Economics and Finance in Indonesia

Volume 69
Number 2 *December 2023*

Article 3

12-1-2023

The Effect of Export-Related Measures on Indonesian Export of Palm, CPO, and Its Derivative Products

Edy Krismanto Sipayung
Universitas Indonesia, Indonesia, edykrismanto36@gmail.com

Christina Ruth Elisabeth
Universitas Indonesia, Indonesia, ruth.elisabeth98@gmail.com

Economics and Finance in Indonesia
Vol. 69 No. 2, December 2023 : 113–127
p-ISSN 0126-155X; e-ISSN 2442-9260

The Effect of Export-Related Measures on Indonesian Export of Palm, CPO, and Its Derivative Products

Edy Krismanto Sipayung[a], & Christina Ruth Elisabeth[a,*]

[a] *Universitas Indonesia, Indonesia*

Manuscript Received: 21 December 2023; Revised: 13 March 2024; Accepted: 21 March 2024

Abstract

This study investigated the effect of Export-Related Measures (ERMs) imposed by the Government of Indonesia on the export volume and value of palm, Crude Palm Oil (CPO), and its derivatives products utilizing the export data of Indonesia to 194 destination countries in the 2011–2020 period. This study combined the dataset of ERMs from the United Nations Conference on Trade and Development (UNCTAD) database and relevant Indonesian regulations. The results reveal that ERMs have a positive and significant effect on both the export volume and value of Indonesian palm, CPO, and its derivatives products. The price-raising effect or costs of ERMs in these products is relatively high, approximately 38.36%. However, the price-raising effect remains lower than the market-creating effect, as confirmed by the estimation results of indirect country characteristics. This study proposes a policy to strengthen the capacity of exporters to comply with ERMs and to harmonize the ERMs in Indonesia with import measures imposed by export destination countries.

Keywords: AVEs, Conformity assessment institution, Export-Related Measures, Indonesia, Palm, CPO, and its derivatives products

JEL classifications: I38; O12; O22

1. Introduction

Indonesia has actively engaged in multilateral, regional, and bilateral trade negotiations in the last two decades, resulting in tariff reductions. In 2019, the average Most Favoured Nation (MFN) tariff in Indonesia was 8.6%, decreasing significantly from 15.3% in 1995 when Indonesia first joined the World Trade Organization (WTO) (WITS 2022). However, non-tariff measures (NTMs) in Indonesia tend to increase over time. In 2018, Indonesia reported 977 NTMs, marking a considerable surge from 767 NTMs in 2015 (Munadi 2019). Among them, the most commonly imposed types are Technical Barriers to Trade (TBT) (44.7%), Sanitary and Phytosanitary (SPS) (24.5%), and Export-Related Measures (ERMs) (12.7%). Currently, the Government of Indonesia (GOI) implements more ERMs on raw commodities or commodities with low added value. According to the World Bank, approximately 33.67% of exported products are subject to at least one ERM. The export value of these products covers 59.75% of the total export of Indonesia.

This study examined the effect of ERMs applied by GOI on the export of palm, Crude Palm Oil (CPO), and its derivatives products during the 2011–2020 period. They were chosen as the focus of this study due to their significant contribution to the export sector of Indonesia. Indonesia is the top global exporter of palm, CPO, and its derivatives products. In 2020, the export value of these products reached 21.6 million USD, covering 14% of total non-oil and gas exports of Indonesia. The global demand for these products tends to rise because they are important raw and intermediate inputs in manufacturing industries. In 2020, the export volume of these

* Corresponding Address: Jakarta, Indonesia . Email: ruth.elisabeth98@gmail.com.

products reached 38.5 million tons, marking an increase from 24.1 million tons in 2011. Despite the significant contribution of these products to Indonesian export, GOI has continued to enforce intensive ERMs on these products. Therefore, it is interesting to explore whether ERMs enforced by GOI have a demand-enhancing or a trade-impeding effect on exports. On the other hand, in addition to impeding trade flows due to price rises from additional costs, several NTMs can simultaneously overcome market imperfections and bolster welfare. NTMs can also mitigate existing information asymmetries and negative externalities, boost consumer confidence, reduce transaction costs for consumers, and ultimately enhance trade.

The types of ERMs imposed on palm, CPO, and its derivatives products vary. In general, ERMs cover both technical and non-technical measures. Technical measures aim to ensure product safety for SPS or TBT reasons. Technical ERMs include requirements related to registration, product quality, safety, performance, testing, inspection and certification, and passage through the specified port of customs for exports (UNCTAD 2019). Furthermore, the proportion of products affected by ERMs in this product group is notably high. Based on data calculation, in 2020, approximately 79% products were impacted by at least one ERM, constituting 80% of the export value of these products.

This study also investigated the institutions responsible for verifying the conformity assessment of ERMs. In 2019, GOI issued a regulation mandating verification by government agencies, a task previously managed by private institutions. This institutional change is expected to simplify the export process, ensure the quality of exported goods according to standards, and support the expansion of Indonesian exports to global markets. This study attempted to empirically examine the effectiveness of this regulation.

This study contributes to the literature on the impact of NTMs on trade flows using pre-existing methods. This study measured the effect of ERMs on specific products, a perspective that has not been widely explored. Research focusing on ERMs on specific products such as palm, CPO, and its derivatives products is important because the impact of NTMs on agri-food trade can vary depending on the types of NTMs, proxies for NTMs, and the level of details of analysis (Santeramo & Lamonaca 2019).

This study differs from the existing literature. First, to the best of the knowledge of the authors, this study is the first attempt to analyze the effect of all types of ERMs on both the value and volume of a specific product within a particular country. The most relevant research is conducted by Santeramo et al. (2019), examining the effect of all ERMs and specific types of import measures enforced by various countries on the value of wine trade. Second, this study employed a more detailed product code (HS 8-digit) to calculate the intensity indexes (Coverage Ratio and Frequency Index) on the HS 6-digit level. An analysis using a more specific HS product code can provide more accurate predictions (Santeramo & Lamonaca 2019). Previous research by Elisabeth & Verico (2022) calculates these indexes at a more aggregate level of the HS 4-digit. Another previous research by Wood et al. (2017) calculates the indexes at the HS 2-digit level. This study also contributes to updating the ERMs database of UNCTAD TRAINS, which serves as the main ERMs data source for this study. This database had not been updated since 2018, thus the authors manually updated the data by incorporating new relevant regulations affecting the export of palm, CPO, and its derivatives products and removing the repealed regulations. Third, this study offers a more comprehensive analysis using three ERMs quantification methods, namely intensity index, Ad-Valorem Equivalents (AVEs), and indirect country characteristic approach. To provide a more valid conclusion regarding the effect of ERMs, this study compared the effect of ERMs on price, as quantified by AVEs, and the results of ERMs estimation using intensity index and indirect country characteristics. Santeramo et al. (2019) focus on assessing the trade effect of ERMs and other import measures without estimating AVEs, while Elisabeth

https://scholarhub.ui.ac.id/efi/vol69/iss2/3
DOI: 10.47291/efi.2023.08

et al. (2020) solely rely on the intensity index to measure the effect of NTMs on the productivity of Indonesian manufacturing firms. In contrast, AVEs are widely utilized to identify the costs of complying with import measures, as demonstrated by Cadot, Gourdon & Tongeren (2018), Ghodsi, Grübler & Stehrer (2016), and Ing & Cadot (2017).

Lastly, this study investigated the role of institutions in verifying the conformity assessment of ERMs. The hypothesis tested in this study is whether government institutions are better at verifying the conformity of ERMs than private institutions. A study by Liepiņa, Lapiņa & Mazais (2014) concludes that the essential determinants of successful verification are competent skills and the utilization of valid tools, rather than the types of the institutions.

The rest of this paper proceeds as follows. Section 2 reviews the relevant literature. Section 3 outlines the empirical strategies and presents a detailed explanation of the data used in the study. Section 4 describes and discusses the empirical findings. Section 5 encapsulates the key findings and concluding remarks.

