DOCTORAL DISSERTATION

NON-TARIFF MEASURES, AID FOR TRADE AND EXPORTS IN VIETNAM AND OTHER DEVELOPING COUNTRIES

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Abstract

This dissertation contributes to the literature on the effects of non-tariff measures in general and antidumping duties in particular, as well as aid for trade on exports of Vietnam and other developing countries. This dissertation is comprised of three chapters that are independent from each other.

Chapter 1 examines the effects of non-tariff measures, technical and non-technical measures, imposed by Vietnam and importing countries on Vietnamese exports at the product level by employing the Poisson-Pseudo Maximum Likelihood method on a balanced panel data of nearly 5000 products for the period 2015 to 2018. The rationale behind using the Poisson-Pseudo Maximum Likelihood method is that my sample contains many zero trade values and may suffer from heteroskedasticity. Hence, following the standard solution suggested in the gravity model literature, the use of the Poisson-Pseudo Maximum Likelihood method can help to obtain consistent and unbiased estimations. The estimated results indicate that the effects of NTMs imposed by Vietnam and importing countries can vary considerably across NTMs classifications, product groups and importing countries. In general, importers' NTMs exert a positive impact on Vietnamese exports, while Vietnam's export related NTMs are found to have a negative impact. For importers' NTMs, the positive impact is driven by the technical category. The non-technical measures do not have a significant effect on Vietnamese exports. Our estimates also suggest that the negative supply side effect of importers' new technical measures tends to dominate their positive demand side effect. Additionally, the importers' technical measures have stronger positive effects on intermediate goods in comparison to final goods. Vietnamese exports of intermediate goods to higher income countries are found to enjoy a higher positive impact of technical measures, compared to those exports to importing countries with a lower level of per capita income. For NTMs voluntary applied by Vietnam on exported

products, technical measures seem to be effective in increasing Vietnam's exports of final products to importing countries with a level of per capita income below USD 11,462. For those importing country markets, the positive marginal effect of Vietnam's export related technical measures on exports of final products is higher in poorer importing countries. On the other hand, the non-technical category tends to have negative effects on Vietnamese exports, especially on intermediate goods. Otherwise, we do not find a significant relationship between importing countries' income level and Vietnam's technical measures on intermediate goods nor on importers' technical measures on final goods.

Chapter 2 considers a specific type of traditional non-tariff measure, specifically the antidumping duty. The chapter investigates the impact of the United States' antidumping investigations on the prices received by Vietnamese shrimp exporters for the period of 2000M1 to 2011M12. Vietnamese shrimp was the target of an antidumping petition filed in late 2003 and Vietnam was treated as a non-market economy country in the investigation. The estimation is performed using the weighted least squares (WLS) method with the weight being the customs values of imported shrimp products, correcting for the possibility of heteroskedasticity to obtain estimators that are more precise than their ordinary least squares (OLS). The estimates indicate that, after the final determination on the imposition of antidumping duty, Vietnamese shrimp exporters increased their prices by much more than 100 percent of the antidumping duties in an attempt to eliminate future duties. In addition, no evidence was found for a significant difference in the exchange rate pass-through of affected products. This result differs from the cases of the market economy examined in previous studies. Furthermore, our analysis shows that there might be an asymmetry of exchange rate pass-through to the border prices of affirmative products after the imposition of the final antidumping duties in complicated scenarios. However, our empirical results did not support that prediction. This chapter offers a

better understanding of non-market economy exporters' pricing reaction to antidumping duties and may help trade policymakers when considering the gains and losses of implementing antidumping duties by using the treatment for a non-market economy. It is important to note that the higher the price due to antidumping duties, the larger the net welfare loss of the importing country that implements the antidumping duties, as shown in previous studies. Our analysis and empirical results revealed that if non-market exporters facing antidumping duties aim to eliminate the future duty, the prices received by non-market economy exporters tend to increase by more than 100 percent of the antidumping duties and, therefore, the net welfare loss for implementing antidumping duties is generally more substantial.

Finally, Chapter 3 investigates the effects of Aid for Trade on the sophistication level of recipient countries' export baskets. Our empirical analysis relies on the sophistication index of exports proposed by Hausmann, Hwang, and Rodrik (2007) and a sample of 73 aid for trade - recipient countries from 2005 to 2017. It makes use of the two-step system generalized methods of moments (GMM), which is widely adopted to tackle potential endogeneity problems as well as the possible omitted variables biases and obtaining estimators that are unbiased and consistent. In this chapter, we treat all right-hand side variables except population size as endogenous variables. According to Hausmann, Hwang, and Rodrik (2007), a causal effect from export sophistication to population size is very unlikely to occur. The results indicate that total aid for trade inflows do not benefit the export sophistication. Aid for trade for trade policy and regulations seems to be the only type of aid for trade that is found to be effective in low-income countries with a real GDP per capita of less than USD 3,047 and furthermore, the poorer the recipient country, the greater the positive impact on export sophistication. In contrast, the effect of aid for trade for economic infrastructure seems to be increasing in per capita income. The positive and negative significant effects of aid for trade for economic infrastructure are

observed for countries with real GDP per capita above USD 29,542 and below USD 2,558, respectively. Otherwise, there are no significant impacts of these two categories on export sophistication. Aid for trade dedicated to building productive capacity exerts a negative impact on the export sophistication at the sectoral level. The findings of this chapter have a number of practical implications on the future allocation of aid for trade. A reconsideration on the allocation of aid for trade across activities, sectors and countries is necessary due to the limited and heterogenous effect of aid for trade on the sophistication of recipient countries' exports. Technical support for trade policy and regulations should be the priority for least developed countries or countries with a low per capita income since this type of aid for trade seems to play an important role in these countries' structural transformation of exports through the reduction of trade costs. In addition, trade aid for building economic infrastructure should be given carefully to countries with low-income level, since its short-run negative effect could cancel out the benefit of aid for trade for trade policy and regulations. Finally, based on the characteristics of each country, the productive capacity building support should be provided to develop potential sectors that have a high level of productivity and technology.

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Declaration

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Chapter 1: Non-tariff Measures and Vietnam's Export Performance

1.1. Introduction

Together with the wave of tariff liberalization around the world in recent decades, the successful implementation of the open-door policies and economic reforms since late 1980s have made Vietnam emerge as one of the largest beneficiaries of international trade, resulting in high economic growth rates. As shown in Figure 1, Vietnam's trade amounted to over USD 400 billion in 2017, up from just about USD 5 billion in 1990. At the same time, real GDP of Vietnam (based on constant 2010 USD) also increased significantly from nearly USD 30 billion in 1990 to over USD 175 billion in 2017.

