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Evaluating The Effect Of Non-Tariff Measures On Agriculture Export - A Case Study Of Vietnam's Exports To The European Union

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Abstract: In this paper, we estimate the impact of non-tariff measures (NTMs) imposed by the EU on agricultural exports of Vietnam, focusing on two of the most practical measures, technical barriers to trade (TBT) and sanitary and phytosanitary (SPS) measures. Estimates were carried out for three groups of agricultural products (HS08, HS09, and HS10) at the 4-digit level of the Harmonized System using panel data from 2001 to 2020 in a gravity setting. The results show that SPS and TBT imposed by the EU have a positive and statistically significant effect on Vietnam's export of agricultural products. In which SPS has more impact than TBT measures. Each additional SPS measure applied by the EU will increase Vietnam's agricultural exports by 1.24%, while each extra TBT measure used by the EU will boost Vietnam's agricultural exports by 2.34%. On the product dimension, the export of product HS08 is positively affected when introducing a new SPS measure, and HS09 is positively affected when introducing a new TBT measure. The estimated results show that NTM has no statistically significant impact on the export of agricultural products with the code HS07. In the long term, NTMs do not affect Vietnam's agricultural exports.

Keywords: Non-Tariff Measures; Sanitary and Phytosanitary; Technical Barriers to Trade; Gravity model; Agriculture Export.

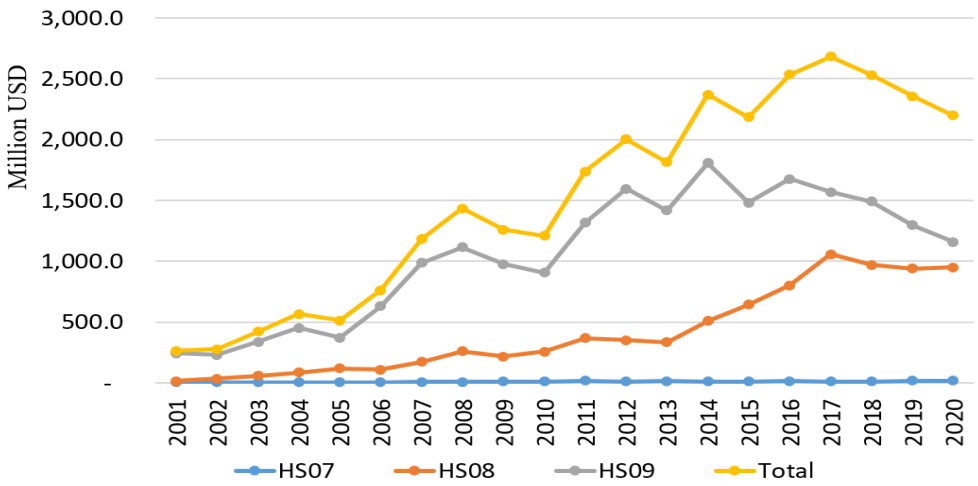
1. Introduction

While tariffs are reduced through regional integration, we are learning more about other obstacles to trade that are more obscure and have the potential to distort trade in agricultural sectors (Peterson, Grant, Roberts, & Karov, 2013). Technical measures such as SPS and TBT regulations are essential for many agricultural products due to the sensitive nature of issues such as food safety and the protection of plant and animal health (Peterson et al., 2013). Different countries apply different types of NTMs. Nevertheless, even the same type of NTM can have an import-promoting effect for one country and an import-dissipating effect for another (Grübler, Ghodsi, & Stehrer, 2016). Assessing the trade effects of NTMs among and within regions, countries, or firms remains a significant challenge for scholars worldwide. The debate on how and in which direction NTMs tend to influence trade is still a topic of interest to many researchers and policymakers (Santeramo & Lamonaca, 2019). Therefore, the economic literature continuously seeks to provide theoretical and empirical conclusions to the ongoing discussion on the actual impact of NTMs

on trade performance (Ronen & Economy, 2017). For developing countries, assessing the trade impact of NTMs has dramatic implications due to the substantial technological and financial constraints and insufficient market access they already face. This study will analyze the impact of the EU's NTM on the agriculture export of Vietnam for the following reasons:

Firstly, the exports to the EU are still low compared to Vietnam's export potential and the EU's import demand for this group of products. With 27 member countries and a population of about 516 million people, the annual demand for agricultural products by the EU is enormous. The total import turnover of agricultural products of the EU in 2020 is 246.8 billion USD, accounting for 36.3% of the total import turnover of the world. Meanwhile, agricultural exports from Vietnam to the EU reached 2.2 billion USD accounting for 0.89% of the total EU's import demand in 2020. Such a proportion shows that the value and turnover of Vietnam's agricultural exports to the EU are still low compared to Vietnam's export potential and the EU's import demand. Vietnam still has much room to promote the trade of agricultural products such as rice, coffee, processed products, and products with geographical indications in the EU market (Huong, 2022).