2. Literature Review

The empirical literature regarding the impact of NTMs on trade flows has produced mixed evidence, pointing to both positive or negative effects (Beghin, Disdier & Marette 2015; Devadason 2011; Ederington & Ruta 2016; Ghodsi, Grübler & Stehrer 2016; Korinek, Melatos & Rau 2008; Melo & Shephard 2018; Santeramo 2019; WTO 2012). The impacts of NTMs specifically depend on the implementing country, the type of NTMs applied, and the characteristics of the commodity. For instance, technical measures and standards generate ambiguous impacts on trade, namely positive, negative, or neutral. Disentangling their ultimate nature requires an empirical study (Devadason 2011; Ederington & Ruta 2016; Fugazza 2013; Korinek, Melatos & Rau 2008; Li & Beghin 2012; Melo & Shephard 2018; Santeramo 2019; Santeramo & Lamonaca 2019).

Existing literature has provided limited attention to the effect of NTMs enforced by the government of the exporting country on its exported products, also referred to as ERMs. Most studies focus on the effect of NTMs enforced by the government of export destination (importing) country on imported products (e.g., Asci, Koç & Erdem 2014; Bao & Qiu 2012; Dal Bianco et al. 2016; Devadason 2011; Disdier, Fontagné & Mimouni 2008; Ghodsi, Grübler & Stehrer 2016; Li & Beghin 2012; Santeramo et al. 2019; Sithamaparam & Devadason 2016). The theoretical literature on NTMs predicts that the effect of ERMs on trade flows is ambiguous (Ganslandt & Markusen 2001). NTMs can have either a demand-enhancing effect (e.g., Cardamone 2011; Chen, Wilson & Otsuki 2008; Henson, Masakure & Cranfield 2011; Otsuki 2011) or a trade-impeding effect (e.g., Arita, Beckman & Mitchell 2017; Dal Bianco et al. 2016; Ferro, Otsuki & Wilson 2015; Peterson et al. 2013). Differences in the impact on trade flows may be attributed to variations in sample data, the countries implementing NTMs, aggregation levels, proxies used for NTMs to represent products subject to NTMs, types of NTMs, level of study detail, models, and methods employed (Devadason 2011; Ederington & Ruta 2016; Fugazza 2013; Ghodsi, Grübler & Stehrer 2016; Li & Beghin 2012; Santeramo 2019; Santeramo & Lamonaca 2019).

NTMs can address the negative externalities and asymmetric information problem on product quality. Thus, it can correct the market failure and improve demand (Beghin, Disdier & Marette 2015; Beghin & Xiong 2018; Cadot, Gourdon & Tongeren 2018; Ghodsi, Grübler & Stehrer 2016; Ghodsi et al. 2017; Melo & Shephard 2018; Xiong & Beghin 2014). However, to comply with the mandatory requirements or standards, the exporters need to pay additional costs known as the cost of compliance, which potentially raises the product price (Disdier & Fugazza 2020; Ghodsi, Grübler & Stehrer 2016; Melo & Shepherd 2018). In conclusion, the impact of implementing NTMs on trade depends on the relative strength of the positive effect on demand

rather than the negative effect on supply due to price rises (Beghin, Disdier & Marette 2015; Cadot, Gourdon & Tongeren 2018; WTO 2012; Xiong & Beghin 2014). Therefore, NTMs have a positive impact only if the increasing demand is higher than the cost of compliance. Conversely, if the cost of compliance is higher than the increasing demand, NTMs exert a negative effect (Chen, Otsuki & Wilson 2006).

3. Method

3.1. Empirical Model

This study investigated the effect of ERMs on the export of palm, CPO, and its derivatives products in two steps. First, by estimating the effect of ERMs on export volume and value. In this study, ERMs are represented by two indicators, namely Coverage Ratio (CR) and Frequency Index (FI). The effect of ERMs on volume is assessed to deflate the impact of rising product prices and to obtain unbiased estimates. Second, by estimating the cost of NTMs, which can be inferred from the AVEs of ERMs. The rate of AVEs indicates the proportional rise in price as a consequence of ERMs. Then, the results of AVEs estimation were compared with the result of ERMs estimation using the indirect country characteristic approach. The objective of this comparison is to determine whether the ERMs have a market-creating or trade-impeding effect.

The Gravity model was employed in the first step of estimation. This model is quite widely used in research, such as in Elisabeth & Verico (2022), Grubler et al. (2016), Santeramo et al. (2019), and Tinbergen (1962). As in Tinbergen (1962), the gravity model estimates bilateral trade flows from the economic size and distance. The basic form of the standard constant elasticity of substitution specification is illustrated in Equation (1), where X_{ijt} is the export flows of Indonesia (country i) to trading partner (county j) at time t.

$$X_{ijt} = \mu Y_{1it}^{\alpha} Y_{2jt}^{\beta} D_{ij}^{*\sigma} \quad (1)$$

The log-linearization of the gravity model in equation (1) is defined as follows:

$$\ln X_{ijt} = \mu + \alpha \ln Y_{1it} + \beta \ln Y_{2jt} + \sigma \ln D_{ij}^{*} + \varepsilon_{ijt} \quad (2)$$

Gross domestic product (GDP) is commonly used as a proxy for economic size, while the physical distance between countries serves as a proxy for distance (Head & Mayer 2014). The model in this study utilize GDP ($GDPEXP_{it}$) and population ($POPEXP_{it}$) as proxies for the economic size of the exporter (Y_{1it}^{α}). Both GDP ($GDPEXP_{it}$) and population ($POPEXP_{it}$) are expected to exhibit a positive relationship with bilateral trade as a large and rich country is more likely to achieve economies of scale and increased exports (Bergstrand 1985; Tinbergen 1962). Two variables are also included to represent the economic size of the importer (Y_{2jt}^{β}), namely GDP ($GDPIMP_{jt}$) and population ($POPIMP_{jt}$). These two variables are expected to have a positive relationship with exports since improved standard of living in a large and rich country tends to raise demand for imported products.

As outlined in Jayasinghe, Beghin & Moschini (2010), distance ($D_{ij}^{*\sigma}$) can be augmented into the geographical and economic distance to capture the trade resistance. Therefore, Equation (2) can be written as follows:

$$D_{ijt}^{*} = (1 + DIS_{ij}) + (1 + TARIFF_{it}) + (1 + ERM_{it}) \quad (3)$$

where, D_{ij} denotes the geographical distance between country i and j. $TARIFF_{it}$ symbolizes the export tariff of Indonesia at year t and $ERMF_{it}$ indicates ERMs of Indonesia at year t. $ERMF_{it}$, the main interest variable of this study, is expected to have an ambiguous effect on export, as observed in Beghin & Xiong (2018) as well as Melo & Shepherd (2018). $ERMF_{it}$ may affect demand in cases of consumer-based market imperfections, such as a lack of information on product quality. However, $ERMF_{it}$ can generate a fixed-cost effect for exporters and raise the price of domestic products. Utilizing the framework established by Melitz

https://scholarhub.ui.ac.id/efi/vol69/iss2/3
DOI: 10.47291/efi.2023.08

(2003), NTMs potentially raise the fixed cost associated with market entry. An increase in the fixed cost of compliance implies that several less productive firms exit the export market, leading to a decline in export both in the intensive margin (export per firm) and the extensive margin (number of firms exporting). Observed from these theoretical backgrounds, it can be concluded that $ERMF_{it}$ can have a positive or negative effect on export.

The dummy variable of institution ($INST_{it}$) is incorporated as the second interest variable to examine the effect of the new regulation, which mandates the government institutions ($INST\_GI_{it}$) to verify conformity assessments, a task previously managed by private institutions ($INST\_PI_{it}$). Stephenson (1997) concludes that the verification of the conformity assessment process can be carried out by producers, consumers, the government as a regulator, or an independent third party. $INST\_GI_{it}$ is predicted to have a positive and significant relationship with export since the objective of this regulation is to provide more accurate verification, which can solve the problem of asymmetric information on product quality and simplify the export process.