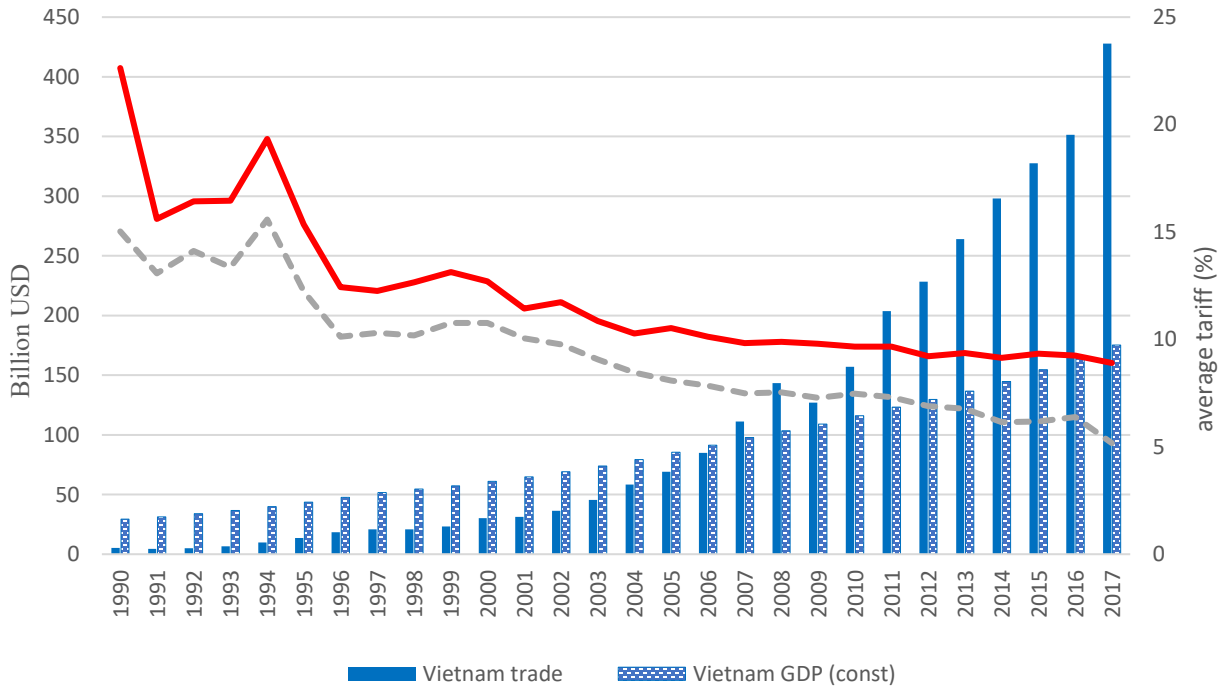

Figure 1: Tariff liberalization and Vietnam's trade and economic growth
Source: WDI – World Bank

However, international trade today is increasingly affected to a large extent by non-tariff measures (NTMs) defined broadly as all policy or regulatory measures other than ordinary custom tariffs that may affect prices or quantities traded, or even both (UNCTAD TRAINS, 2019). Vietnamese exports are no exception, as there have been more and more reports of NTMs imposed

by importing countries on exported products of Vietnam, especially agriculture products. In addition, Vietnam also applies on a voluntary basis a substantial amount of NTMs on export products in order to fulfill international convention's commitments or to ensure the quality of exported products (Vo, Nguyen and Tran, 2016). Unlike tariffs, the diversity and complexity in the form of NTMs makes their impacts on international trade ambiguous. These observations motivate a proper analysis and understanding on how NTMs affect Vietnam's export performance.

Against this backdrop, we employ a structural gravity model and the recently updated global database on NTMs at the product-country level to empirically investigate the effects of NTMs imposed by Vietnam and importing countries on Vietnamese exports, differentiating by NTMs classification (technical and non-technical), by newly and previously initiated technical NTMs, by product group (intermediate and final good) as well as by income level of the importing country.

The main aim of this chapter is to disentangle the trade effects of NTMs imposed by Vietnam and importing countries. Previous literature on NTMs has almost exclusively considered the importer's NTMs. To the best of our knowledge, this study provides the first attempt to assess the average effect of an exporting country's export-related NTMs on export flows of nearly 5000 products. Secondly, we also aim to examine the differentiated effects across NTMs classification. As provided by the UNCTAD, the international classification divides NTMs into two main groups, technical and non-technical measures. Non-technical NTMs, also known as non-tariff barriers, include traditional trade policy instruments such as quantitative restrictions (quotas, prohibitions), contingent trade protective measures (antidumping, countervailing), and price control measures. Technical NTMs comprise all regulatory and technical measures that stem from non-trade objectives related to general standards, health, safety, and environmental quality such as sanitary and phytosanitary (SPS) measures and technical barriers to trade (TBT).

To the best of our knowledge, there is a consensus in results estimating the impact of importer's non-technical category on trade. Importer's non-technical measures have been shown to decrease

trade flows through the significant reduction in market access and increase in exporting firms' costs of compliance with those measures (Kee, Nicita, and Olarreaga, 2009; Hoekman and Nicita, 2011; Ghodsi et al., 2017; Kinzius, Sandkamp and Yansil, 2019; Timini and Conesa, 2019). On the other hand, the net effect of importing country's technical measures is not unambiguous since they can generate both trade-restricting and trade-enhancing effects (Ganslandt and Markusen, 2001; Fugazza, 2013). The trade-restricting effect is caused by an increase in the costs of exporters through their compliance with the technical measures. On the other hand, the compliance of exporters with the importing country's technical measures (e.g., SPS measures) can certify the safety and quality of products to consumers, resulting in a higher demand (the trade-enhancing effect). The ability to comply with technical measures is dependent on technology and production capability of exporters. Hence, the impact of the technical measures on trade could vary across countries as well as across firms and industries. Empirical studies on the effects of importing country's technical NTMs on international trade have also demonstrated mixed results. One of the first empirical studies on the trade effect of importer's technical NTMs was Otsuki, Wilson and Sewadeh (2001). The authors investigated the effects of European Union's (EU) regulation on aflatoxin (SPS measures) on cereals, dried fruits and nuts imported from nine African countries from 1989 to 1998. Using a gravity model framework, they found the export loss to be around 65 percent due to the implementation of the regulation. Similarly, Wilson and Otsuki (2004) found that a 1 percent increase in regulatory stringency of regulation on pesticide residues applied by OECD countries is associated with a 1.63 percent decrease in banana imports. Using the ad valorem equivalent (AVE) of NTMs, the study by Disdier, Fontagné and Mimouni (2008) found negative and significant impacts of TBT and SPS measures on agricultural and food aggregate exports of developing countries to OECD countries. Murina and Nicita (2017) examined the effects of technical regulation (restricted to SPS measures) on EU imports of agriculture products and found negative effects on imports from low-income countries. Using French firm-level data, Fontagné et

al. (2015) found that the regulation on product standards negatively affects both extensive and intensive margins of exports. Several other studies also report negative impacts of importer's technical measures on trade (Maskus, Otsuki and Wilson, 2005; Winchester et al., 2012). These studies represent the cases where the negative supply side effects of importer's technical NTMs outweigh their positive demand side effects. On the other hand, another strand of empirical studies has documented the positive relationship between importer's technical NTMs and trade flows, indicating the cases where higher demands on products with more technical measures possibly compensate the costs of NTMs compliance (Disdier, Fontagné and Mimouni, 2008; Murina and Nicita, 2017; Gibson and Wang, 2018; Timini and Conessa, 2019). At the industry level, Disdier, Fontagné and Mimouni (2008) found positive effects of technical NTMs on exports of eight industries, while other is negative or insignificant. By using the "global database on non-tariff measures" published by the UNCTAD TRAINS, Timini and Conessa (2019) investigated the effects of NTMs stock, technical and non-technical measures, applied by importing countries on Chinese exports at the product level during the period 2001 to 2014. The authors found positive and significant effects of the technical measures on Chinese exports.

