.320)
crisis_gdp_i	-3.465 (15.812)	0.249 (5.382)	0.071 (9.326)	11.503 (9.269)	5.674 (16.637)
crisis_gdp_j	-0.578*** (0.110)	-0.063 (0.097)	0.029 (0.174)	-0.218 (0.159)	0.027 (0.655)
cftacptpp_covid_19	-1.112 (1.285)	-0.514 (0.471)	-1.250 (0.778)	-0.599 (1.221)	-0.424 (0.750)
evfta_covid_19	-1.880 (1.275)	-0.644 (0.393)	-2.322*** (0.645)	0.944 (1.084)	0.249 (0.765)
aec_covid_19	-2.350 (1.564)	-0.299 (0.467)	0.109 (0.871)	0.485 (1.023)	-0.129 (0.767)
vnjkfta_covid_19	-0.226 (1.341)	0.009 (0.642)	0.431 (1.186)	-	1.943** (0.833)
vnkfta_covid_19	-1.042 (0.905)	-0.490 (0.808)	-0.515 (1.120)	-1.131 (0.861)	-0.042 (0.996)
vncuta_covid_19	-0.950 (1.066)	-0.344 (0.582)	-	-	-
lnGDPi	0.794 (0.530)	0.308** (0.121)	0.513 (0.319)	1.958*** (0.461)	0.239 (0.559)
lnGDPj	0.310*** (0.101)	0.736*** (0.057)	0.671*** (0.167)	1.534*** (0.248)	1.738*** (0.180)

lndist	0.517*** (0.101)	- 0.094 (0.073)	0.184 (0.210)	- 1.654*** (0.319)	1.074*** (0.157)
vnjkfta_crisis_2008	-	- 0.643 (0.810)	-	-	- 3.007** (1.386)
Constant	- 7.396 (6.175)	- 6.975*** (1.857)	- 13.517*** (3.467)	- 33.192*** (6.451)	- 27.741*** (6.118)
Observations	3,412	43,343	4,205	6,898	6,728

Standard errors in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

Source: Authors' calculation

Across all estimations, the coefficients on the FTA variables display substantial variation both in magnitude and statistical significance. For rice, two coefficients are statistically significant: CPTPP (-0.998, p < 0.10) and EVFTA (-2.800, p < 0.01), both indicating negative associations with export values. For pangasius fish, the AEC coefficient is positive and significant (0.580, p < 0.05), while the EVFTA coefficient is negative and significant (-1.018, p < 0.01). Other FTA variables for this product are statistically insignificant. For mango, the RCEP (2.175, p < 0.01) and VNKFTA (2.045, p < 0.01) coefficients are positive and significant, whereas the AEC shows a negative and significant coefficient (-1.772, p < 0.01). For lemon, two FTAs exhibit positive and statistically significant coefficients: CPTPP (1.690, p < 0.01) and AEC (1.659, p < 0.01). Conversely, the VNKFTA shows a negative and significant coefficient (-2.295, p < 0.01).

For star apple, several coefficients are negative and significant: CPTPP (- 0.793, p < 0.10), VJEPA (- 4.237, p < 0.01), and VCUTA (-3.177, p < 0.01). Two agreements – AEC (1.128, p < 0.10) and VJEPA–COVID interaction (1.943, p < 0.05) – show positive and significant coefficients. Regarding the control variables, the GDP of importing countries ($\ln GDP_j$) is positive and highly significant across all five models, ranging from 0.310 (p < 0.01) in the rice equation to 1.738 (p < 0.01) in the star apple equation. The GDP of the exporter ($\ln GDP_i$) is positive and significant in the pangasius (0.308, p < 0.05) and lemon (1.958, p < 0.01) regressions. The coefficient on distance (lndist) is significant in most models but varies in sign: negative for lemon (-1.654, p < 0.01) and positive for rice (0.517, p < 0.01) and star apple (1.074, p < 0.01).

The coefficients for global event dummies and their interaction terms – crisis_2008, covid_19, and related GDP interactions – are largely statistically insignificant across all products, indicating that these events did not exhibit systematic linear relationships with export values once other factors were controlled for.

Overall, the results demonstrate clear heterogeneity in the statistical significance and direction of FTA effects across different agricultural commodities. These numerical patterns provide the empirical foundation for the subsequent discussion section, which examines the possible explanations behind these observed relationships.