$TARIFF_{it}$ is treated as trade costs and predicted to have a negative and statistically significant effect on trade flows (Head & Ries 1999; Pavcnik 2002; Trefler 2004). DJS_{ij} denotes the geographical distance between country i and j. Geographical distance affects transport costs, transaction costs, and delivery time (Edmonds, Croix & Li 2008; Egger 2000). The expected sign of this variable is negative in which closer distance between two countries implies lower transportation and transaction costs and shorter delivery time of import.

To control macroeconomic conditions and price changes in the export market, the Real Exchange Rate of the export destination countries (RER_{ijt}) is included. The expected relationship between RER_{ijt} and export is positive and significant since a real depreciation of Indonesian currency enhances export (Krugman, Obstfeld & Melitz 2018).

The specification of the gravity model thus becomes:

$$\begin{aligned}\ln X_{ijt} &= \beta_0 + \beta_1 ERM_{it} + \beta_2 INST_{it} \\ &\quad + \beta_3 \ln(1 + TARIFF_{it}) \\ &\quad + \beta_4 \ln GDPEXP_{it} + \beta_5 \ln POPEXP_{it} \\ &\quad + \beta_6 \ln GDPIMP_{jt} + \beta_7 \ln POPIMP_{jt} \\ &\quad + \beta_8 \ln DIS_{ij} + \beta_9 \ln RER_{ijt} + \varepsilon_{ijt} \quad (4)\end{aligned}$$

This study estimated the gravity model using Poisson Pseudo Maximum Likelihood (PPML) to address the presence of zero flows and heteroscedasticity in the error term. It is widely recognized that Ordinary Least Squares (OLS) fails to utilize the information contained in the zero trade flows as these observations are simply discarded when transformed into a logarithmic form. In contrast, PPML estimates the gravity model in multiplicative form instead of logarithmic, as proposed by Silva & Tenreyro (2006). This estimator can perform reasonably well even when the proportion of zeroes is large (Vanzetti, Peters & Knebel 2016) and effectively handle heteroscedasticity and zero trade flows.

ERMs, the interest explanatory variable, is quantified into two indicators: Coverage Ratio ($ERM_{it}\_CR^k_{it}$) and Frequency Index ($ERM_{it}\_FI^k_{it}$). To calculate CR and FI, the ERMs data on HS 8-digit level are aggregated into HS 6-digit level. Mathematically, the CR of ERMs ($ERM_{it}\_CR^k_{it}$) is defined as the share of the export value of a specific product (k), in this regard palm, CPO, and its derivatives products, affected by at least one NTMs, which can then be formulated as follows:

$$ERM_{it}\_CR^k_{it} = \left[\frac{\sum D_{st} V_{st}}{\sum V_{st}}\right] \times 100 \qquad (5)$$

where s is product k at the HS 8-digit level, k is product category k at the HS 6-digit level, and t is time period. In the above equation, s symbolizes a particular product item at the HS 8-digit level, contained in product category k at the HS 6-digit level. In the case where ERMs are imposed on product s in year t, the dummy variable D_{it} is assigned

a value of one. Moreover, V_{st} is the export value of country i for product s. Therefore $\sum V_{st}$ is the export value of product s from country i in year t.

The drawback of using CR is the potential for an endogeneity problem in the dependent variable (Fugazza 2013). On one hand, the high CR of ERMs can be interpreted as restrictive export. However, on the other side, an increase in CR suggests that ERMs have a low impact on export, as the value of the affected product continues to rise. Therefore, CR cannot accurately reflect the restrictiveness of NTMs. To overcome this issue, it is suggested to utilize FI.

The FI of ERMs ($ERM_{it}\_FI^k_{it}$) accounts for the presence of ERMs only and summarizes the percentage of products affected by ERMs. Thus, FI can be mathematically computed as follows:

$$ERM_{it}\_FI^k_{it} = \left[\frac{\sum D_{st}M_{st}}{\sum M_{st}}\right] \times 100 \qquad (6)$$

where s is product k at the HS 8-digit level, k is product category k at the HS 6-digit level, and t is the time period. In the above equation, s refers to a product item at the HS 8-digit level contained in product k at the HS 6-digit level, M_{st} is a dummy variable that reflects whether there is export of product s from Indonesia to export destination countries in year t, while the definition of D_{st} is similar to that in Equation (5).

3.2. Estimation of ERMs on Unit Value and Quantity

In the second step, this study estimated the effect of ERMs on both price and quantity to assess whether ERMs can improve the market. The AVEs of ERMs are calculated by following the methodology outlined by Ing & Cadot (2017)[1]. The imposition of ERMs can directly or indirectly raise the price of goods; therefore, it is necessary to determine the rate of tariff equivalent to estimate the price effect of NTMs on trade flows as well as to differentiate the effects of NTMs from other variables (Korinek, Melatos & Rau 2008). AVEs indicate the proportional raise in prices because of the imposition of NTMs (Ing & Cadot 2017). Furthermore, the rate of AVEs reflects the size of compliance costs incurred (Cadot, Gourdon & Tongeren 2018; Korinek, Melatos & Rau 2008). The specification model to calculate AVEs is as follows:

$$\begin{aligned} \ln P_{ijt} &= \beta_1 G_{ijt} + \beta_2 \ln(1 + TARIFF_{it}) \\ &\quad + \beta_3 Dummy\_ERM_{it} \\ &\quad + \beta_4 (Dummy\_ERM_{it}\delta_j) + \delta_i + \delta_j \\ &\quad + \delta_k + \varepsilon_{ijt} \end{aligned} \qquad (7)$$

where i, j, and t symbolize country i, country j, and year, respectively. P_{ijt} is the unit value of the product in year t. $Dummy\_ERM_{it}$ is a dummy variable of ERMs. G_{ijt} is the control variable other than $TARIFF_{it}$ and ERM_{it}. It includes GDP of the exporting country ($GDPEXP_{it}$), the population of the exporting country ($POPEXP_{it}$), GDP of the importing country ($GDPIMP_{jt}$), the population of the importing country ($POPIMP_{jt}$), the physical distance between the countries (DIS_{ij}) and the real exchange rate (RER_{ijt}). Moreover, $Dummy\_ERM_{it}\delta_j$ represents ERM_{it} and importer interaction, δ_i, δ_j, δ_k are exporters, export destination countries, and product fixed effect, while ε_{ijt} denotes the error term.

Furthermore, to identify the effect of ERMs, ERMs on export volume are regressed using the indirect country characteristic approach by referring to Cadot, Gourdon & Tongeren (2018). This approach allows the interaction between ERMs and the share of the importer in world trade of CPO and its derivative products to discern the effect of ERMs on export volume. This approach provides more accurate results by incorporating the characteristics

[1]We estimate AVEs following Ing & Cadot (2017). The formula is as follow $AVE_{icm} = 100 \times exp[(\beta_m + \beta_{jm}) - 1]$ where AVE_{icm} represents Ad-valorem equivalent of NTMs type m (ERMs) imposed in Indonesian on product C, β_m is the direct effect of NTMs type m (ERMs) on estimated unit value, β_{jm} is interaction effects of NTMs type m with importer on estimated unit value.

https://scholarhub.ui.ac.id/efi/vol69/iss2/3
DOI: 10.47291/efi.2023.08

of importers. The specification model is as follows:

$$\begin{aligned} Q_{ijt} &= \beta_1 G'_{ijt} + \beta_2 Dummy\_ERM_{it} \\ &\quad + \beta_3 (Dummy\_ERM_{it} S_{it}) \\ &\quad + \beta_4 (Dummy\_ERM_{it} S_{jt}) + \delta_i + \delta_j \\ &\quad + \delta_k + \varepsilon_{ijt} \end{aligned} \tag{8}$$

where Q_{ijt} denotes the export volume of these products in year t. G'_{ijt} represents the traditional gravity variable comprising distance, GDP of the exporting country, and GDP of the export destination country in year t. S_{it} and S_{jt} are the respective shares of the exporters and importers in world trade in year t. $Dummy\_ERM_{it}$ is a dummy variable of ERMs, assigned a value of 1 if ERMs are present in the product at year t. $Dummy\_ERM_{it}S_{it}$ and $Dummy\_ERM_{it}S_{jt}$ signify the interaction between ERM_{it} and the exporter share as well as ERM_{it} and the importer share, respectively.