Figure 1: Export of Agricultural Products from Vietnam to the EU



(Source: Authors' calculation based on WTO data base)

Secondly, the EU is identified as one of the potential export markets for Vietnam's agricultural products. However, in recent years, the export value of this group of goods from Vietnam to the EU has decreased. Figure 1 shows that the export turnover of agricultural products from Vietnam to the EU continuously reduced from 2017-2021. This situation requires research to find out the factors that hinder Vietnam's agricultural exports to this market and propose solutions to continue promoting agricultural exports to this market.

Thirdly, in 2020, the EU-Vietnam Free Trade Agreement (EVFTA) officially came into effect. EVFTA is expected to create many opportunities for exporting Vietnamese goods in general and agricultural products in particular. There are still concerns that, besides the advantages of tariff preferences, Vietnam's agricultural exports still face obstacles from the EU's NTMs. These concerns stem from the fact that the EU is one of the most frequent users of NTMs, particularly in the agricultural sector (VCCI, 2019). These measures may increase the cost of agricultural

exports because Vietnam's agricultural export production is still unsustainable.

Our empirical aims to estimate whether the NTM imposed by the EU significantly impacted exports of Vietnam agricultural products. The remaining question has been whether the NTMs have facilitated or impeded Vietnam's agricultural product exports? How do the magnitude-specific types of EU's NTMs affect Vietnam's export of agricultural products? What difference is the level of impact of NTMs among groups of these products? Furthermore, is there a different impact of NTMs in the short-term and long-term?

The study focuses mainly on the most stringent measures (SBS and TBT) that the EU imposes on the potential agricultural products exports of Vietnam: Edible vegetables and certain roots and tubers (HS07), Edible fruit and nuts; peel of citrus fruit or melons (HS08), and Coffee, tea, maté and spices (HS09). These three categories of agricultural products were selected because these are the three main groups of agricultural products exported to the EU, accounting for more than 96% of Vietnam's total agricultural exports to this market in the 2001-2020 period. We expect that the estimation will contribute to a better understanding of how NTMs can potentially affect Vietnam's export of agricultural products, which is of paramount importance for Vietnam to design and implement better export-enhancing policies efficiently.

The remainder of this paper is structured as follows. Section 2 presents the basic theory of the impact of NTMs on exports and briefly summarizes the results of related studies. Section 3 outlines the econometric model and data sources, and section 4 describes empirical results and discussion. The final section provides the conclusion and policy implications.

2. Literature review

2.1. Theoretical impact of NTM on exports

Generally, NTMs are not imposed with a direct trade policy objective but to correct market failures. SPS measures protect human, animal, or plant life from risks arising from additives, contaminants, toxins, pests, and diseases, prevent or limit pests' spread, and protect biodiversity. TBT are regulations on product characteristics, related processes, and production methods. It may also include or deal exclusively with terminology, symbols, packaging, marking, or labeling requirements as they apply to a product, process, or production method (UNCTAD, 2019). The effect of an NTM on trade is ambiguous, as it can be trade-facilitating in the presence of positive externalities or trade-hindering when used as a protective measure (Akintola, Boughanmi, Antimiani, Zaibet, & Kotagama, 2021).

NTMs might promote trade if they can reduce information asymmetries and externalities, mitigating risks in consumption (Bratt, 2017; Ghodsi, Gruebler, & Stehrer, 2016; Grübler et al., 2016; Ronen & Economy, 2017). Some items, such as labeling requirements, provide additional information to consumers, potentially shaping consumption patterns and increasing trust, which might be trade-promoting. Standard like SPS and TBT measures may bear the potential of quality upgrading, which in turn increases import demand and boosts trade (Dolabella, 2020; Ronen & Economy, 2017; Xiong & Beghin, 2012). The existence of technical measures could enhance the flow of goods by providing reassurance to potential foreign purchasers. Exporters and domestic producers differ in their capacities to cope with new standards. Therefore, implementing a new NTM might, in the end, increase the imports of the NTM-imposing country (Popper, Greenfield, Crane, Malik, & Technology, 2004). Setting standards for products and that if the exporting country meets these standards, it will increase consumer confidence and reduce transaction costs. Then, the implementation of an NTM can improve the country's export (Peterson et al., 2013).

From hindering effect, in general, NTMs are imposed by governments for a variety of legitimate objectives that may have nothing to do with international trade but still create trade frictions and serve protectionist motives (Ronen & Economy, 2017). NTMs were thought to have a direct negative trade impact and were commonly denominated as non-tariff barriers. Some items are, by definition, trade restrictive, such as import prohibitions and quotas (Looi Kee, Nicita, & Olarreaga, 2009). NTMs create additional hurdles for current and potential exporters to overcome by raising the costs of producing export-oriented goods. When a new NTM is imposed, firms will likely incur additional charges to comply with this measure. This is reflected by a shift to the left in the supply curve, initially raising prices and reducing quantities (Crivelli & Gröschl, 2016; Ghodsi, Grübler, Reiter, & Stehrer, 2017; Xiong & Beghin, 2017). An NTM implemented in the destination country implies higher compliance costs and import prices. If the difference between import prices pre- and post-NTM is greater (smaller) than the difference between domestic prices pre- and post-NTM, domestic producers face more minor (greater) implementation costs and obtain greater (lower) profits than foreign producers. The NTM acts as a barrier (catalyst) for trade if it reduces (increases) domestic imports (Swinnen & Vandemoortele, 2011).