Discussion

The estimation results present a nuanced and complex portrait of the impacts of Free Trade Agreements on Vietnam's agricultural exports, revealing substantial heterogeneity across different agreements and commodities. This variation aligns with the contemporary understanding that new-generation FTAs represent a significant evolution from traditional trade pacts. They extend far beyond tariff reduction to encompass comprehensive and high-standard provisions in areas such as sustainable development [1], e-commerce, and investment dispute settlement [2]. Our findings empirically support the proposition that tariff preferences alone do not guarantee enhanced export performance; rather, the realized effects are conditional upon the capacity of domestic producers and institutions to meet the stringent non-tariff requirements embedded within these modern agreements.

A particularly salient finding is the negative and statistically significant association of high-standard agreements, namely the EVFTA and CPTPP, with the export values of staple products like rice and pangasius fish. This outcome should not be interpreted as a failure of the agreements themselves, but rather as empirical evidence of the persistent challenges Vietnamese exporters face in complying with the rigorous Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) standards that characterize these advanced markets. New-generation agreements, especially the EU-Vietnam FTA, place a strong emphasis on regulatory cooperation and sustainability in areas such as health and food safety [15]. The high adjustment costs and technical capacity required to meet these standards – from controlling maximum residue limits (MRLs) for pesticides to implementing robust traceability systems – can erect formidable non-tariff barriers. These barriers may effectively offset the benefits of tariff liberalization, a challenge that is particularly acute for sectors dominated by small-scale, fragmented production structures, as is common in Vietnam's agricultural landscape.

In stark contrast, regional integration frameworks such as the ASEAN Economic Community (AEC) and the Regional Comprehensive Economic Partnership (RCEP) are associated with positive and significant trade effects for several products. The positive coefficient for pangasius and lemon exports under the AEC, for example, is consistent with the stated objective of the AEC to create a single market and production base that facilitates a freer flow of goods among member states [29] . Similarly, the strong positive impact of RCEP on mango exports aligns with the agreement's aim to enhance regional economic integration and is consistent with analyses predicting that RCEP would particularly benefit

value-added trade in food sectors [30]. It is plausible that compliance hurdles within these regional blocs are lower, and that established trade relationships, geographical proximity, and simplified logistics allow producers to more readily capitalize on preferential market access.

The analysis further underscores that the effects of FTAs are highly commodity-specific, militating against any generalized conclusions. For instance, the CPTPP is associated with a statistically significant increase in lemon exports but a decrease in star apple exports. This divergence likely stems from a confluence of factors, including product-specific quarantine requirements in destination markets, the maturity of the respective export value chains, and the sector's readiness to meet the technical standards demanded by CPTPP members. Such variation reinforces the findings of previous literature that the impacts of FTAs differ significantly across sectors [3] and that different agricultural products possess unique trade dynamics [31]. This highlights the inadequacy of aggregate-level analyses, which can conceal these critical commodity-level variations.

In summary, our empirical results contribute to the literature by providing disaggregated quantitative evidence on the effects of Vietnam's new-generation FTAs. The findings are consistent with the classical Vinerian framework of trade creation and trade diversion [6], but they introduce a crucial modern corollary: non-tariff measures are a primary determinant of these outcomes in the context of contemporary trade policy. The observed statistical associations, varying in both sign and significance, underscore that the benefits of trade liberalization are not automatic. Instead, they are contingent upon the development of sectoral, institutional, and logistical capacities needed to overcome the technical barriers to trade. By employing a robust econometric methodology suited for disaggregated trade data [5], [27], this study provides a granular perspective that complements earlier, macro-level assessments of Vietnam's economic integration [32].

V. POLICY IMPLICATIONS

The empirical findings from this study unequivocally demonstrate that the anticipated benefits of new-generation Free Trade Agreements for Vietnam's agricultural exports are not automatic. The heterogeneous impacts observed across commodities and agreements underscore that market access is now contingent less on tariff concessions and more on the sophisticated capacity of domestic producers and institutions to meet a complex web of technical and regulatory requirements. Consequently, a paradigm shift in policy is required, moving away from broad trade promotion towards targeted interventions that strengthen the structural, institutional, and technological foundations essential for sustainable participation in global agricultural value chains.