The estimation results from Equation (7) and (8) are then compared to assess whether ERMs have a positive or negative effect by measuring the market-creating effect against business costs or compliance costs. Positive AVEs and a rise in export volume suggest a net demand-enhancing effect of ERMs. Meanwhile, positive AVEs yet a decline in export volume signify a trade-impeding effect of ERMs (Cadot, Gourdon & Tongeren 2018). The net impact of NTMs on trade depends on the size of the demand shifting and supply shifting, as explained by Beghin, Disdier & Marette (2015), WTO (2012), and Xiong & Beghin (2014). The demand shifting stems from market corrections to product quality, whereas the supply shifting arises from the rising cost of compliance. In this study, AVEs represent the growing cost of compliance with ERMs. The positive effect of ERMs on trade flows is revealed when the supply shifting is lower than the demand shifting.

3.3. Data

This study analyzed the effect of ERMs on the export of palm, CPO, and its derivatives products to 194 export destination countries from 2011 to 2020. In this period, GOI issued significant export regulations on several raw commodities, including palm, CPO, and its derivatives products. To represent export, the export value and volume at the HS Code of 8-digit level were utilized. The data on export value and volume were obtained from the Statistics Indonesia (BPS). Furthermore, the UNCTAD TRAINS database was utilized as the primary source of ERMs data of Indonesia. However, since this database had not been updated since 2018, the authors update the data manually by incorporating new relevant regulations which affect the export of palm, CPO, and its derivatives products and eliminating the repealed regulations.

This study employed the database of the Directorate General of Customs and Excise, Ministry of Finance, as the data source of export tariff. The data on GDP and population were sourced from World Bank while the data on geographic distance were obtained from The Centre d'Études Prospectives et d'Informations Internationales (CEPII). Furthermore, several relevant data were incorporated from Bank Indonesia, International Financial Statistics (IFS), UNCTAD, and the World Bank to calculate the real exchange rate. Lastly, the data on the share of exporters and importers were derived from the Trade Map.

Figure 1 depicts the values of CR and FI of ERMs, which are the main interest variables of this study. It is evident that the value of CR is more dispersed than that of FI because of the variability in the export flow and the export value of the investigated products across the study period. Table 1 summarizes the descriptive statistics of all variables, offering comprehensive information on all variables employed in this study.

4. Results and Analysis

The discussion on empirical findings proceeds in two steps. First, elaborating the estimation results of Equation (4) in Table 2 to explain the effect of ERMs and government institutions as verification in-

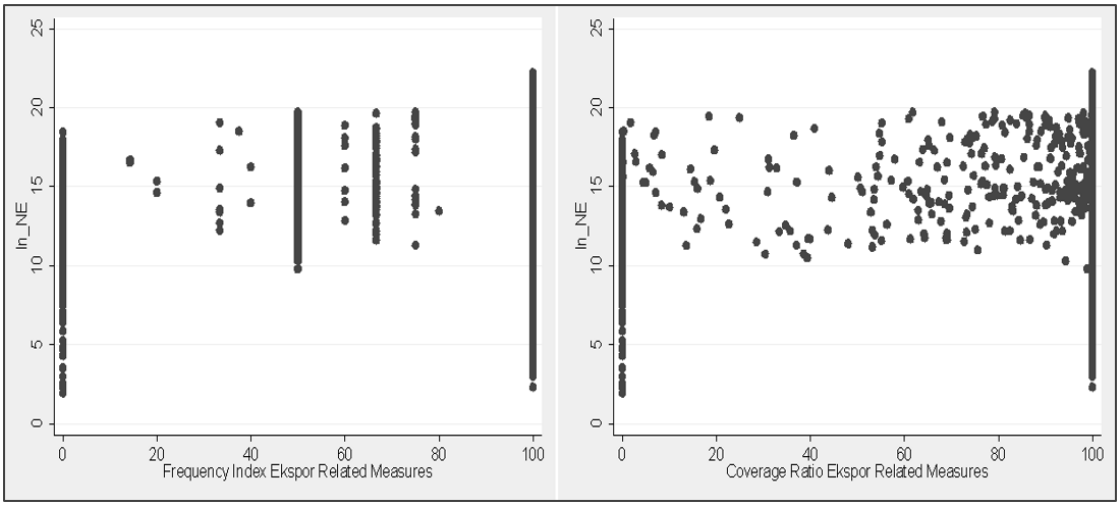

Figure 1. Distribution of FI and CR Values of ERMs

stitutions of ERMs on export. Second, reviewing the estimation results of Equation (7) in Table 3, specifically column (1), to indicate the cost of compliance of ERMs. Subsequently, the estimation results of Equation (8) in Table 3, focusing on column (2), are explored to assess the net effect of ERMs on export.

As shown in Table 2, the effect of ERMs is estimated using three estimators, namely OLS, Fixed Effect (FE), and PPML. The estimation results shown in columns (1) and (4) are obtained through OLS, columns (2) and (5) through FE, and columns (3) and (6) through PPML.

The estimation results obtained through OLS and PPML illustrate that $ERM_{it}\_CR_{it}^{k}$ and $ERM_{it}\_FI_{it}^{k}$ have positive and significant effects on the value and volume of export. However, the results of the FE estimation suggest that neither $ERM_{it}\_CR_{it}^{k}$ nor $ERM_{it}\_FI_{it}^{k}$ has a significant effect on the value or volume of export. The estimated coefficients of $ERM_{it}\_CR_{it}^{k}$ and $ERM_{it}\_FI_{it}^{k}$ using the PPML estimator are higher compared to those generated through OLS estimator. This difference may stem from the presence of heteroscedasticity (Dal Bianco et al. 2016; Silva & Tenreyro 2006). By comparing the results of these two estimators, it is concluded that the PPML estimation results are robust. Therefore, the rest of the discussion relies on the PPML results.

As detailed in Table 2, specifically columns (3) and (6), the estimated coefficients for $ERM_{it}\_CR_{it}^{k}$ on the volume and value of export are 0.03 and 0.025, respectively. Meanwhile, the estimated coefficients for $ERM_{it}\_FI_{it}^{k}$ on the volume and value of export are 0.026 and 0.023, respectively. Since the variables of $ERM_{it}\_CR_{it}^{k}$ and $ERM_{it}\_FI_{it}^{k}$ are expressed in percentages, it is necessary to interpret the estimated coefficients using the formula: $(100\%x(exp^{\beta}-1))$, following Silva & Tenreyro (2006). Accordingly, an increase of 1% in is associated with a respective rise in export volume and value by 3.0% and 2.5%. Meanwhile, an increase of 1% in $ERM_{it}\_FI_{it}^{k}$ is correlated to growth in export volume and value by 2.6% and 2.3%, respectively.