Thirdly, there might be a difference between the effect of newly and previously initiated technical NTMs on Vietnamese exports. Indeed, exporting firms or producers may need sometimes to react to the imposition of new technical regulations. Hence, the adverse effect of newly initiated technical measures can possibly eliminate or at least dominate any positive effect on demand that they may have.

Next, we examine whether there is a heterogeneous effect between types of goods, specifically intermediate and final goods. As argued by Timini and Conessa (2019), final goods may be exposed to more restrictive non-technical measures imposed by importing countries, which makes it even harder to access the destination market. In addition, since final goods have a higher elasticity of substitution compared to intermediate goods (Jones, 2011), the trade-impeding effect for final

goods may be more severe. NTMs can affect trade costs and then possibly lead to disruption of global value chains (Timini and Conessa, 2019). Thus, it is likely that intermediate goods are not the target of more restrictive NTMs. Timini and Conessa (2019) found a negative and significant impact of importer's non-technical measures on Chinese exports of final goods, while an insignificant result is found for intermediate goods. On the other hand, they found no significant heterogeneous trade effect of importer's technical NTMs between intermediate and final goods.

Finally, an empirical analysis is conducted to assess the trade effect of technical measures with the additional consideration of differing income levels of the importing countries. As high-income countries tend to demand more high-quality products (Brambila and Porto, 2016), we may expect that the trade-enhancing effect of importer's technical NTMs may be larger for exports to higher-income countries. Regarding Vietnam's export related technical NTMs, most of those measures are also applied to products in the domestic market. Thus, the imposition of any technical standards and regulations should put in the context of domestic market. Vietnam's export related technical measures include not only requirements, testing and examinations, but also guidance and training to ensure exporters and producers meet certain technical standards. In fact, one could argue that countries with a similar level of development tend to have similar standards and regulations. Therefore, we may expect that Vietnam's export related technical NTMs should be effective in increasing Vietnamese exports to countries with an income level lower or similar to Vietnam, through the improvement in product quality. In addition, this positive effect may decrease in the income level of importing countries.

Similar to Timini and Conessa (2019), we adopt the same database on NTMs to investigate the effects of NTMs on Vietnamese exports. However, the limitation of this database is that it only provides the data on the stock of NTMs for certain years. Therefore, as in Timini and Conessa (2019), constructing panel data for a long time series from 2001 to 2014 requires a big assumption for many countries in their sample that there were no measures initiated nor ended before the

available years. Our sample period is from 2015 to 2018 with missing data for only one or two years. Moreover, we have data available for years before and after the missing period that help our dataset to be more robust than that of Timini and Conessa (2019).

The main finding of this chapter is that the effects of NTMs imposed by Vietnam and importing countries can vary considerably across NTMs classifications, product groups and importing countries. In general, importers' NTMs exert a positive impact on Vietnamese exports, while Vietnam's export related NTMs are found to have a negative impact. For importers' NTMs, the positive impact is driven by the technical category. The non-technical measures do not have a significant effect on Vietnamese exports. Our estimates also suggest that the negative supply side effect of importers' new technical measures tends to dominate their positive demand side effect. Additionally, the importers' technical measures have stronger positive effects on intermediate goods in comparison to final goods. Vietnamese exports of intermediate goods to higher income countries are found to enjoy a higher positive impact of technical measures, compared to those exports to importing countries with a lower level of per capita income. For NTMs voluntary applied by Vietnam on exported products, technical measures seem to be effective in increasing Vietnam's exports of final products to importing countries with a level of per capita income below USD 11,462.09. For those importing country markets, the positive marginal effect of Vietnam's export related technical measures on exports of final products is higher in poorer importing countries. On the other hand, the non-technical category tends to have negative effects on Vietnamese exports, especially on intermediate goods. Otherwise, we do not find significant relationship between importing countries' income level and Vietnam's technical measures on intermediate goods as well as importers' technical measures on final goods.

The rest of this chapter is organized as follows. The next section presents our methodology and data used for empirical analysis. Results are reported in Section 1.3. Section 1.4 provides robustness checks for our empirical results. Section 1.5 concludes this chapter.

1.2. Methodology and data

1.2.1. Methodology

This section discusses the empirical framework used to examine the impacts of NTMs on Vietnamese exports. Based on the theoretically motivated gravity model derived by Anderson and Wincoop (2003), we consider the following product-level gravity equation:

$$lnX_{jkt} = lnY_{vn,t} + lnY_{jt} - lnY_t^w + (1-\sigma)lnt_{jkt} - (1-\sigma)lnP_{vn,t} - (1-\sigma)lnP_{jt} \quad (1)$$

Where X_{jkt} is Vietnam's exports of product k to country j in year t. The elasticity of substitution between products is assumed to be constant and denoted by σ. $Y_{vn,t}$, Y_{jt}, Y_t^w are the nominal GDPs of Vietnam, country j, and the world in year t, respectively. $P_{vn,t}$ and P_{jt} denote the multilateral resistance terms (MRTs) which refer to the relative trade costs of Vietnam and country j to the rest of the world. Following Feenstra (2002), Baier and Bergstrand (2007) and due to the lack of variation on exporters, we introduce year (γ_t) and importer-year (φ_{jt}) dummies into the equation (1) to properly control for the MRTs. The introduction of these dummy variables makes it impossible to estimate the coefficients of the nominal GDPs. Time fixed effects can also control for foreign capital flows, especially inward foreign direct investments, which are an important determinant of export performance.[1]

The remaining term t_{jkt} represents all bilateral trade costs between Vietnam and importer j in year t for product k. Traditionally, trade costs are further modeled as a function of tariff and a number of time-invariant factors such as distance, a shared border, common languages, a colonial relationship. However, instead of estimating the coefficients of time-invariant variables, we use product-importer dummies (ω_{kj}) to capture the effects of the time-invariant factors. To address the impacts that NTMs have had on Vietnamese exports, we include NTMs as a bilateral trade cost. In addition, one major concern when estimating the gravity model at product level is to properly

[1] We wish to thank Professor Teru Nishikawa for suggesting this point.

account for heteroscedasticity and the presence of a large number of zero trade values. Following Santos Silva and Tenreyro (2006), Santos Silva and Tenreyro (2011), we employ the Poisson-Pseudo Maximum Likelihood (PPML) method to obtain consistent and unbiased estimations. Consequently, considering the use of PPML estimation method, our empirical equation can be rewritten as follows:

$$X_{jkt} = \beta_1 \ln(1 + tariff_{jkt}) + \beta_2 ln(1 + IMntm_{jkt}) + \beta_3 ln(1 + VNntm_{jkt}) + \gamma_t + \varphi_{jt} + \omega_{kj} + \varepsilon_{jkt} \quad (2)$$

Where $tariff_{jkt}$ is the most effective tariff applied to Vietnamese product k by importer j in year t; $VNntm_{jkt}$ denotes the total number of export related NTMs that applied by Vietnam to exports of product k to country j; $IMntm_{jkt}$ denotes the total number of NTMs that applied to imports of product k coming from Vietnam by country j; ε_{jkt} is the error term.