A particular NTM is said to increase trade if its demand-enhancing effect dominates its trade-cost effect, while it is said to hinder trade if the former falls short of the latter.

NTMs can potentially have an economic effect on international trade in goods, changing quantities traded, prices, or both (UNCTAD, 2019). The direction, as well as the extent to which NTMs impact trade, depend on multiple elements, among which are the specific type of measure, the product or sector, the size of exporting firms, the country affected, and the country applying the measure (Bratt, 2017; De Melo & Shepherd, 2018; Dolabella, 2020; Ghodsi et al., 2017; Looi Kee et al., 2009; Peterson et al., 2013). The effects of NTMs also vary between short-term and long-term (Su, 2021).

Empirical studies use a variety of methods to estimate the impact of NTMs on international trade, including the Partial Equilibrium Framework (Beghin, Disdier, Marette, & Van Tongeren, 2012; Ghodsi, 2015a; Van Tongeren, Beghin, & Marette, 2009), Computable General Equilibrium models (Francois, Manchin, & Norberg, 2011) and Gravity Models (Chen, Yang, & Findlay, 2008; Disdier, Fontagné, & Mimouni, 2008; Disdier, Tai, Fontagné, & Mayer, 2010; Essaji, 2008; Ghodsi, 2015b; Grübler et al., 2016; Matthews, Salvatici, & Scoppola, 2017; Ronen & Economy, 2017; Yousefi & Liu, 2013) (Peterson et al., 2013). Among those methods, the GM model has been widely employed due to the availability of data as well as the feasibility of the model.

2.2. Empirical impact of NTMs on agricultural exports

Studies verify that although the magnitude of the trade effects may vary, the majority of the recent empirical research asserts the dominance of the trade-restricting effects of NTMs on the agriculture sector (Chen et al., 2008; Crivelli & Gröschl, 2012; Disdier et al., 2008; Ferro, Otsuki, & Wilson, 2015; Grübler et al., 2016; Looi Kee et al., 2009; Peterson et al., 2013; Ronen & Economy, 2017; Santeramo & Lamonaca, 2019; Su, 2021). A more significant adverse effect is pronounced in developing countries (Disdier et al., 2008; Ferro et al., 2015; Grübler et al., 2016; Li & Beghin, 2012). SPS and quantitative measures imposed on agricultural goods tend to have a sizeable negative effect than other NTMs (Grübler et al., 2016; Ronen & Economy, 2017).

Ferro et al. introduce a standards restrictiveness index to analyze the impact that food safety standards have on international exports of agricultural products. Their new measure of standards restrictiveness is created using maximum residue levels of pesticides for 61

importing countries and 66 different products. The findings suggest that, on average, more restrictive measures are associated with a lower probability of observing trade. However, after testing for sample selection and the proportion of exporting firms in a gravity model, the analysis finds that the effect of standards on trade intensity in most cases is indistinguishable from zero. The results also suggest that exports from developing countries are particularly constrained by stricter standards (Ferro et al., 2015). Chen et al. used a gravity model to evaluate the effect of the residue standards on China's export of vegetables and aquatic products. The results show that these measures imposed by importing countries harm China's export of agricultural products. The trade effect of food safety standards is much more significant than the import tariff (Chen et al., 2008).