The findings from both $ERM_{it}\_CR_{it}^{k}$ and $ERM_{it}\_FI_{it}^{k}$ confirm that ERMs have a demand-enhancing effect on both export volume and value. This result can primarily be attributed to the nature of most of the ERMs imposed on exported products, consisting of technical measures that aim to ensure product quality, safety, and standards. Compliance with standards, particularly those harmonized with the international standards, will strengthen the competitiveness of agricultural and

https://scholarhub.ui.ac.id/efi/vol69/iss2/3
DOI: 10.47291/efi.2023.08

Table 1. Definition of Variables and Descriptive Statistics

Variable	Description	Source	Mean	Std. Dev.
X_{ijt}	The value and volume of exported palm, CPO, and its derivatives products from Indonesia (i) to country destination (j), in year t.	Statistics Indonesia (BPS)		
	Export Value (in million USD)		23.2	145
	Export Volume (Q_{ijt})($inthousandtons$)		37.4	220
P_{ijt}	The unit value of palm, CPO, and its derivatives products from Indonesia to export destination country j in year t (in USD/Kg).	BPS (processed)	3.89	29.19
ERM_{it}	Export-related measures enforced by GOI on the export of palm, CPO, and its derivatives products in the form of FI, CR, and dummy in year t.	UNCTAD TRAINS and the relevant regulations applicable in Indonesia (processed)		
	$ERM_{it}\_FI_{it}^{k}$ frequency index of ERMs on product k, enforced by GOI on year t (in %)		86	32.21
	$ERM_{it}\_CR_{it}^{k}$ coverage ratio of ERMs on product k, enforced by GOI on year t (%)		87.41	31.96
	$Dummy\_ERMit$ represents the dummy variable of ERMs		0.87	0.34
$INST_{it}$	A dummy variable of institutions conducting conformity assessment in year t.	The Regulation of the Minister of Trade Number 54 of 2015		
	$INST\_PI_{it}$ Private institutions conducting conformity assessment		0.35	0.48
	$INST\_GI_{it}$ Government institutions conducting conformity assessment		0.18	0.38
$TARIFF_{it}$	Export Tariff imposed on exported palm, CPO, and its derivatives products in year t (in USD/Ton).	Directorate General of Customs and Excise, Ministry of Finance	33.03	64.02
$GDPEXP_{it}$	Gross Domestic Product of Indonesia in year t (in billion USD).	World bank	964	82.8
$GDPIMP_{jt}$	Gross Domestic Product of export destination country j in year t (in billion USD).	World bank	891	2560
$POPEXP_{it}$	The total population of Indonesia in year t (in million).	World bank	260	9.09
$POPIMP_{jt}$	The total population of exporting country j in year t (in million).	World bank	78.3	228
DIS_{ij}	The geographical distance between Indonesia and export destination country j (in Km).	CEPII	9233.02	4476.53
RER_{ijt}	The real exchange rate of the Indonesian currency against the currency of the export destination country j in year t (in IDR/LCU).	Bank Indonesia, IFS, UNCTAD, World Bank (processed)	6269.79	191585.9
S_{it}	Exporter share in world trade of palm, CPO, and its derivatives products in year t	Trade Map (processed)	0.30	0.23
S_{jt}	Importer share in world trade of palm, CPO, and its derivatives products in year t	Trade Map (processed)	0.003	0.02

food exporters (Jaffee & Henson 2004). In addition, the standards can also encourage demand by changing consumer behavior (Fugazza 2013) and reduce information or transaction costs (Beghin, Disdier & Marette 2015; Ederington & Ruta 2016). Improvement in product quality and safety has the potential to boost consumer confidence (Bao & Qiu 2012; Ghodsi et al. 2017), reduce uncertainty, enhance the willingness of consumers to pay in export destination countries, and foster increased product purchases (Chen, Wilson & Otsuki 2008; Korinek, Melatos & Rau 2008; Swinnen 2016). The results of this study are similar to Santeramo et al. (2019), which discover a positive and significant effect of ERMs on the global wine trade both in all and specific market segments.

The estimation results from columns (3) and (6) reveal that the estimated coefficient of the institution ($INST_{it}$) does not have any significant effect on both the volume and value of export. This result differs from the prediction. Transitioning from private to government institutions is expected to improve the verification process and reduce the trade cost. However, the estimation results indicate no difference between private ($INST\_PI_{it}$) and gov-

Table 2. Estimation Results of Export Volume and Value

Variable	Export Volume						Export Value					
	OLS (1)		FE (2)		PPML (3)		OLS (4)		FE (5)		PPML (6)	
	Using CR	Using FI	Using CR	Using FI	Using CR	Using FI	Using CR	Using FI	Using CR	Using FI	Using CR	Using FI
$ERM_{it}\_CR_{it}^{k}$	0.021***		0.000		0.030***		0.019***		-0.001		0.025***	
	(0.002)		(0.002)		(0.003)		(0.002)		(0.002)		(0.002)	
$ERM_{it}\_FI_{it}^{k}$		0.017***		-0.001		0.026***		0.015***		-0.002		0.023***
		(0.002)		(0.002)		(0.002)		(0.002)		(0.002)		(0.002)
$INST\_PI_{it}$	0.321*	0.488***	-0.134	-0.112	0.256	0.252	0.092	0.257	-0.230*	-0.215*	0.120	0.109
	(0.180)	(0.178)	(0.137)	(0.136)	(0.225)	(0.220)	(0.162)	(0.160)	(0.127)	(0.125)	(0.232)	(0.225)
$INST\_GI_{it}$	0.276	0.533**	0.079	0.113	0.212	0.243	-0.246	0.007	-0.190	-0.168	0.005	0.029
	(0.245)	(0.242)	(0.174)	(0.171)	(0.358)	(0.346)	(0.227)	(0.224)	(0.164)	(0.162)	(0.358)	(0.344)
$TARIFF_{it}$	0.066	0.081	0.027	0.031	-0.064*	-0.058*	0.140***	0.154***	0.054	0.057	-0.061*	-0.055
	(0.052)	(0.052)	(0.041)	(0.041)	(0.034)	(0.034)	(0.043)	(0.043)	(0.036)	(0.036)	(0.035)	(0.035)
DIS_{ij}	-0.559***	-0.572***	0.000	0.000	-0.502***	-0.518***	-0.345***	-0.356***	0.000	0.000	-0.541***	-0.556***
	(0.074)	(0.074)	(.)	(.)	(0.047)	(0.048)	(0.072)	(0.073)	(.)	(.)	(0.056)	(0.057)
$GDPIMP_{jt}$	-0.031	-0.030	-0.094	-0.089	0.080*	0.083*	-0.094**	-0.093**	-0.182	-0.180	-0.094**	-0.091**
	(0.042)	(0.042)	(0.287)	(0.288)	(0.046)	(0.046)	(0.038)	(0.038)	(0.274)	(0.275)	(0.042)	(0.042)
$GDPEXP_{it}$	3.407***	3.079***	-0.220	-0.264	1.690	1.414	3.014***	2.707***	-0.126	-0.147	2.480*	2.148
	(1.122)	(1.124)	(0.621)	(0.618)	(1.297)	(1.298)	(1.026)	(1.029)	(0.564)	(0.561)	(1.325)	(1.323)
$POPIMP_{jt}$	0.607***	0.608***	0.021	0.043	0.471***	0.472***	0.629***	0.631***	-0.584	-0.565	0.673***	0.675***
	(0.048)	(0.048)	(1.121)	(1.120)	(0.062)	(0.062)	(0.045)	(0.045)	(1.073)	(1.072)	(0.060)	(0.060)
$POPEXP_{it}$	6.684*	5.292	7.608***	7.415**	-1.169	-0.726	10.550***	9.119***	8.210***	8.071***	-5.763	-5.107
	(3.984)	(3.992)	(2.901)	(2.896)	(4.944)	(4.847)	(3.473)	(3.483)	(2.634)	(2.630)	(5.088)	(4.972)
RER_{ijt}	0.083***	0.084***	0.238	0.244	0.085***	0.087***	0.094***	0.095***	0.142	0.145	0.159***	0.159***
	(0.022)	(0.022)	(0.279)	(0.281)	(0.019)	(0.019)	(0.020)	(0.020)	(0.234)	(0.235)	(0.018)	(0.018)
CONS	-216.288***	-180.006***	-126.556***	-122.060***	-15.362	-15.957	-281.040***	-244.601***	-127.680***	-124.791***	52.773	49.467
	(63.086)	(63.090)	(46.675)	(46.455)	(83.321)	(80.723)	(54.741)	(54.768)	(42.780)	(42.552)	(83.731)	(80.749)
Observations	4562	4562	4562	4562	4563	4563	4562	4562	4562	4562	4563	4563
R2	0.165	0.159	0.024	0.024	0.139	0.144	0.155	0.148	0.013	0.013	0.145	0.150

Note: standard errors in parentheses * p < .1, ** p < .05, *** p < .01

https://scholarhub.ui.ac.id/efi/vol69/iss2/3
DOI: 10.47291/efi.2023.08

ernment ($INST\_GI_{it}$). This finding is relevant to Liepiņa, Lapiņa & Mazais (2014), explaining that the most important aspects in verification are competent skills and valid tools. Therefore, both private and government institutions can conduct effective verification provided they have competent personnel and valid tools.