Firstly, we use Equation (2) to see the overall effects of NTMs imposed by Vietnam and its trading partners on Vietnam's exports. Secondly, we would like to identify the differentiated effects of technical and non-technical measures on Vietnamese exports. Hence, instead of using the aggregated variables of NTMs as in Equation (2), we consider the disaggregated variables of technical ($VNntm\_tech_{jkt}$ and $IMntm\_tech_{jkt}$) and non-technical measures ($VNntm\_nontech_{jkt}$ and $IMntm\_nontech_{jkt}$). In general, we follow, with slight modification, the international classification of NTMs developed by the Multi-Agency Support Team (MAST) – UNCTAD to define technical and non-technical measures. Details on the classification of NTMs can be found in Table 1 and 2. As discussed above, while non-technical measures are expected to have negative impacts on exports, the effect of technical measures is not unambiguous. It would depend on the positive demand-side and negative supply-side effects of technical measures, which one will dominate the other.

Table 1: Classification of Import related Non-tariff Measures

Import related Non-tariff Measures	
Technical Group	Non-technical Group
A: Sanitary and phytosanitary measures excluding A1, A81 B: Technical barriers to trade excluding B1, B81 C: Pre-shipment inspection and other formalities	D: Contingent trade-protective measures E: Non-automatic licensing, quotas, prohibitions, and quantity-control measures other than for SPS or TBT F: Price-control measures, including additional taxes and charges G: Finance measures H: Measures affecting competition I: Trade-related investment measures A1: Prohibitions/restrictions of imports for SPS reasons B1: Import authorization/ Licensing related to TBT A81, B81: Product registration/ Approval requirements
Note: authors' elaboration based on the classification of NTMs on https://trains.unctad.org/	

Table 2: Classification of Export related Non-tariff Measures

Export related NTMs	
Technical measures	Non-technical measures
P1: SPS and TBT related export measures, excluding **P11, P12, P17** **P2:** Export Formalities **P6**: Export support measures	**P11:** Authorization or permit requirements to export, for technical reasons **P12:** Export registration requirements for technical reasons **P17**: export prohibition for SPS reasons **P3**: Export-licence,-quota,-prohibition and other restrictions other than SPS or TBT measures **P4**: Export price-control measures including additional taxes and charges **P5**: State-trading enterprises, for exporting; other selective export channels **P7**: Measures on re-export **P9**: Export measures, n.e.s.
Note: authors' elaboration based on the classification of NTMs on https://trains.unctad.org/	

Thirdly, even when the positive net effect of technical measures is found, one would expect that the adverse effects of newly initiated technical measures can possibly eliminate their positive effect. It may need some time for exporting firms or producers can change their production to satisfy the technical regulations. Therefore, there may be a differentiated effect between newly and previously initiated technical measures. To test that, we generate dummy variables $newVNntm\_tech\_dum_{jkt}$ and $newIMntm\_tech\_dum_{jkt}$, which take the value of one if there are

any technical measures initiated by Vietnam and its trading partner j, respectively, in year t and zero otherwise. These two dummies enter the regression equation together with the disaggregated variables of NTMs. Alternatively, we also calculate the $VNntmtech_{jkt}$ and $IMntm\_tech_{jkt}$ separately for newly and previously initiated measures. Then, the calculated variables of technical measures are used in the regression as an alternative specification to verify our prediction. Next, we estimate regressions of the technical and non-technical variables on subsamples of intermediate and final products. To classify products into intermediate and final groups, we follow the Broad Economic Categories (BEC) classification. Finally, we add interaction terms between variables of technical NTMs and importing country's per capita GDP to the specifications used for the above subsamples. Due to multiple high-dimensional fixed effects, PPML estimates are generated in Stata using the command "ppmlhdfe" (Correia, Guimaraes and Zylkin, 2020).

1.2.2. Data

This study employs a balanced panel consisting of Vietnamese exports of more than 5000 products (including zero trade values) at HS 6 digits to 29 trading partners over the period 2015 to 2018. The choice of trading partners and sample period is based strictly on the availability of data on non-tariff measures and exports.

The dataset was constructed from three databases. The primary database is the "global database on non-tariff measures" published by the UNCTAD TRAINS. The database provides very detailed information on the stock of NTMs applied by nearly 100 countries at a certain year to each imported and exported products at the HS 6-digit level. However, due to the lack in time series for many countries, we can only exploit data of 30 countries, including Vietnam, for the period 2015 to 2018, including 17 countries with complete time series and 13 countries with one- or two-year missing data to construct our NTM variables. For these 13 countries, they have data that are available for

years before and after these missing years. Lists of countries and available years for NTMs data are shown in Table 3.[2]

Therefore, using the dates of implementation and withdrawal in the database, we can calculate the NTMs stock for the missing years. Hence, a necessary assumption here is that there were no measures initiated and abolished immediately during these missing years. Compared to previous studies using this database, our assumption is more realistic since we had data on both sides of the missing periods and the missing periods are also shorter. Next, data on the Effectively Applied Tariff for Vietnam exports were obtained from the World Bank's World Integrated Trade Solution database (WITS). Using the conversion table available on the WITS website, tariff and non-tariff measure data are converted to the 2012 HS 6-digit level. Finally, export data of Vietnam at the HS 6-digit level (2012 version) are taken from the CEPII-BACI database. Table 4 presents summary statistics and description of our variables.

Table 3: List of Sample Countries and Available Years for NTMs Data

Country	Available years	Country	Available years	Country	Available years
Argentina	2015-2018	**El Salvador**	2015-2018	**Panama**	2015-2018
Bolivia	2015-2018	**European Union**	2015, 2016, 2018	**Paraguay**	2015-2018
Brazil	2015-2018	**Guatemala**	2015-2018	**Peru**	2015-2018
Brunei Darussalam	2015, 2018	**Honduras**	2015-2018	**Philippines**	2015, 2018
Cambodia	2015, 2018	**Indonesia**	2015, 2018	**Singapore**	2015, 2018
Canada	2015, 2017	**Lao**	2015, 2018	**Thailand**	2015, 2018
Chile	2015-2018	**Malaysia**	2015, 2018	**United States of America**	2014, 2017, 2018
Colombia	2015-2018	**Mexico**	2015-2018	**Uruguay**	2015-2018
Costa Rica	2015-2018	**Myanmar**	2015, 2018	**Venezuela**	2015-2018
Ecuador	2015-2018	**Nicaragua**	2015-2018	**Vietnam**	2015, 2018

[2] All 28 countries of the European Union enter our estimations as a single country since they have the same trade policy. Unfortunately, some important trading partners of Vietnam are not included due to the lack of data on NTMs (e.g., China, Japan). However, Vietnamese exports to countries in our database still account for about 60% of total Vietnamese exports.