Santeramo et al. assess the impact of SPS and TBT regulations and standards estimating for Chilean fresh fruit exports that incorporates a stringency-perception index that comprises different dimensions of trade requirements. The results suggest that an increase in stringency has a negative and substantial effect on exported volumes, and the reduction is higher if stringency increases in developed countries. Results also showed that different dimensions affect trade differently (Santeramo & Lamonaca, 2019). Yang Su evaluates the impact of green trade barriers on the export of agricultural products. The empirical results show that implementing green trade barriers will lessen the export quantity of farming products and raise the sell abroad price. In the long run, implementing green trade obstacles will promote scientific and technological progress, increase the export of agricultural products and expand diversified markets (Su, 2021). Using a set of variables identified in academic literature, Wood et al. analyze the effect of SPS on New Zealand, U.S., Korean, and Japanese agricultural exports to China. The key findings from the empirical projection show that Chinese SPS measures have a negative, albeit insignificant, effect on the whole sample. The SPS measures have a negative effect on Japan and the U.S., while from a Korean perspective, their impact was positive and significant. As part of a secondary analysis, it was interesting to note that the SPS measures had a positive effect on New Zealand's exports before its free trade agreements (FTA) with China came into force (Wood, Wu, Li, & Jang, 2017). Julia Grübler et al. (2016) examine the impact of NTMs on imports of 103 WTO member countries from 2002-2011. The study applies the GM model to estimate the impact levels of each type of NTM and compares the impact of NTMs to see if there is a difference between intermediate products and final goods. The results show that NTM promotes trade in industrial products while restricting trade in agricultural products. Rich countries adopt more NTMs than poorer countries, and developed countries are affected by smaller NTMs than developing countries. The results also show that quantitative restrictions have a more pronounced trade-restrictive effect than other NTMs. Li & Beghin find that the demand effects of TBT and SPS on the agriculture-food sector are less likely to be favorable than in other sectors. Predominantly, a more significant negative effect is on agriculture and food which arrives from developing countries (Li & Beghin, 2012). Xiong et al. find no evidence of the EU MRL having a significant negative trade impact on these groundnut exports from Africa across various estimation methods. African domestic supply plays a vital role in determining the volumes of trade and the propensity to trade. Their findings suggest that the trade potential of African groundnut exporters is more constrained by domestic supply issues rather than by limited market access (Xiong & Beghin, 2012).

However, a finding by Jacob et al. (2017) studied the influence of TBT and SPS measures on exporting Japanese and Korean goods to the Chinese market. The result reveals that China's SPS measures help improve the quality and safety

of agricultural products imported into China and increase the value of Korean agricultural exports to the Chinese market (Wood et al., 2017). Crivelli & Groschl (2012**)** show that while SPS measures imposed on agricultural goods affect the extensive margin negatively, their aggregate effect is positive, conditional on market entry (intensive margin). Their paper also shows that the impact of SPS measures on the intensive margin of trade varies across exporters in a way that some exporters benefit while others lose from such measures (Crivelli & Gröschl, 2012). Everett Peterson et al. (2013) uses the GM model to evaluate the impact of US SPS measures applied to fresh fruits and vegetables on US imports of this product. The authors analyze 47 fresh fruit and vegetable products imported from 89 exporting countries from 1996-2008. The results show that SPS measures generally reduce exports to exporting countries with little experience accessing the US market. The export-restrictive impact of these measures is significantly reduced for exporting countries with more extended access to the US market and accumulated experience when exporting to the US market. This study also provides a coefficient determining the level of market access at which SPS measures can promote trade. The research results also show that at least two-thirds of export partners to the US can overcome the trade-restrictive impact of all the SPS measures that this country has put in place to promote exports to this market (Peterson et al., 2013).

In Vietnam, research by Nguyen Viet Khoi et al (2014) shows that the impact of NTMs on exporting agricultural products includes both negative and positive effects. The negative impact is reflected in the point where environmental standards have become a challenge for Vietnamese agricultural products when based on common ground, Vietnamese agricultural products have not yet met those technical standards. But also, thanks to strong signals from the market, in the long term, the ability of exporters to meet technical standards will allow Vietnamese agricultural products to increase in value, thereby encouraging growers and businesses. Agricultural agriculture changes perspective, development strategy, and even technological innovation in order to increase the value of exported agricultural products (Viet & Thanh, 2014).

In this article, we differentiate major categories of EU's NTMs applied for agricultural products, which can provide better insights into the implications of using different NTMs. In addition, our analysis is based on the intensity of use of NTM types by counting the number of imposed NTMs. This study quantifies and compares the trade volume effects of two of the most frequently used NTMs, TBT and SPS measures.

3. Research methodology

3.1. Estimation model

In order to evaluate the impact of NTMs, we consider a panel of export flows from Vietnam to the EU at a 4-digit product level. The panel range spans the period 2001-2020. Following the common practice in the literature, we employed the gravity model. The model in the logarithmic form is as follows:

$$\ln(\exp_{pt}) = \beta_{0p} + \beta_{1p}\ln(1 + t_{pt_{-k}}) + \sum_{n=1}^{N-1}\beta_{2p}^{n}NTM_{pt_{-k}}^{n} + \beta_3 expsh_{pt} + \beta_4 impsh_{pt} + \beta_5 \ln(reer_t) + \beta_6 \ln(gdp_t^{EU}) + \beta_7 \ln(gdp_t^{VN}) + \omega_t + \omega_p + \mu_{pt} \quad (1)$$

In which ln is the natural logarithm, p indicates the product type, k means the time lag, and t refers to the year;

exp_{pt}, is an independent variable, stands for the exports value of product p from Vietnam to EU at time t;

$t_{pt_{-k}}$ refers to the ad valorem tariff imposed by the EU against the import of product p at time t_{-k}; $NTM^{n}_{pt_{-k}}$ denotes the number of an NTM type (n) applied by the EU to product p imported from Vietnam in year t_{-k}. The expected effect of the tariff on export is negative while the effect of the NTMs cannot be clearly determined. If the number of NTMs increases, the import requirements will become more stringent and adversely affect the export of agricultural products. However, as the analysis in the above research overview shows, NTM can promote the exporting country to produce export products that better meet the standards of the importing country and the import demand for the product increases.