$TARIFF_{it}$ negatively and significantly affects export volume and value. A 1% increase in export tariffs ($TARIFF_{it}$) reduces export volume and value by (0.058–0.064)% and 0.061%, respectively. The results are similar to those of Solleder (2013) that export duties decrease export volume and value. It also supports the results conveyed by Obado, Syaukat & Siregar (2009) and Rifin (2010), noting that export duties decrease the export and competitiveness of CPO of Indonesia in the international market.

The geographical distance (DIS_{ij}) has a negative and significant effect on both export volume and value. This finding is consistent with the theoretical prediction that greater distance incurs higher transportation costs, thus increasing the price of goods (Kabir, Salim & Al-Mawali 2017). Conversely, the real exchange rate (RER_{ijt}) has a positive and significant effect on export, consistent with the prediction that a real depreciation of Indonesian currency strengthens export. This result is similar to Rifin (2010), Sari, Hakim & Anggraeni (2014), and Zarzoso & Lehmann (2003). Three control variables symbolizing the economic mass exhibit positive and significant effects as predicted. Those variables are the GDP of the exporting country ($GDPEXP_{it}$), the GDP of the export destination country ($GDPIMP_{jt}$), and the population of the export destination country ($POPIMP_{jt}$). Meanwhile, the population of the exporting country ($POPEXP_{it}$) does not have a significant effect.

The discussion for the second step focuses on Table 3. Table 3 column (1) displays the estimation results of Equation (7). The AVEs are calculated from the estimated coefficients in column 1 using the formula outlined by Ing & Cadot (2017). The calculation reveals that the AVEs of ERMs on palm, CPO, and its derivatives products is 38.36[2]. This number indicates that the proportional rise in the exported product price affected by ERMs is 38.36%. This number is frequently interpreted as the cost of business compliance of ERMs, considerably higher than the finding by Ing & Cadot (2017), identifying the AVEs of 7.6% for SPS on all imported agricultural products in Indonesia.

Even though the AVEs of ERMs is relatively high, it cannot be concluded directly that ERMs have a negative effect on trade. It is imperative to compare the results with the estimation results of ERMs regression on export volume using an indirect country characteristic approach. Column (2) of Table 3 summarizes the ERMs regression on export volume. The estimated coefficients of $Dummy\_ERM_{it}S_{jt}$ and $Dummy\_ERM_{it}S_{it}$ are positive and significant. These results confirm that the market-creating effect of ERMs is higher than the cost of compliance. Therefore, it can be concluded that ERMs have a net positive effect on exports. These findings corroborate the estimation results from the first step, using intensity indexes, namely coverage ratio ($ERM_{it}\_CR^k_{it}$) and frequency index ($ERM_{it}\_FI^k_{it}$) as proxies for ERMs.

5. Conclusion

This study aims to explore the effect of ERMs of Indonesia on the export of palm, CPO, and its derivatives products using the export data of these products to 194 destination countries over the period of 2011–2020. The effect of ERMs is investigated by estimating their effect on both export volume and value as well as the cost of NTMs. The results of AVEs estimation are then compared with those obtained through the indirect country characteristic approach to examine whether ERMs have a demand-enhancing or trade-impeding effect.

The findings of this study exhibit that ERMs imposed on palm, CPO, and its derivatives prod-

[2] $AVE_{icm} = 100 \times exp[(0.042 + 0.00) - 1], AVE_{icm} = 100 \times exp[-0.958] = 38.36.$

Table 3. Regression Results of Priced-Based and Quantity-Based Estimation

	(1) Unit Value (ln) OLS	(2) Export Volume (in levels) PPML
$Dummy\_ERM_{it}$	0.042	0.011
	(0.085)	(0.389)
$Dummy\_ERM_{it}\delta_j$	0.000	
	(.)	
$Dummy\_ERM_{it}S_{jt}$		17.140***
		(1.033)
$Dummy\_ERM_{it}S_{it}$		2.076***
		(0.486)
Control Variable	Yes	Yes
Exporter f.e.	Yes	Yes
Importer f.e.	Yes	Yes
Product f.e.	Yes	Yes
_cons	78.513***	8.131
	(18.187)	(10.132)
N	4562	9042
R^2	0.479	0.751

Note: standard errors in parentheses * p < .1, ** p < .05, *** p < .01

ucts have a positive and significant effect on export. The higher the proportion of coverage ratio ($ERM_{it}\_CR^k_{it}$) and frequency index ($ERM_{it}\_FI^k_{it}$) of ERMs, the higher the export value and volume of these products. However, the imposition of ERMs also generates a price-rising effect on export. The estimated effect of ERMs in increasing export price is 38.36%, as indicated from the calculation of AVEs. Despite the relatively high AVEs, the results obtained from the indirect country characteristic approach confirm that ERMs have a positive effect.

Using the framework of a demand-supply shifting as delineated by Beghin & Xiong (2018), Fugazza (2013), Josling, Roberts & Orden (2004), and Melo & Shepherd (2018), it can be concluded that the rising demand from market failure correction is higher than reducing supply because of the increasing price from additional costs. This finding is similar to Cadot, Gourdon & Tongeren (2018) that SPS expands trade in several countries.

The findings also reveal the effect of the institutions conducting the verification of conformity assessment. It indicates no difference between private and government institutions. Changing from private to government institutions in verifying conformity assessment is considered ineffective in enhancing export.

The findings of this study suggest that GOI should implement ERMs policies to ensure product quality and safety. The policies should also be aligned with NTM policies implemented in the export destination countries. This study also recommends that exporters or stakeholders should strengthen and improve their capacity to fulfill ERM requirements. It is crucial because ERMs guaranteeing product quality and safety have the potential to encourage demand, which may outweigh the effect of trade costs in meeting NTM provisions.

This study still has several limitations. Due to data availability, the classification of palm, CPO, and its derivative products utilized the HS 8-digit level and overlooked the small portion of excluded HS. Further studies are needed to assess the impact of ERMs parallel with the NTMs on import enforced by export destination countries to provide a more comprehensive understanding of the total effect of NTMs on the exported products of Indonesia.

References

[1] Arita, S, Beckman, J & Mitchell, L 2017, 'Reducing transatlantic barriers on U.S.-EU agri-food trade: What are the possible gains?', *Food Policy*, vol. 68, pp. 233-247. doi: https://doi.org/10.1016/j.foodpol.2016.12.006.

[2] Asci, S, Koç, AA, & Erdem, S 2014, 'The impact of non-tariff measures on agro-food export between MENA countries

https://scholarhub.ui.ac.id/efi/vol69/iss2/3
DOI: 10.47291/efi.2023.08

and the EU', *SERMED 2014 Conference Papers*(p. 34), Instituto Universitario de Análisis.

[3] Bao, X & Qiu, LD 2012, 'How do technical barriers to trade influence trade?', *Review of International Economics*, vol. 20, no. 4, pp. 691-706. doi: https://doi.org/10.1111/j.1467-9396.2012.01047.x.

[4] Beghin, J & Xiong, B 2018, 'Trade and welfare effects of technical regulations and standards', in Melo, JD & Nicita, A (eds.), *Non-tariff measures: economic assessment and policy options for development* (pp. 159-194), United Nations Conference on Trade and Development.

[5] Beghin, JC, Disdier, AC & Marette, S 2015, 'Trade restrictiveness indices in the presence of externalities: An application to non-tariff measures', Canadian Journal of Economics/Revue canadienne d'économique, vol. 48, no. 4, pp. 1513-1536. doi: https://doi.org/10.1111/caje.12157.

[6] Bergstrand, JH 1985, 'The gravity equation in international trade: Some Microeconomic foundations and empirical evidence', *The Review of Economics and Statistics*, vol. 67, No. 3, pp. 474-481. doi: https://doi.org/10.2307/1925976.