General Policy Recommendations

A primary policy imperative is the strengthening of institutional capacity and the strategic dissemination of information. Many producers and enterprises, particularly small and medium-sized ones (SMEs), lack a practical, operational understanding of the intricate commitments within new-generation FTAs, especially concerning the Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) regulations [33]. To bridge this critical knowledge gap, government agencies should establish dedicated FTA support units. These units must function as active intermediaries, translating complex legal text from agreements like the EVFTA and CPTPP into actionable operational guidelines, providing real-time updates on evolving SPS/TBT regulations in key markets, and delivering targeted training on complex topics such as rules of origin and sustainability certifications. Such institutional support is paramount for enabling agricultural stakeholders to effectively navigate the demanding regulatory landscapes that characterize modern trade agreements [2].

Simultaneously, it is essential to promote value chain integration and the strategic restructuring of agricultural production to overcome the inherent limitations of small-scale, fragmented farming. The current production structure severely constrains quality control, traceability, and standardization, which are non-negotiable requirements in high-value export markets. Policy measures should therefore actively incentivize the formation of specialized, large-scale farming zones and fortify the coordinating role of agricultural cooperatives. Financial and technical support should be prioritized for business models that cultivate deep, transparent linkages between farmers, processing firms, and exporters. This integration aligns production with international standards and dynamic market demand, fostering a necessary transition from a paradigm of quantity-driven output to one centered on quality, value, and sustainability [34].

Furthermore, strategic public and private investment in quality infrastructure and research and development (R&D) is crucial for addressing technical and non-tariff barriers. Public-private partnerships can be leveraged to develop a national network of internationally accredited laboratories, advanced cold-chain logistics, and modern post-harvest treatment centers. Concurrently, R&D initiatives must be directed toward developing climate-resilient crop varieties and promoting sustainable agricultural practices that reduce chemical inputs and enhance environmental stewardship [35]. The adoption of digital technologies, such as the Internet of Things (IoT) and AI-driven precision agriculture, should be accelerated, as these innovations offer powerful tools for improving resource management, ensuring traceability, and demonstrating compliance with international standards [36], [37].

Sector-Specific and FTA-Specific Recommendations

The substantial variation in FTA effects across commodities necessitates a tailored policy response rather than uniform export-promotion measures.

For exports to the European Union under the EVFTA, where this study identifies significant negative associations for staples like rice and pangasius, policy must pivot decisively towards overcoming non-tariff barriers. Support should concentrate on enhancing compliance with the EU's stringent SPS standards. This includes intensive training programs on the acceptable use of veterinary and plant-protection substances to meet Maximum Residue Limits (MRLs) and direct assistance for enterprises to obtain recognized sustainability certifications (e.g., ASC for aquaculture, GlobalG.A.P. for agriculture). Critically, the protection of Vietnamese Geographical Indications (GIs) under the EVFTA presents a strategic opportunity. Policymakers should actively support branding and marketing campaigns for GI-protected products, leveraging their unique origin and quality to develop high-value niche market segments, a strategy shown to significantly boost agricultural economic growth [38], [39].

For regional FTAs such as the RCEP and AEC, where results indicate more positive impacts for perishable goods like mango and lemon, policy should focus on capitalizing on the advantages of geographical proximity. Priorities must include upgrading logistics and cold-chain infrastructure to minimize transit times and spoilage, thereby maintaining product quality. Furthermore, targeted training on the cumulative rules of origin within these agreements is essential. This would enable producers to flexibly source inputs from across member countries while retaining preferential tariff treatment, thereby optimizing regional supply chains and strengthening competitiveness [40].

For products exhibiting limited or negative outcomes, such as star apple, a more diagnostic approach is warranted. Specialized agencies should conduct in-depth assessments to pinpoint the specific technical or phytosanitary barriers impeding exports. Should these barriers prove technologically or economically prohibitive in the short term, policies should support farmers in diversifying toward alternative crops with demonstrated export potential and more favorable market access conditions under existing FTAs.

Finally, while this study focuses on exports, the findings implicitly warn of increased competitive pressures on domestic sectors, particularly the livestock industry. To build resilience, it is a national priority to strengthen compliance with international animal health standards. Establishing disease-free zones consistent with the guidelines of the World Organisation for Animal Health (OIE) would not only safeguard domestic production from import competition but also create the foundational credibility required for future participation in global meat and livestock export markets.