In addition to trade policy instruments $t_{pt_{-k}}$ and $NTM^{n}_{pt_{-k}}$, we control for country characteristics that are changing over time:

$expsh_{pt}$ and $impsh_{pt}$ are the share of Vietnam's export share and EU's import share in the world trade's value of product p in year t, respectively. This can be viewed as a proxy of importer's and exporter's market power for each particular product. The intuition of how market shares of importers and exporters in the world market will affect trade with an imposition of a new NTM presents contradictory forces. When imposing a new NTM, a sizeable importing country's market power could mean higher compliance costs for exporting countries and a more considerable negative trade impact since they do not have many other options to export to. However, suppose a specific country concentrates on a large number of the world's demand for a product and imposes an NTM. In that case, it is more difficult for exporting countries to divert their products to other markets, leading to a bigger effort to comply with the NTM and a potential smaller negative or larger positive trade effect. Similarly, the exporter's market share also plays a role in this narrative. The bigger the exporter's market power, the easier it is for them to divert their exports to another third country, which could also imply in a larger negative or smaller positive impact on the bilateral trade (Dolabella, 2020).

$reer_t$ represents Vietnam's real effective exchange rate at year t. We expect the sign of this coefficient to be negative because an increase in the exchange rate will make exports more expensive for consumers in the EU market and the EU's demand for agricultural products imported from Vietnam will decrease.

gdp_t^{VN} and gdp_t^{EU} reflect the gross domestic products of the EU and Vietnam at year t. These variables stand for the market potential (Dolabella, 2020). Variables $gdp_t^{VN}$is proxied for Vietnam's supply capacities, and $gdp_t^{EU}$is proxied for EU's absorption capacity. These factors are expected positively affect Vietnam's export of agricultural products.

We also consider economic shocks influencing Vietnam's export flows to the EU's market by including ω_t as the time-fixed effect in the equation. We also add dummy variables by product group, ω_p, to the model. These dummy variables are included in the model to increase the reliability of the estimate and control possible deviations outside the model.

Because the demand takes time to react to policy changes and for some NTMs, reverse causality should be a barrier to the estimation of the actual NTM effect (Ghodsi et al., 2016). The lagged value of an NTM is expected to lessen this problem (Dolabella, 2020). In the regression model, we choose to back variables t and NTMs with one and five-year lag. A One-year lag assesses the impact of NTM in the short term, and a five-year lag evaluates the impact of NTM in the long term. We estimate Equation 1 for each product p at the 4-digit level of the HS, so the constant β_{0p} represents product fixed effects.

The coefficients of our estimation show how much the ln of export value is expected to decrease or increase due to an additional NTM. In order to show the effects on export value, we transform our coefficients according to Equation

1, such that Export Effects (EE) can be interpreted as changes in percentages:

$$EE_p^n \text{in } \% = \left(e^{\beta_{2p}^n} - 1\right)x100 \quad (2)$$

The problem of estimating equation (1) arises when there are zero trade flows. Neglecting zero trade flows leads to skewed counterparties due to sampling selection problems, especially if the reason for the existence of trade is zero related to the cost of the trade. In this case, the Poisson Pseudo-Maximum-Likelihood (PPML) estimation method will help to overcome the problem (Silva, Tenreyro, & statistics, 2006). The PPML resolves issues arising from the Rezo trade and produces a consistent estimate that is easy to interpret. We choose the PPML panel fixed effects and controls for country-pair time-invariant characteristics to estimate the parameters. So the effect of traditional gravity variables such as distance, dummies of common language, common border, and common colonizer, among others, cannot be estimated but are fully taken into account and cannot bias other estimates (Dolabella, 2020). The model selection is evaluated based on the standard error values of the parameters in the regression model to see the accuracy of the estimates in the model.

3.2. Data sources

Trade data was taken from the Commodity Trade Statistics Database (COMTRADE) and was complemented by the ITC database. This source provides data on the export value of countries to partners by year and by commodity group detailed up to the 6-digit HS code. In our study, we collect data on the export value of 3 main groups of agricultural products with 4-digit HS codes. This source also provides the total export and import value of each country's goods by year, allowing the author to calculate the share of Vietnam's exports and the EU's import share of each group of agricultural products in the total world turnover.

NTM notifications to the WTO come from the WTO's Integrated Trade Intelligence Portal (I-TIP). This data source provides the 136 NTMs that WTO members offer for each commodity group (details to products with 6-digit HS codes). We use counter variables for each type of EU NTM corresponding to each line of Vietnamese agricultural exports.

Ad valorem tariffs at the HS 4-digit level were retrieved from Trade Analytical Information System (TRAINS) and the WTO's Integrated Data Base (IDB) provided by the World Integrated Trade Solutions (WITS) platform. We use the average of all Ad valorem duties in the HS code.