[7] Cadot, O, Gourdon, J & Tongeren, FV 2018, 'Estimating ad valorem equivalents of non-tariff measures', *OECD Trade Policy Papers, 215*, Organisation for Economic Cooperation and Development. doi: https://doi.org/10.1787/f3cd5bdc-en.

[8] Cardamone, P 2011, 'The effect of preferential trade agreements on monthly fruit exports to the European Union', *European Review of Agricultural Economics*, vol. 38, no.4, pp. 553-586. doi: https://doi.org/10.1093/erae/jbq052.

[9] Chen, MX, Otsuki, T & Wilson, JS 2006, 'Do standards matter for export success?', *World Bank Policy Research Working Paper, 3809*, World Bank. viewed 8 August 2022, <https://documents1.worldbank.org/curated/pt/646391468340769662/pdf/wps3809.pdf>.

[10] Chen, MX, Wilson, JS & Otsuki, T 2008, 'Standards and export decisions: Firm-level evidence from developing countries', *The Journal of International Trade and Economic Development*, vol. 17, no. 4, pp. 501-523. doi: https://doi.org/10.1080/09638190802250027.

[11] Dal Bianco, A, Boatto, VL, Caracciolo, F & Santeramo, FG 2016, 'Tariffs and non-tariff frictions in the world wine trade', *European Review of Agricultural Economics*, vol. 43, no. 1, pp. 31-57. doi: https://doi.org/10.1093/erae/jbv008.

[12] Devadason, ES 2011, 'Non-tariff measures in ASEAN: Barriers to intra-regional trade?', *SSRN Electronic Journal*. doi: https://dx.doi.org/10.2139/ssrn.1950195.

[13] Disdier, AC & Fugazza, M 2020, *A practical guide to the economic analysis of non-tariff measures*, United Nations and World Trade Organization. doi: https://doi.org/10.18356/b9cc8a8d-en.

[14] Disdier, AC, Fontagné, L & Mimouni, M 2008, 'The impact of regulations on agricultural trade: Evidence from the SPS and TBT agreements', *American Journal of Agricultural Economics*, vol. 90, no. 2, pp. 336-350. doi: https://doi.org/10.1111/j.1467-8276.2007.01127.x.

[15] Ederington, J & Ruta, M 2016, 'Chapter 5 - Nontariff measures and the world trading system', in Bagwell, K & Staiger, R (eds.), *Handbook of Commercial Policy, Volume 1 Part B* (pp. 211-277), Elsevier. doi: https://doi.org/10.1016/bs.hescop.2016.04.010.

[16] Edmonds, C, Croix, SL & Li, Y 2008, 'China trade: Busting gravity's bounds', *Journal of Asian Economics*, vol. 19, no. 5-6, pp. 455-466. doi: https://doi.org/10.1016/j.asieco.2008.09.013.

[17] Egger, P 2000, 'A note on the proper econometric specification of the gravity equation', *Economics Letters*, vol. 66, no. 1, pp. 25-31. doi: https://doi.org/10.1016/S0165-1765(99)00183-4.

[18] Elisabeth, CR & Verico, K 2022, 'The effects of Indonesia's technical barriers to trade on manufacturing exports: An empirical analysis using the pseudo-Poisson maximum likelihood method', *Journal of International Trade Law and Policy*, vol. 21, no. 2, pp. 160-181. doi: https://doi.org/10.1108/JITLP-08-2021-0045.

[19] Elisabeth, CR, Panennungi, MA, Verico, K & Ekananda, M 2020, 'Non-tariff measures on imported intermediate input: Empirical evidence from Indonesian manufacturing sector', *International Journal of Economics and Management*, vol. 14, no.2, pp. 189-201.

[20] Ferro, E, Otsuki, T & Wilson, JS 2015, 'The effect of product standards on agricultural exports', *Food Policy*, vol. 50, pp. 68-79. doi: https://doi.org/10.1016/j.foodpol.2014.10.016.

[21] Fugazza, M 2013, 'The economics behind non-tariff measures: Theoretical insights and empirical evidence', *Policy Issues in International Trade and Commodities Study Series, 57*, United Nations. viewed 8 August 2022, <https://unctad.org/system/files/official-document/itcdtab58_en.pdf>.

[22] Ganslandt, M & Markusen, JR 2001, 'Standards and related regulations in international trade: A modeling approach', *NBER Working Paper, 8346*, National Bureau of Economics Research. doi: 10.3386/w8346.

[23] Ghodsi, M, Grübler, J & Stehrer, R 2016, 'Estimating importer-specific ad valorem equivalent of non-tariff measures', *wiiw Working Paper, 129*, Wiener Institut für Internationale Wirtschaftsvergleiche - The Vienna Institute for International Economic Studies. viewed 8 August 2022, <https://www.wiiw.ac.at/estimating-importer-specific-ad-valorem-equivalents-of-non-tariff-measures-dlp-3971.pdf>.

[24] Ghodsi, M, Grübler, J, Reiter, O & Stehrer, R 2017, 'The evolution of non-tariff measures and their diverse effects on trade', *wiiw Research Report, 419*, Wiener Institut für Internationale Wirtschaftsvergleiche - The Vienna Institute for International Economic Studies. viewed 8 August 2022, <https://wiiw.ac.at/the-evolution-of-non-tariff-measures-and-their-diverse-effects-on-trade-p-4213.html>.

[25] Head, K & Ries, J 1999, 'Rationalization effects of tariff reductions', *Journal of International Economics*, vol. 47, no. 2, pp. 295-320. doi: https://doi.org/10.1016/S0022-1996(98)00019-1.

[26] Head, K & Mayer, T 2014, 'Chapter 3 - Gravity equations: Workhorse, toolkit, and cookbook', in Gopinath, G,

Helpman, E, & Rogoff, K (eds.), *Handbook of International Economics, volume 4* (pp. 131-195), Elsevier. doi: https://doi.org/10.1016/B978-0-444-54314-1.00003-3.

[27] Henson, S, Masakure, O & Cranfield, J 2011, 'Do fresh produce exporters in Sub-Saharan Africa benefit from global GAP certification', *World Development*, vol. 39, no. 3, pp. 375-386. doi: https://doi.org/10.1016/j.worlddev.2010.06.012.

[28] Ing, LY & Cadot, O 2017, 'Ad valorem equivalents of non-tariff measures in ASEAN', *ERIA Discussion Paper Series, ERIA-DP-2017-09*, Economic Research Institute for ASEAN and East Asia. viewed 8 August 2022, <https://www.eria.org/research/ad-valorem-equivalents-of-non-tariff-measures-in-asean/>.

[29] Jaffee, S & Henson, S 2004, 'Standards and agro-food exports from developing countries: Rebalancing the debate', *World Bank Policy Research Working Paper, 3348*, World Bank. doi: https://doi.org/10.1596/1813-9450-3348.

[30] Jayasinghe, S, Beghin, JC & Moschini, GC 2010, 'Determinants of world demand for U.S. corn seeds: The role of trade costs', *American Journal of Agricultural Economics*, vol. 92, no. 4, pp. 999-1010. doi: https://doi.org/10.1093/ajae/aaq056.

[31] Josling, T, Roberts, D & Orden, D 2004, 'Food regulation and trade: Toward a safe and open global system - An overview and synopsis', *Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting*, Denver, Colorado, August 1-4, 2004. doi: http://dx.doi.org/10.22004/ag.econ.20008.

[32] Kabir, M, Salim, R & Al-Mawali, N 2017, 'The gravity model and trade flows: Recent developments in econometric modeling and empirical evidence', *Economic Analysis and Policy*, vol. 56, pp. 60-71. doi: https://doi.org/10.1016/j.eap.2017.08.005.

[33] Korinek, J, Melatos, M & Rau, M 2008, 'A review of methods for quantifyng the trade of standards in the agri-food sector', *OECD Trade Policy Papers, 79*, Organisation for Economic Cooperation and Development. doi: https://doi.org/10.1787/235833787115.