Table 4: Descriptive Statistics of Variables

Variable	Description	Obs	Mean	S. D.	Min	Max
X_{jkt}	Vietnamese exports of product k to country j in year t	597,885	807	38,039	0	13,815,878
$ln(1 + tariff_{jkt})$	the Effectively Tariff applied to Vietnamese product k by importer j in year t	593,693	0.05	0.07	0	3.26
$ln(1 + IMntm_{jkt})$	the number of NTMs that applied to imports of product k coming from Vietnam by country j in year t	597,885	0.95	1.07	0	4.50
$ln(1 + IMntm\_tech_{jkt})$	the number of technical NTMs that applied to imports of product k coming from Vietnam by country j in year t	597,885	0.71	0.95	0	4.14
$newIMntm\_tech\_dum_{jkt}$	take the value of 1 if there are any technical measures initiated by Vietnam's trading partner j on product k in year t and zero otherwise	597,885	0.04	0.20	0	1
$ln(1 + oldIMntm\_tech_{jkt})$	the number of NTMs that initiated before year t by country j and still applied to imports of product k coming from Vietnam in year t	597,885	0.05	0.27	0	3.93
$ln(1 + newIMntm\_tech_{jkt})$	the number of NTMs that initiated in year t by country j and applied to imports of product k coming from Vietnam	597,885	0.68	0.93	0	4.14
$ln(1 + IMntm\_nontech_{jkt})$	the number of non-technical NTMs that applied to imports of product k coming from Vietnam by country j in year t	597,885	0.55	0.74	0	3.33
$ln(1 + VNntm_{jkt})$	the number of export-related NTMs that applied by Vietnam to export of product k to country j in year t	597,885	0.80	0.79	0	3.22
$ln(1 + VNntm\_tech_{jkt})$	the number of export-related technical NTMs that applied by Vietnam to export of product k to country j in year t	597,885	0.45	0.66	0	2.94
$newVNntm\_tech\_dum_{jkt}$	take the value of 1 if there are any technical measures initiated by Vietnam on exports of product k to j in year t and zero otherwise	597,885	0.06	0.23	0	1
$ln(1 + oldVNntm\_tech_{jkt})$	the number of export-related technical NTMs that initiated before year t by Vietnam and still applied to export of product k to country j in year t	597,885	0.07	0.29	0	1.79
$ln(1 + newVNntm\_tech_{jkt})$	the number of export-related technical NTMs that initiated in year t by Vietnam and applied to export of product k to country j in year t	597,885	0.38	0.63	0	2.94
$ln(1 + VNntm\_nontech_{jkt})$	the number of export-related non-technical NTMs that applied by Vietnam to export of product k to country j in year t	597,885	0.51	0.59	0	2.40
$lngdppc_{jt}$	Importing country j's GDP per capita	597,885	8.94	1.04	7.06	11.08

Notes: 200,264 observations are used in the regression because the command "ppmlhdfe" in Stata drops all observations that are either singletons or separated by a fixed effect. Source: Authors own calculation.

1.3. Empirical results

In Table 5, Column (1) presents the results of Equation 2 with the aggregated variables of non-tariff measures, including all types of measures. The coefficient of total NTMs applied by Vietnam's trading partners is positive and highly significant at the 1 percent level, indicating that higher NTMs imposed by importing countries are associated with greater Vietnamese exports. The other variable of our interest in this estimation, the total export related NTMs applied by Vietnam, is negative and statistically significant at a 5 percent level. Namely, the higher intensity of Vietnam's export related NTMs lowers the exports of Vietnam. These results may imply that the positive demand side effects of import related NTMs dominated their negative supply side effects, while vice versa for Vietnam's export related NTMs.

In Column (2) of Table 5, the impact of NTMs is differentiated according to types of NTMs, specifically technical and non-technical measures. Examining effects of NTMs at a more disaggregated level can help to reinforce the results above. The coefficient of importers' technical NTMs is positive and significant at the 1 percent level, while the coefficient of importers' non-technical NTMs is negative, but statistically insignificant. Therefore, the positive and significant effect of total NTMs applied by importers in Column (1) is primarily driven by the positive demand side effect of the technical category. This result is in line with Murina and Nicita (2017) and Timini and Conesa (2019). For Vietnam's NTMs, the coefficient of technical measures is not statistically different from zero. Hence, it seems to be that the implementation of technical export related measures did not have any impact on Vietnamese exports. On the other hand, non-technical measures imposed by Vietnam have negative impacts on exports through its negative and highly significant coefficient as shown in Column (2). Finally, the coefficient estimates of tariff are negative and significant at a 1 percent level in all specifications as expected.

Table 5: Effects of NTMs, technical and non-technical measures, on Vietnamese exports 2015-2018

Dependent variable	v_t (1)	v_t (2)	v_t (3)	v_t (4)
$ln(1+tariff_{jkt})$	-1.04*** (0.364)	-1.04*** (0.365)	-1.04*** (0.365)	-1.04*** (0.365)
$ln(1+IMntm_{jkt})$	0.216*** (0.07)			
$ln(1+IMntm\_tech_{jkt})$		0.207** (0.083)	0.251*** (0.084)	
$newIMntm\_tech\_dum_{jkt}$			-0.085** (0.042)	
$ln(1+oldIMntm\_tech_{jkt})$				0.106* (0.056)
$ln(1+newIMntm\_tech_{jkt})$				0.068 (0.048)
$ln(1+IMntm\_nontech_{jkt})$		-0.018 (0.073)	-0.025 (0.072)	0.041 (0.063)
$ln(1+VNntm_{jkt})$	-0.106** (0.048)			
$ln(1+VNntm\_tech_{jkt})$		-0.018 (0.036)	-0.041 (0.038)	
$newVNntm\_tech\_dum_{jkt}$			0.03 (0.055)	
$ln(1+oldVNntm\_tech_{jkt})$				0.005 (0.037)
$ln(1+newVNntm\_tech_{jkt})$				0.014 (0.051)
$ln(1+VNntm\_nontech_{jkt})$		-0.162*** (0.056)	-0.162*** (0.06)	-0.131** (0.059)
Adj R-squared	0.9858	0.9858	0.9858	0.9858
Obs	200,264	200,264	200,264	200,264

*Note: Poisson regressions. Robust standard errors in parentheses; ***p < 0.01, **p < 0.05, *p < 0.1. Year, importer-year and importer-product fixed effects are included in all specifications.*

Next, Column (3) presents the case where the dummies of newly initiated technical measures are estimated with the disaggregated variables of NTMs. All coefficients of the disaggregated indices for NTMs are very similar to those in Column (2). The coefficient on importer's new technical measures is negative and statistically significant at a 5 percent level. The introduction of this dummy variable leads to a higher value for the coefficient of the total number of technical measures imposed on imports from Vietnam by importing countries, compared to the one in

Column (2). This means that the initiation of technical NTMs by importers tends to have a negative impact on Vietnamese exports. In addition, we show the results of our alternative specification in Column (4) to see the differentiated effects between newly and previously initiated technical measures on Vietnamese exports. The results suggest that only technical measures previously imposed by importers have a positive impact on Vietnamese exports, while higher technical measures that newly initiated by importers are not associated with higher imports from Vietnam. A possible explanation may be that the adverse effects of new technical measures tend to be stronger and eliminate the positive demand side effects of those measures on Vietnamese exports as exporters may find it difficult to comply with new technical regulations. On the other hand, both new and old measures initiated by Vietnam seem to have no effect on exports, as shown by the insignificant value of coefficients related to those variables in Column (3) and (4).