Data on GDP was retrieved from https://data.worldbank.org/indicator. The latest update of the WB includes data for 2021, which constrains our analysis to the period 2001 to 2020. Real GDP per capita at chained PPP in 2015 mil.USD was used for the estimation.

Real GDP at chained PPP in 2015 mil.USD was used for the computation. And data on Real Effective Exchange Rate is made available by Bruegel at https://www.bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database/.

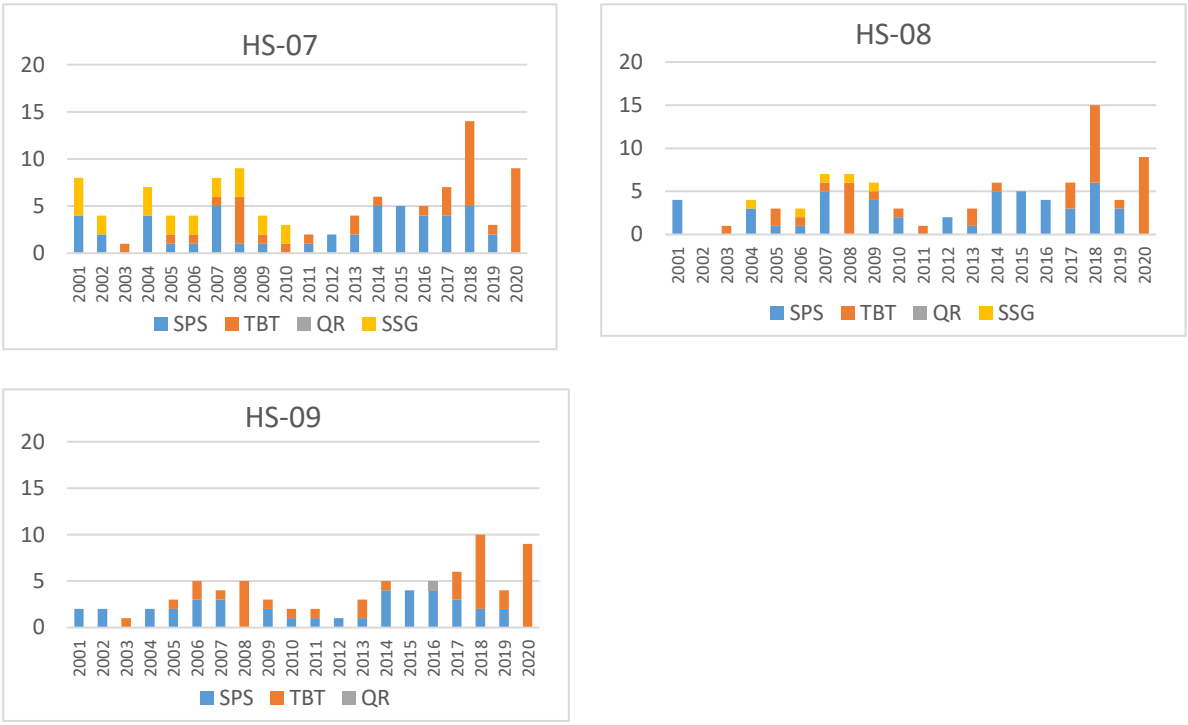
4. Empirical Results and Discussions

4.1. EU's NTM notifications

Figure 2 depicts the total number of annual NTM notifications that the EU applies to Vietnam's agricultural exports in particular and all agricultural products imported (with codes HS07, HS08, and HS09) in the period 2001-2020. As shown in the Figure, SPS and TBT measures were the dominant applied form of NTM and increased during the period under investigation. Special Safeguards (SSG) measure is mainly applied to commodity groups with HS07 code. However, from 2011 to now, this measure is no longer applied by the EU. Quantitative

restrictions, though small in number, are mainly applied to product code HS09 in a few years.

Figure 2: Number of the EU's NTM notifications on Agriculture Products by the NTM type



Source: Author' calculations based on the I-TIP

We cannot confirm the increasing trend of NTMs for agricultural products that the EU informed the WTO during the period. However, the data shows a fluctuation and an increasing trend of NTMs in recent years. From 2013 to 2017, the number of NTMs notified by the EU ranged from 3 to 7 NTMs per commodity group. In 2018, this number increased and ranged from 10 to 18. The number of NTMs notified by the EU dropped to less than 5 NTMs in 2019, then increased to 9 in 2020 for all three commodity groups. The data also shows that the EU has applied TBT more in the last five years.

4.2. Econometric results

We considered four different models for our analysis. The first model estimates the entire sample, and the following models assess for three particular product groups code HS07, HS08, and HS09. The first model aims to assess the impact of NTMs on Vietnam's agricultural exports to the EU in general, while the remaining three models aim to assess the impact of NTMs on each product group. The separate assessment for each product group will allow comparison of the impact of NTM between different groups of agricultural products.