VI. CONCLUSION

This study quantitatively examined the effects of new-generation FTAs – including the CPTPP, EVFTA, and RCEP – on Vietnam's agricultural exports using a gravity model estimated with the PPML method. The results show that the impacts of these agreements are heterogeneous across products and markets. While regional agreements such as the RCEP and AEC are associated with positive effects on certain fruits, particularly mango and lemon, high-standard FTAs such as the EVFTA and CPTPP show negative or insignificant impacts on staple products like rice and pangasius fish.

These findings suggest that tariff preferences alone are not sufficient to enhance export performance. Non-tariff barriers – especially Sanitary and Phytosanitary (SPS) standards, technical regulations, and quality requirements – remain the main determinants of market access. The results therefore indicate that policy efforts should focus on strengthening institutional capacity, improving information dissemination, promoting value chain coordination, and investing in quality infrastructure and research. Addressing these structural and technical constraints is essential for enabling agricultural producers and enterprises to benefit from FTA opportunities in a sustainable manner.

This research has several limitations. The analysis covers only a selected group of agricultural products and does not account for the potential effects of FTAs on processed or high-value-added goods. Moreover, the model captures the overall effects of trade agreements but does not directly quantify specific non-tariff barriers. Future studies could extend the analysis by constructing indicators of SPS and TBT measures or by employing firm-level data to explore differences in adaptive capacity among producers. Such work would provide a deeper understanding of how Vietnam's agricultural sector can strengthen its competitiveness and resilience in the context of expanding FTA networks.

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REFERENCES

1. J. Gilson, "Sustainable development and the environment in EU and Japanese free trade agreements: embedding anthropocentric narratives," *Environ. Polit.*, vol. 33, no. 4, pp. 727–748, June 2024, doi: 10.1080/09644016.2023.2274750.
2. A. Makarenko and L. Chernikova, "'New Generation' EU Free Trade Agreements: A Combination of Traditional and Innovative Mechanisms," in *Post-Industrial Society*, J.

Kovalchuk, Ed., Cham: Springer International Publishing, 2020, pp. 109–122. doi: 10.1007/978-3-030-59739-9_10.