Table 6: Intermediate goods versus final goods

Dependent variable: v_t	**Intermediate Goods (1)**	**Intermediate Goods (2)**	**Final Goods (3)**	**Final Goods (4)**
$ln(1 + tariff_{jkt})$	2.854	2.781	-1.251***	-1.250***
	(2.772)	(2.788)	(0.443)	(0.444)
$ln(1 + IMntm\_tech_{jkt})$	0.564***	-2.613***	0.098*	-0.222
	(0.173)	(0.825)	(0.058)	(0.521)
$*lngdppc_{jt}$		0.360***		0.033
		(0.109)		(0.051)
$ln(1 + IMntm\_nontech_{jkt})$	-0.191	-0.028	-0.202**	-0.186*
	(0.134)	(0.096)	(0.095)	(0.098)
$ln(1 + VNntm\_tech_{jkt})$	-0.057	0.295	0.036	0.857**
	(0.065)	(0.442)	(0.055)	(0.363)
$*lngdppc_{jt}$		-0.04		-0.081**
		(0.048)		(0.037)
$ln(1 + VNntm\_nontech_{jkt})$	-0.196*	-0.235**	-0.115	-0.098
	(0.109)	(0.101)	(0.081)	(0.080)
Pseudo R-squared	0.9677	0.9680	0.9928	0.9928
Obs	102,652	102,652	67,608	67,608

*Note: Poisson regressions. Robust standard errors in parentheses; ***p < 0.01, **p < 0.05, *p < 0.1. Year, importer-year and importer-product fixed effects are included in all specifications.*

In Column (1) and (3) of Table 6, we estimate the impact of technical and non-technical measures separately on Vietnamese exports of intermediate and final goods. The coefficients of

importer's technical measures are positive and significant for both subsamples with stronger effect for intermediate goods. This result differs from that of Timini and Conessa (2019) who found no significant difference between product groups in the trade effect of importer's technical NTMs. However, this is broadly consistent with the earlier discussions. In addition, similar to Timini and Conessa (2019), we found a significant and negative effect of importing countries' non-technical measures only for final goods. For Vietnam's export-related measures imposed on exports of intermediate goods, only the non-technical category is estimated to have negative and significant impact, as shown in Column (1). This means that the implementation of export-related non-technical measures by Vietnam have trade-impeding effects on export of intermediate goods.

Finally, we identify the effect of technical NTMs for Vietnamese exports of intermediate and final goods across importing country markets by presenting estimates where we interact both variables of interest with importing countries' GDP per capita. Column (2) of Table 6 presents the results for intermediate goods, which show that the coefficient on importers' technical measures is negative (-2.613) and statistically significant at the 1 percent level, whereas the associated interaction term is positive (0.36) and also significant at the 1 percent level. This indicates that the effect of technical NTMs applied by importers seem to be increasing in per capita income of importing countries. Also in this specification, the coefficient of Vietnam's export related technical measures and its interaction term are statistically insignificant at the conventional level.

In contrast to the above results of intermediate goods, the estimates of final goods show insignificant coefficients for importers' technical measures and the associated interaction with per capita income of importing countries. Regarding Vietnam' export related technical measures for final goods, its coefficient is positive (0.857) and significant at the 5 percent level. The coefficient on its interaction term with per capita GDP is negative (-0.081) and statistically significant at the 5 percent level, indicating that the positive impact of Vietnam' export related technical measures for final goods seems to be decreasing in per capita GDP of importing countries. At the same time,

other coefficients in Column (2) and (4) are very similar to the corresponding coefficients in Column (1) and (3), respectively.

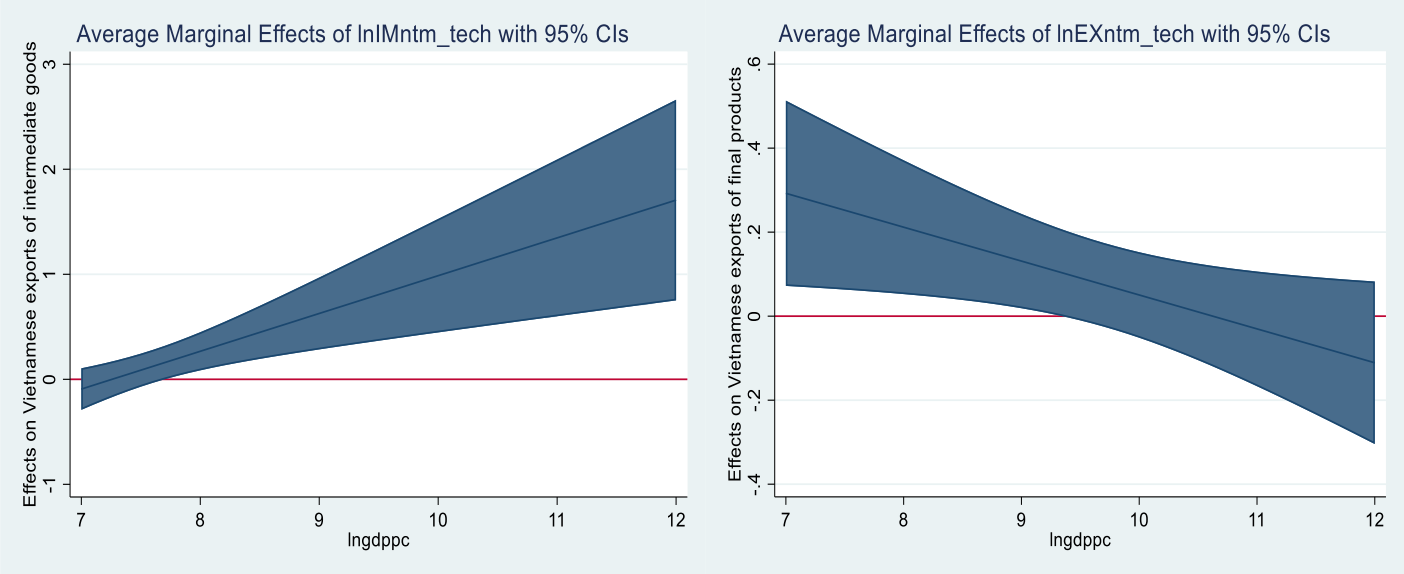

Figure 2: Marginal Impact of technical NTMs as a Function of per capita GDP.
Source: Authors

However, to obtain an intuitive and clearer picture of the impact of technical NTMs applied by Vietnam and its trading partners on Vietnamese exports of intermediate and final goods, Figure 2 presents the average marginal effects of the technical NTMs' variables for different levels of importing countries' per capita income at the 95% confidence intervals. In this figure, the left part presents the marginal effects of importing countries' technical measures on Vietnamese exports of intermediate goods, while the marginal effects of Vietnam's export related technical measures on exports of final goods are shown in the right. We only include in this figure the variables that have significant marginal effects. The significant marginal effect refers to situations in which the 95% confidence interval does not contain zero. As can be seen from the figure, the importers' technical NTMs imposed on Vietnamese exports of intermediate goods shows an increasing marginal effect with respect to per capita income of importing countries, while the marginal effects of the other variable are decreasing in importing countries' per capita income. The marginal effects of importing countries' technical NTMs on Vietnamese exports of intermediate goods take positive

significant values as importing countries have a per capita GDP above USD 2,209.67 ($e^{7.7006}$). Turning to the export related technical NTMs of final goods, they were shown to have a positive and significant impact on Vietnamese exports of final goods to importing countries with per capita GDP below USD 11,462.09 ($e^{9.3468}$). Otherwise, there were no significant effects on Vietnamese exports.