Within these 2-digit HS code groups of agricultural products, we collect export data from Vietnam to the EU for 4-digit HS code products with export value > 0 in most years from 2001-2020. When excluding observations with zero export flows for each of these product lines, the number of observations included in the entire sample is 488. The number of observations for the three remaining models for each sub-sample product group HS07, HS08, and HS09, are 155, 180, and 153 respectively. Then, we estimate the

effect of NTMs on the export of Equation 1 using the PPML estimator.

Table 1 summarises our estimation results, reporting the estimated coefficient and robust standard errors. Column (A) shows the results for the total sample, and the three right columns present the regression results for three sub-samples of product groups HS07 (column B), HS08 (column C), and HS09 (column D), equivalent.

The estimated coefficients for tariff, export share, and real effective exchange rate have the correct sign and are statistically significant across almost specifications (except group product HS08).

The higher the import tax rate, the more it will reduce Vietnam's agricultural exports. The application of tariffs by the EU on Vietnamese agricultural exports will also reduce the competitive advantage between Vietnamese goods and other competitors (in case these exporting countries are not subject to import tax or only to a lower import tax rate).

The coefficient of REER is negative, indicating that a higher value of a VND against a weighted average of several foreign currencies will lose the price competitiveness of Vietnamese agricultural exports, resulting in a decline in agricultural exports.

The more significant the proportion of Vietnam's agricultural exports in the world market, the more it will promote Vietnam's agricultural exports to the EU. We explain this result that Vietnam is one of the major exporters of agricultural products in the world. The cost of complying with a new NTM should be lower since it is more likely to have extra resources to comply with new measures, resulting in a positive trade effect.

The estimated coefficient for import share has a positive sign for the entire sample model and two specifications models for HS07 and HS09. This result shows that, in general, the greater the market power of the importing country, the more it will promote Vietnam's agricultural exports to that market. The explanation for this result is that the EU market is identified as one of the target markets to promote agricultural exports of Vietnam, especially for two commodity groups (HS07 and HS09). Therefore, the additional EU's NTM led to a more considerable effort of exporters to comply with the NTM and a positive trade effect. On the other hand, for the HS08 product group, the sign of this coefficient is opposite to the initial expectation: the larger the import share, the more it will reduce Vietnam's exports to the EU market.

The explanatory variable GDP of Vietnam has unexpected signs for three of the four models. The regression coefficients for this variable are not statistically significant, so we conclude that the GDP of Vietnam does not affect agriculture export. The sign of the EU's GDP variable is negative and statistically significant. This regression result also contradicts the initial expectation that higher market size and purchasing power in importing countries will increase the demand for Vietnam agriculture goods. However, we can explain from the perspective that, as GDP increases, consumers' requirements for standards for agricultural products increase. European consumers will tend to import agricultural products in the higher quality segment. Meanwhile, for Vietnam's agricultural exports, the quality is still unstable. There are still situations where shipments to the EU are forced to return due to violations of EU quality standards.

Table 1: Estimation Results of EU's NTMs Applied to Vietnam's Agricultural Export

	(A) Whole sample	(B) HS07	(C) HS08	(D) HS09
Ln (1+tar_1)	-0.0557***	-0.125***	0.0285	-0.0490**

	(0.0157)	(0.0394)	(0.0378)	(0.0247)
SPSt_1	0.0123*	-0.00388	0.0534***	-0.000147
	(0.00694)	(0.0146)	(0.0123)	(0.00730)
TBTt_1	0.0231*	-0.00782	0.0392	0.0333***
	(0.0128)	(0.0242)	(0.0319)	(0.00969)
SPSt_5	0.00867	-0.00396	0.0185	-0.00664
	(0.00776)	(0.0160)	(0.0158)	(0.0100)
TBTt_5	0.00616	0.00701	0.0257	-0.00866
	(0.0167)	(0.0249)	(0.0362)	(0.0172)
Impsh	1.168***	1.690***	-1.234***	1.626***
	(0.0922)	(0.190)	(0.364)	(0.129)
Expsh	2.585***	3.399***	1.635***	1.865***
	(0.121)	(0.354)	(0.318)	(0.140)
Lreer	-3.896	3.358	-11.61*	-3.784**
	(2.651)	(5.020)	(6.602)	(1.903)
Lgdpeu	-2.685*	1.207	-6.972*	-3.103***
	(1.531)	(3.093)	(4.163)	(1.095)
Lgdpvn	-0.637	1.206	-2.120	-0.683
	(0.680)	(1.266)	(1.610)	(0.456)
Year	N	N	N	Y
Constant	48.13*	-31.60	131.7*	51.84***
	(26.70)	(54.04)	(73.46)	(17.43)
Observations	488	155	180	153
R-squared	0.618	0.404	0.673	0.770

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Source: Authors' estimation)