3. D. V. Suslov, "Estimating the effects of free trade agreements on trade flows in east Asia," *Smart Innovation, Systems and Technologies*, vol. 138. pp. 511–527, 2020. doi: 10.1007/978-3-030-15577-3_49.
4. G. M. Caporale, C. Rault, R. Sova, and A. Sova, "On the bilateral trade effects of free trade agreements between the EU-15 and the CEEC-4 countries," *Review of World Economics*, vol. 145, no. 2. pp. 189–206, 2009. doi: 10.1007/s10290-009-0011-8.
5. B. Qiu, G. Tian, and D. Wang, "Empirical Analysis of Sustainable Trade Effects of FTAs Based on Augmented Gravity Model: A Case Study of China," *Sustainability (Switzerland)*, vol. 15, no. 1. 2023. doi: 10.3390/su15010269.
6. J. Viner, *The Customs Union Issue*. Oxford University Press, 2014. doi: 10.1093/acprof:osobl/9780199756124.001.0001.
7. M. E. Kreinin and M. G. Plummer, "Theory and Economic Modeling of Preferential Trading Arrangements," *The Oxford Handbook of International Commercial Policy*. 2012. doi: 10.1093/oxfordhb/9780195378047.013.0006.
8. D. Karemera, W. Koo, G. Smalls, and L. Whiteside, "Trade creation and diversion effects and exchange rate volatility in the global meat trade," *Journal of Economic Integration*, vol. 30, no. 2. pp. 240–268, 2015. doi: 10.11130/jei.2015.30.2.240.
9. M. Richardson, "Endogenous protection and trade diversion," *Dimensions of Trade Policy*. 2017. doi: 10.1142/9789813207615_0005.
10. B. Heid and F. Stähler, "Structural gravity and the gains from trade under imperfect competition: Quantifying the effects of the European Single Market," *Economic Modelling*, vol. 131. 2024. doi: 10.1016/j.econmod.2023.106604.
11. M. G. Plummer and C. S. Yue, "Realizing the ASEAN economic community: A comprehensive assessment," *Realizing the ASEAN Economic Community: A Comprehensive Assessment*. 2009. [Online]. Available: https://www.scopus.com/inward/record.uri?eid=2-s2.0-84894923980&partnerID=40&md5=6114b4ac808c181078b08274ed6c26bf
12. H. G. Mai and H. T. Bui, "The impact of free trade agreements on foreign direct investment inflows: Evidence from next-generation agreements in Vietnam," *Investment Management and Financial Innovations*, vol. 22, no. 3. pp. 1–13, 2025. doi: 10.21511/imfi.22(3).2025.01.
13. C. Delev, "Walking the Talk? Assessing EU-Latin America FTA Trade Committees as Drivers of Sustainability Action," *European Foreign Affairs Review*, vol. 30. pp. 135–156, 2025. [Online]. Available: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85216186516&partnerID=40&md5=3dcc584f54a822f2bfb99019135bc754
14. P. Roffe, "Intellectual Property and the New Generation of Free Trade Agreements: The Agreement Between Chile and the United States of America," in *Knowledge Generation and Protection*, J. M. Martínez-Piva, Ed., New York, NY: Springer New York, 2009, pp. 85–116. doi: 10.1007/978-1-4419-1264-0_4.
15. G. Kolev *et al.*, "TTIP – Probleme und Chancen," *Wirtschaftsdienst*, vol. 96, no. 3, pp. 159–171, Mar. 2016, doi: 10.1007/s10273-016-1952-x.
16. D.-C. Horng, "Reshaping the EUs FTA Policy in a Globalizing Economy: The Case of the EU-Korea FTA," *J. World Trade*, vol. 46, no. Issue 2, pp. 301–326, Apr. 2012, doi: 10.54648/TRAD2012010.
17. N. C. Leitão, "Gravity Model and International Trade: A Survey of the Literature," *Administrative Sciences*, vol. 14, no. 9. 2024. doi: 10.3390/admsci14090219.
18. J. Tinbergen, "Shaping the world economy," *Int. Exec.*, vol. 5, no. 1, pp. 27–30, Dec. 1963, doi: 10.1002/tie.5060050113.
19. J. Anderson, "A Theoretical Foundation for Gravity Equation," *Am. Econ. Rev.*, vol. 69, pp. 106–16, Feb. 1979.
20. J. E. Anderson and E. Van Wincoop, "Gravity with Gravitas: A Solution to the Border Puzzle," *Am. Econ. Rev.*, vol. 93, no. 1, pp. 170–192, Feb. 2003, doi: 10.1257/000282803321455214.
21. Maria. Cipollina and Luca. Salvatici, "Reciprocal trade agreements in gravity models: A meta-analysis," *Review of International Economics*, vol. 18, no. 1. pp. 63–80, 2010. doi: 10.1111/j.1467-9396.2009.00877.x.
22. Y. Heo and N. K. Doanh, "Is NAFTA Trade-Creating or Trade-Diverting? A System GMM Approach," *Economic Papers*, vol. 39, no. 3. pp. 222–238, 2020. doi: 10.1111/1759-3441.12281.
23. C. Samavong, "Measuring trade creation and trade diversion effects of the ASEAN free trade area: A gravity model approach," *Southeast Asian Journal of Economics*, vol. 7, no. 1. pp. 71–91, 2019. [Online]. Available: https://www.scopus.com/inward/record.uri?eid=2-s2.0-