1.4. Robustness checks

Table 7: Robustness Checks

Dependent variable:	v_{t+1} *(1)*	v_{t+1} *(2)*	v_t *(3)*	v_t *(4)*	v_t *(5)*	v_t *(6)*
$ln(1 + tariff_{jkt})$	-0.954** (0.394)	-0.971** (0.392)	-1.04*** (0.172)	-1.036*** (0.173)	-1.043*** (0.363)	-1.039*** (0.364)
$ln(1 + IMntm_{jkt})$	0.204*** (0.058)		0.216** (0.091)		0.191*** (0.056)	
$ln(1 + IMntm\_tech_{jkt})$		0.195** (0.068)		0.207* (0.115)		0.17*** (0.064)
$ln(1 + IMntm\_nontech_{jkt})$		-0.053 (0.077)		-0.018 (0.125)		0.013 (0.062)
$ln(1 + VNntm_{jkt})$	-0.170***		-0.106 (0.076)		-0.084** (0.042)	
$ln(1 + VNntm\_tech_{jkt})$		-0.012 (0.037)		-0.018 (0.059)		-0.013 (0.034)
$ln(1 + VNntm\_nontech_{jkt})$		-0.300*** (0.067)		-0.162* (0.089)		-0.134*** (0.047)
Pseudo R-squared	0.9863	0.9864	0.9858	0.9858	0.9828	0.9828
Obs	202,744	202,744	200,264	200,264	336,612	336,612

Note: Poisson regressions. Robust standard errors without clustering in parentheses of Column (1) and (2); Standard errors in parentheses of Column (3) and (4) are clustered at importer-product and year; ***p < *0.01,* **p < *0.05,* *p < *0.1. Year, importer-year and importer-product fixed effects are included in all specifications.*

Firstly, there is also a concern that the effect of non-tariff measures on trade flows is endogenous. The implementation of NTMs may be resulted from rapid increase in exports. Therefore, to test the robustness of our baseline specifications, we lead the dependent variable in Equation (2) for one year and run this lead dependent variable on our contemporaneous trade policy variables. The estimated results are shown in Column (1) and (2) of Table 7. The coefficients for the variables of our interest in Column (1) and (2) of Table 7 are very similar to those in Column (1) and (2) of

Table 5. The results for other specifications that use the one-year lead dependent variables are also similar.

Secondly, following Egger and Tarlea (2015), instead of using robust standard errors, we use multiple clusters in our baseline specifications. Specifically, we cluster our standard errors by importer-product and year. As shown in Column (3) and (4) of Table 7, standard errors of all coefficients are increased, but generally the coefficients of NTMs variables are still robust.

Finally, including the 28 member states of the European Union as a single trading partner of Vietnam can make Vietnamese exports to the European Union excessively large when compared to the exports to other markets. This may affect the estimates of coefficients. Therefore, Column (5) and (6) in Table 7 report the results of estimations in which the member states of the European Union are included separately in the database.[3] There are in total 56 trading partners of Vietnam in the database used for the estimations in Column (5) and (6) of Table 7. The results are still similar to those in Column (1) and (2) of Table 5.

1.5. Conclusions

Given the declining importance of tariffs, non-tariff measures matter increasingly in international trade. This places a challenge for developing countries following an export-led growth strategy like Vietnam. This study sets out to investigate the effects of NTMs, specifically technical and non-technical measures, imposed by both Vietnam and trading partners on Vietnam exports for the period 2015 to 2018.

The results indicate that NTMs imposed by importing countries increase Vietnamese exports. This positive effect is driven primarily by technical measures. In addition, our estimates also show that the adverse impact of importing countries' new technical measures imposed on imports coming from Vietnam seems to dominate their positive impact of the demand side. We do not find a

[3] We wish to thank Professor Kiyotaka Sato for suggesting this point.

significant impact of non-technical measures applied by importing markets on total exports of Vietnam. Considering the differentiated effects of technical and non-technical measures across types of goods, including intermediate and final goods, this suggests that technical measures imposed by importing countries have stronger positive effects on intermediate products. Additionally, the estimated results also suggest, only for the subsample of intermediate goods, that as far as the level of importing countries' per capita income is above USD 2209.67, Vietnamese exports to higher income countries tend to experience a higher positive impact of technical measures, compared to exports to importing countries with a lower level of per capita income. Meanwhile, the final products seem to be the target of non-technical measures used by importing countries. For the technical measures on final goods, we do not find a significant relationship between their impacts on Vietnamese exports and the development level of importing countries.

For NTMs voluntary applied by Vietnam on exported products, technical measures seem to be effective in increasing Vietnam's exports of final products to importing countries with the level of per capita income below USD 11,462.09. For those importing country markets, the positive marginal effect of Vietnam's export-related technical measures on exports of final products is higher in poorer importing countries. On the other hand, the non-technical category tends to have negative effects on Vietnamese exports, especially on intermediate goods.

Chapter 2: Price Effects of the United States (US) Antidumping Investigations in a Non-Market Economy Case: Vietnam's Shrimp Exports to the US[4]

2.1. Introduction

Along with rapid trade liberalization, countries have been widely using contingent protective measures as temporary trade barriers for more than two decades. Among the contingent protective measures, the antidumping (AD) duties are still known as the predominant measure used by both developed and developing countries to protect local industries against foreign competition (Blonigen and Prusa 2015). The more frequent use of antidumping actions shows up not only in the increasing number of AD cases initiated and the number of AD duty orders issued over time, but also over a wider set of users and products. According to the World Trade Organization (2019a, 2019b), from 1995 to 2017, there were 5,531 AD investigations or about 240 AD investigations per year initiated by 62 countries or customs territories in which a total of 3,602 AD measures were applied over this period. This led to a proliferation of studies on the effects of AD measures on various issues.

The effects of AD duties on firms' pricing behavior have recently been attracting much interest. To date, several studies have shown an increase in trade prices due to the imposition of AD duties (for example, Prusa (2001), Blonigen and Haynes (2002, 2010), Ganguli (2008), Avsar (2013), and Nizovtsev and Skiba (2016)). The significant change in the exchange rate pass-through to US import prices of affected products resulting from AD duties has been found in Blonigen and Haynes (2002) and Turkcan (2007). Together, these studies argued that the method for calculating AD duties and the procedure of administrative review (recalculation of AD duty) are the rationale

[4] This chapter has been published in the International Trade Journal.

behind their findings. However, previous studies have almost exclusively mentioned the method used for the case of a market economy country. Therefore, one question that needs to be asked is whether the case of non-market economy countries, which use a different method of AD duty calculation, differs from the cases of previous studies.

In this chapter, we specifically examine the impact of the United States (US) AD investigations and administrative reviews on the pricing behavior of Vietnamese shrimp exporters for the period of 2000M1 to 2011M12. The most important feature of this case is that Vietnam was treated as a non-market economy (NME).[5] There are two primary aims of this study: (1) to investigate how the prices received by Vietnamese shrimp exporters respond to the AD duty changes after the final determination, and (2) to empirically examine whether or not AD duties affect the exchange rate pass-through of affected shrimp products (defined as the effect of exchange rate changes on local currency import prices exclusive of tariffs and duties).