We now consider the effects of SPS and TBT on the agricultural export flow from Vietnam to the EU. We begin by considering the estimation results in column A of Table 1. The coefficients for the SPS and TBT are positive and statistically significant, indicating that these measures contribute to promoting Vietnam's agriculture exports. This result contradicts concerns that NTMs will hinder Vietnam's agriculture exports. NTMs may optimize the industrial structure of Vietnam's agricultural products and promote innovation in agricultural products-related enterprises. Under the influence of the current innovation-driven development strategy, strengthening the company's concern for product quality awareness and promoting enterprise innovation is in line with the current development strategy of Vietnam. Vietnam's export standards can be improved for Vietnam in the face of NTMs, using various measures to promote the various aspects of products, such as research and development, production, packaging, sales, and improved products. Vietnam has formed large specialized farming areas to produce agricultural export products. Many agricultural products, notably coffee, tea, and some fruits of Vietnam, have been produced and processed according to standard processes to meet the requirements of NTMs applied by EU countries. Therefore, the EU's application of more NTMs creates an incentive for export enterprises to improve production technology, giving Vietnam's agricultural products an advantage over competitors. This result is consistent with a "learning-by-doing" framework, whereby exporters can treat shipments more efficiently as

their cumulative experience grows (Peterson et al., 2013). The empirical result is also consistent with the assumption that meeting strict standards for imports will increase the producer's fixed costs to a certain extent. Once manufacturers adjust their production to reach this threshold, the imposition of new standards will not hinder exports to that market.

In columns (B), (C), and (D), we evaluate the impact of NTMs for each commodity group with HS codes HS07, HS08, and HS09, respectively. Although, according to the overall sample estimation results, both SPS and TBT positively impact agricultural exports. However, the results show significant differences in each group of goods. While SPS has a positive and statistically significant impact on exports of HS08, this measure does not affect exports of product codes HS07 and HS09. Meanwhile, the TBT measure only has a positive and statistically significant impact on exports of products code HS09 and does not affect exports of products code HS07 and HS08.

The results of all four regression models show that the coefficients of the SPS and TBT with a 5-year lag are not statistically significant. From this result, we suppose that the SPS and TBT measures applied by the EU have no impact on Vietnam's agricultural exports in the long run.

Table 2: Export Effect of TBT and SPS in percentage

EE (%)	**TBT**	**SPS**
Total	2.34	1.24
Edible vegetables and certain roots and tubers (HS07)	Non_effect	Non_effect
Edible fruit and nuts; peel of citrus fruit or melons (HS08)	Non_effect	5.49
Coffee, tea, maté and spices (HS09)	3.39	Non_effect

(Source: Authors' calculation based on the estimation results)

Table 2 shows the change in percentage of export value when there is an additional TBT or SPS notification to the WTO. Generally, when there is one more SPS or TBT measure notification by the EU, Vietnam's agriculture exports to the EU will increase by 1.24% and 2.34%, respectively. For the product dimension, an additional SPS notification will increases export of product code HS08 by 5.49%, and one additional of TBT notification will increase exports of products code HS09 by 5.02%.

5. Conclusion and policy implication

The results of this study provide further evidence that not all NTM measures lead to trade restrictions, especially for trade in agricultural products. Once the exporting country has accumulated enough experience to adapt to the importing country's standards, further imposition of NTM measures should not impede exports. For Vietnam, some conclusions and policy implications drawn from the results of this study are as follows:

Firstly, the EU's TBT and SPS measures promote Vietnam's agricultural exports to this market. The result proves that Vietnam's agricultural sector has accumulated enough experience to overcome the threshold of NTM measures that hinder exports. Currently, many Vietnamese enterprises have proven that the quality of their products meets the requirements of the EU, in line with the tastes of the EU people, such as cashew, coffee, vegetables, dragon fruit, and litchi. However, in the future, Vietnam's agricultural products may

continue to face other NTM measures that may restrict exports. For export enterprises, it is necessary to have a proactive and long-term solution to TBTs and other NTMs.

Secondly, when there is an improvement in income, EU consumers tend to increase the import demand for high-quality agricultural products. Therefore, to promote the export of agricultural products to the EU market, Vietnamese enterprises producing agricultural products for export need to apply international standards in production and processing. For the EU market, goods need to meet very high technical standards, in which it is necessary to pay attention to policies related to environmental protection, energy saving, and labor standards. Enterprises need a research strategy to improve quality, innovate technology in producing and processing agricultural products for export, and increase the export proportion of processed agricultural products. From a national perspective, it is necessary to develop national standards harmoniously with international standards.

Thirdly, tariffs have a substantial impact on agricultural exports. Therefore, when the EVFTA comes into effect, the tax barrier will be removed to zero, which will be a positive factor for Vietnam's exports. To take advantage of this advantage, Vietnam needs to continue to improve product quality, strictly follow production processes to ensure stable product quality, and better meet the increasing demands of consumers in the EU market. On the State side, it is necessary to strengthen trade promotion measures and implement programs to promote Vietnamese agricultural products to partners in the EU market.

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