85073054839&partnerID=40&md5=6c67ac57fb3bcee3eed86c6a681bc748

24. S. Jayasinghe and R. Sarker, "Effects of regional trade agreements on trade in agrifood products: Evidence from gravity modeling using disaggregated data," *Review of Agricultural Economics*, vol. 30, no. 1. pp. 61–81, 2008. doi: 10.1111/j.1467-9353.2007.00392.x.
25. L. Sun and M. R. Reed, "Impacts of free trade agreements on agricultural trade creation and trade diversion," *American Journal of Agricultural Economics*, vol. 92, no. 5. pp. 1351–1363, 2010. doi: 10.1093/ajae/aaq076.
26. W. Martin and C. S. Pham, "Estimating the gravity model when zero trade flows are frequent and economically determined," *Applied Economics*, vol. 52, no. 26. pp. 2766–2779, 2020. doi: 10.1080/00036846.2019.1687838.
27. J. M. C. Santos Silva and S. Tenreyro, "The log of gravity," *Review of Economics and Statistics*, vol. 88, no. 4. pp. 641–658, 2006. doi: 10.1162/rest.88.4.641.
28. K. P. Timsina and R. J. Culas, "Impacts of Australia's free trade agreements on trade in agricultural products: an aggregative and disaggregative analysis," *Australian Journal of Agricultural and Resource Economics*, vol. 64, no. 3. pp. 889–919, 2020. doi: 10.1111/1467-8489.12377.
29. K. Ishikawa, "The ASEAN Economic Community and ASEAN economic integration," *Journal of Contemporary East Asia Studies*, vol. 10, no. 1. pp. 24–41, 2021. doi: 10.1080/24761028.2021.1891702.
30. W. Wei, T. Ali, M. Liu, and G. Yang, "Regional Comprehensive Economic Partnership Can Boost Value-Added Trade in Food and Non-Food Sectors in Asia–Pacific Economies," *Foods*, vol. 13, no. 13. 2024. doi: 10.3390/foods13132067.
31. V. Erokhin, G. Tianming, and A. Ivolga, "International Agricultural Trade: Products," *Shifting Patterns of Agricultural Trade: the Protectionism Outbreak and Food Security*. 2021. doi: 10.1007/978-981-16-3260-0_3.
32. H. M. Nguyen, N. H. Bui, and D. H. Vo, "The nexus between economic integration and growth: Application to vietnam," *Annals of Financial Economics*, vol. 14, no. 3. 2019. doi: 10.1142/S2010495219500143.
33. T. B. N. Nguyen, L. T. H. Thu, and P. Q. Nguyen, "The impact of new generation FTAS on the sustainable agriculture businesses in Vietnam: Case of EVFTA," *International Journal of Conservation Science*, vol. 11, no. 3. pp. 819–828, 2020. [Online].
34. M. Y. Shalaby, K. H. Al-Zahrani, M. B. Baig, and G. S. Straquadine, "Realizing sustainable agriculture through rural extension and environmental friendly farming technologies: Basic ingredients," *Bulgarian Journal of Agricultural Science*, vol. 18, no. 6. pp. 854–864, 2012. [Online].
35. H. Mahmood, M. S. Hassan, G. Meraj, and M. Furqan, "Agriculture's Role in Environmental Sustainability: A Comprehensive Review of Challenges and Solutions," *Challenges in Sustainability*, vol. 12, no. 3. pp. 178–189, 2024. doi: 10.56578/CIS120302.
36. M. Awais, X. Wang, S. Hussain, F. Aziz, and M. Q. Mahmood, "Advancing Precision Agriculture Through Digital Twins and Smart Farming Technologies: A Review," *AgriEngineering*, vol. 7, no. 5. 2025. doi: 10.3390/agriengineering7050137.
37. A. Chauhan and P. Tripathy, "Internet of Things (IoT) Integrated Solutions for environmentally friendly intelligent Farming: A Systematic Review," *2023 3rd International Conference on Advance Computing and Innovative Technologies in Engineering, ICACITE 2023*. pp. 2118–2123, 2023. doi: 10.1109/ICACITE57410.2023.10182525.
38. C. Li, J. Gao, L. Ge, W. Hu, and Q. Ban, "Do Geographical Indication Products Promote the Growth of the Agricultural Economy? An Empirical Study Based on Meta-Analysis," *Sustainability (Switzerland)*, vol. 15, no. 19. 2023. doi: 10.3390/su151914428.
39. H. Qie, Y. Chao, H. Chen, and F. Zhang, "Do geographical indications of agricultural products promote county-level economic growth?," *China Agricultural Economic Review*, vol. 15, no. 3. pp. 666–681, 2023. doi: 10.1108/CAER-08-2022-0187.
40. S. Suvannaphakdy, "Assessing the impact of the regional comprehensive economic partnership on asean trade," *Journal of Southeast Asian Economies*, vol. 38, no. 1. pp. 133–154, 2021. doi: 10.1355/ae38-1f.