[34] Krugman, PR, Obstfeld, M & Melitz, MJ 2018, *International economics: theory and policy* (11th edition), Pearson.

[35] Li, Y & Beghin, JC 2012, 'A meta-analysis of estimates of the impact of technical barriers to trade', *Journal of Policy Modeling*, vol. 34, no. 3, pp. 497-511. doi: https://doi.org/10.1016/j.jpolmod.2011.11.001.

[36] Liepiņa, R, Lapiņa, I & Mazais, J 2014, 'Contemporary issues of quality management: Relationship between conformity assessment and quality management', *Procedia - Social and Behavioral Sciences*, vol. 110, pp. 627-637. doi: https://doi.org/10.1016/j.sbspro.2013.12.907.

[37] Melitz, MJ 2003, 'The impact of trade on intra-industry reallocations and aggregate industry productivity', *Econometrica*, vol. 71, no. 6, pp. 1695-1725. doi: https://doi.org/10.1111/1468-0262.00467.

[38] Melo, JD & Shepherd, B 2018, 'The economics of non-tariff measures: A primer', in Melo, JD & Nicita, A (eds.), *Non-tariff measures: economic assessment and policy options for development* (pp. 121-158), United Nations Conference on Trade and Development.

[39] Munadi, E 2019. 'Indonesian non-tariff measures: updates and insights', in Doan, HTT & Rosenow, S (eds.), *Non-tariff measures in ASEAN-an update* (pp. 67-84), Economic Research Institute for ASEAN and East Asia.

[40] Obado, J, Syaukat, Y & Siregar, H 2009, 'The impacts of export tax policy on the Indonesian crude palm oil industry', *Journal of International Society for Southeast Asian Agricultural Sciences*, vol. 15, no. 2, pp. 107-119.

[41] Otsuki, T 2011, 'Effect of international standards certification on firm-level exports: An imposition of the control function approach', *OSIPP Discussion Paper 11E005*, Osaka School of International Public Policy, Osaka University. viewed 8 August 2022, <http://www.osipp.osaka-u.ac.jp/archives/DP/2011/DP2011E005.pdf>.

[42] Pavcnik, N 2002, 'Trade liberalization, exit, and productivity improvements: Evidence from Chilean plants', *The Review of Economic Studies*, vol. 69, no. 1, pp. 245-276. doi: https://doi.org/10.1111/1467-937X.00205.

[43] Peterson, E, Grant, J, Roberts, D & Karov, V 2013, 'Evaluating the trade restrictiveness of phytosanitary measures on US fresh fruit and vegetable imports', *American Journal of Agricultural Economics*, vol. 95, no. 4, pp. 842-858. doi: https://doi.org/10.1093/ajae/aat015.

[44] Rifin, A 2010, 'The effect of export tax on Indonesia's Crude Palm Oil (CPO) export competitiveness', *ASEAN Economic Bulletin*, vol. 27, no. 2, pp. 173-184. doi: 10.1355/ae27-2b.

[45] Santeramo, FG 2019, 'On non-tariff measures and changes in trade routes: From North-North to South-South trade?', *IATRC Commissioned Paper, 22*, International Agricultural Trade Research Consortium. viewed 8 August 2022, <https://ageconsearch.umn.edu/record/287317/files/IATRC%20CP22%20-%20Santeramo.pdf>.

[46] Santeramo, FG & Lamonaca, E 2019, 'The effects of non-tariff measures on agri-food trade: A review and meta-analysis of empirical evidence', *Journal of Agricultural Economics*, vol. 70, no. 3, pp. 595-617. doi: https://doi.org/10.1111/1477-9552.12316.

[47] Santeramo, FG, Lamonaca, E, Nardone, G & Seccia, A 2019, 'The benefits of country-specific non-tariff measures in world wine trade', *Wine Economics and Policy*, vol. 8, no. 1, pp. 28-37. doi: https://doi.org/10.1016/j.wep.2018.12.001.

[48] Sari, AR, Hakim, DB & Anggraeni, L 2014, 'Analisis pengaruh non-tariff measures ekspor komoditi Crude Palm Oil (CPO) Indonesia ke negara tujuan ekspor utama', *Jurnal Ekonomi dan Kebijakan Pembanguan*, vol 3, no. 2, pp. 111-135. doi: https://doi.org/10.29244/jekp.3.2.2014.111-135.

[49] Silva, JMCS & Tenreyro, S 2006, 'The log of gravity', *The Review of Economics and Statistics*, vol. 88, no. 4, pp. 641-658. doi: https://doi.org/10.1162/rest.88.4.641.

[50] Sithamaparam, AG & Devadason, ES 2016, 'Do non-tariff measures in the EU, Japan and the ASEAN matter for export consignments from Malaysia?', *Institutions and Economics*, vol. 8, no. 2, pp. 1-25.

[51] Solleder, O 2013, 'Trade effects of export taxes', *Graduate*

https://scholarhub.ui.ac.id/efi/vol69/iss2/3
DOI: 10.47291/efi.2023.08

Institute of International and Development Studies Working Paper, 08/2013, The Graduate Institute of International and Development Studies. viewed 8 August 2022, <https://repository.graduateinstitute.ch/record/15643/>.

[52] Stephenson, SM 1997, 'Standards, conformity assessment and developing countries', *Policy Research Working Papers, 1826*, World Bank. viewed 8 August 2022, <https://documents.worldbank.org/curated/en/640841468766532803/102502322_20041117162503/additional/multi-page.pdf>.

[53] Swinnen, J 2016, 'Economics and politics of food standards, trade, and development', *Agricultural Economics*, vol. 47, no. 1, pp. 7-19. doi: https://doi.org/10.1111/agec.12316.

[54] Tinbergen, J 1962, *Shaping the world economy. Suggestions for an international economic policy*, The Twentieth Century Fund.

[55] Trefler, D 2004, 'The long and short of the Canada-US free trade agreement', *American Economic Review*, vol. 94, no. 4, pp. 870-895. doi: 10.1257/0002828042002633.

[56] UNCTAD 2019, *International classification of non-tariff measures - 2019 version*, United Nations Conference on Trade and Development. doi: https://doi.org/10.18356/33bf0bc6-en.

[57] Vanzetti, D, Peters, R & Knebel, C 2016, 'Sand in the wheels: Non-tariff measures and regional integration in SADC', *Policy Issues in International Trade and Commodities, Study Series, 71*, United Nations Conference on Trade and Development. viewed 8 August 2022, <https://unctad.org/publication/sand-wheels-non-tariff-measures-and-regional-integration-sadc>.

[58] WITS 2022, *MFN simple average by country product from world in % 1988-2021: by country MFN simple average in percentage for all products world between 1988 and 2021*, World Integrated Trade Solution, viewed 8 August 2022, <https://wits.worldbank.org/CountryProfile/en/country/by-country/startyear/LTST/endyear/LTST/tradeFlow/Import/indicator/MFN-SMPL-AVRG/partner/WLD/product/Total>.

[59] Wood, J, Wu, J, Li, Y & Jang, H 2017, 'The economic impact of SPS measures on agricultural exports to China: An empirical analysis using the PPML method', *Social Sciences*, vol. 6, no. 2, p. 51. doi: https://doi.org/10.3390/socsci6020051.

[60] WTO 2012, *World Trade Report 2012: Trade and public policies: A closer look at non-tariff measures in the 21st century*, World Trade Organization. viewed 8 August 2022, <https://www.wto.org/english/res_e/publications_e/wtr12_e.htm>.

[61] Xiong, B & Beghin, J 2014, 'Disentangling demand-enhancing and trade-cost effects of maximum residue regulations', *Economic Inquiry*, vol. 52, no. 3, pp. 1190-1203. doi: https://doi.org/10.1111/ecin.12082.

[62] Zarzoso, IM & Lehmann, FN 2003, 'Augmented gravity model: An empirical application to Mercosur-European union trade flows', *Journal of Applied Economics*, vol. 6, no. 2, pp. 291-316. doi: https://doi.org/10.1080/15140326.2003.12040596.