The first systematic study of the impact of antidumping duties' imposition on prices was reported by Blonigen and Haynes (2002). The authors examined the effects of the US AD investigations on the pass-through of exchange rates and AD duties in the US import prices exclusive of the AD duties for Canadian steel between 1989 and 1995. They demonstrated that the US AD duties become endogenous with the pricing decision of exporting firms in both its home market and the US market because of the method for calculating the AD duty. This change causes a significant increase in the exchange rate pass-through after the imposition of the final AD duties. Furthermore, the presence of an AD duty might lead to asymmetric pass-through of exchange rate movements, but the empirical results did not support this. Also, they found the AD duty pass-through rate to US border prices (exclusive of AD duties) to be around 60% (Blonigen and Haynes

[5] According to the US AD law in Title VII of the Tariff Act of 1930 (1930), the term "non-market economy (NME) country" is generally defined as any foreign country that does not run the economy based on market principles, implying that the fair value is not reflected in the sales of final goods. For example, Vietnam and China are designated as NMEs.

2010). Similar results have been reported by Turkcan (2007), who found a structural break and no asymmetric behavior in the exchange rate pass-through following the imposition of AD duties on US steel imported products from Turkey – a market economy.

A study of the effects of the AD investigations on trade prices has not been done extensively for non-market economy cases. Lu, Tao, and Zhang (2013) found a small increase in export prices when preliminary AD duties are in place, while they found no changes after the final AD duties were imposed by the US on Chinese exporters. As far as we know, previous studies have only been carried out in a period before the ultimate results of the first administrative review were announced. It means that there was no change in the AD duty rate during the sample period in existing studies. One of our innovations is that by using a longer sample period that encompasses the results of several administrative reviews, new insights on the NME exporters' price response to a change in the AD duty will be examined.

Our main finding is that Vietnamese shrimp exporters lowered their prices by a small amount in the presence of preliminary AD duties. However, after the final determination, the average export price increase for products subject to US AD duties is about 1.34% and 0.89% in response to a 1% increase and decrease in AD duties, respectively. These results suggest that NME exporting firms increase their prices by much more than the amount of the AD duty imposed or increased in an attempt to eliminate future duties. Secondly, our estimates also show that US AD duties do not affect the exchange rate pass-through of affected shrimp products. More specifically, the exchange rate coefficients for the affected products remain unchanged when the final AD duties are imposed. This result differs from the cases of Blonigen and Haynes (2002) and Turkcan (2007). Additionally, there is no evidence of asymmetric pass-through of exchange rate movements following the final AD duties.

Overall, this research highlights the difference between the effects of AD duties on the pricing behavior of exporters from market and non-market economies. Understanding NME exporting

firms' pricing behavior is important for the future of AD duty implementation, especially because the price-increasing response of exporting firms to AD duties increases the net welfare loss of implementing countries (Gallaway, Blonigen, and Flynn 1999).

The next section presents a brief overview of the US antidumping investigation procedures and the method for calculating AD duties in a non-market economy case. Section 2.3 presents the history of US antidumping petitions in certain frozen warmwater shrimp's imports from Vietnam. Our empirical methodology and data description are outlined in Section 2.4, and results are presented in Section 2.5. Conclusions are given in Section 2.6.

2.2. The US antidumping investigation in a non-market economy case

Figure 3 presents the timeline showing the main stages of the US AD investigation process. In an AD investigation, the US Department of Commerce (USDOC) determines whether the investigated products are priced in the US market at less than fair value (LTFV). Then, if dumping is proved by the US International Trade Commission (USITC) to be the reason for the severe injury of the US domestic industry, the imports of violating firms or countries will be levied with an AD duty equal to the estimated amount by which the fair value exceeds the price charged in the US market.

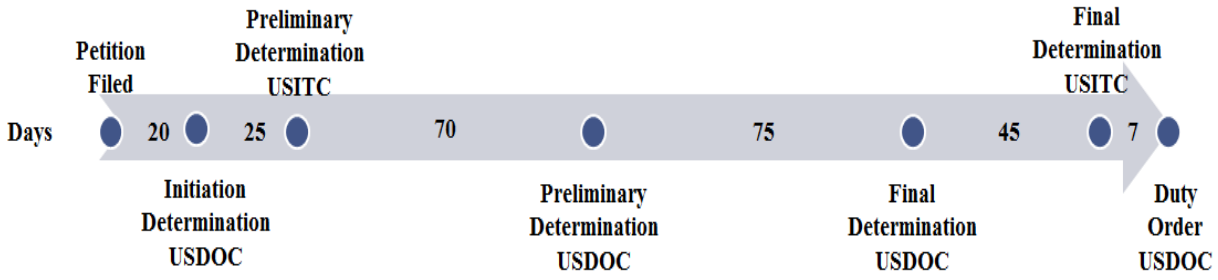

Figure 3: The Overall US Antidumping Investigation Timeline
Source: Author's own compilation based on USITC (2015)

As shown in Figure 3, in each stage, there is a short period of time for agencies to investigate and come to a determination. If both the USITC and USDOC end their preliminary phase with an affirmative determination, then importers are required to post a cash deposit or a bond based on the estimated AD duties as shown in the USDOC preliminary determination. Then, if affirmative

determinations are made by both the USDOC and USITC in the final phases, an AD duty order will be issued to impose an ad valorem AD duty on the affirmative products. In this final step, both the list of affirmative products and the final AD duties may be different from the preliminary determinations.

However, the actual AD duties faced by foreign firms are only determined after the subject merchandise is imported. So, each year, if the USDOC receives requests from any interested parties (such as domestic petitioners, importers, or foreign firms) to conduct an administrative review on any foreign firms, the dumping margins (AD duties) will be recalculated for those particular firms. If the new AD duty differs from the previous duty, a duty equal to this new rate shall be applied to the subject imports. Then, a bill (or a reimbursement) equal to the differing amount plus interest is assessed (or rebated). Thus, this kind of procedure allows foreign firms to have some strategies to have the future duty stopped or reduced (Blonigen and Haynes 2002).

Regarding the AD duty calculation, there are several different methods depending on the features of the investigated country and firm. In this study, we specifically focus on the method normally used for a non-market economy country. When the USDOC treats a country as a non-market economy (NME), a NME method will be applied to derive the "fair value."[6] The USDOC conducts a calculation of fair value based on factors of production (labors, materials, electricity, and so on) reported by some top NME suppliers of the subject merchandise and then values these factors using publicly available data from a surrogate country to get the "fair value."[7] After that, the USDOC converts the constructed "fair value" in the surrogate country's currency into US dollars, using the bilateral exchange rate of the surrogate country. If the export price is below the

[6] In a market economy case, the USDOC uses the foreign firms' prices in their home market or third-country market as the "fair value." For more details about the method for a market economy country, see Blonigen and Haynes (2002).

[7] The selection of a surrogate country is under the control of the USDOC based on the AD law. There are some criteria for choosing a surrogate country in an investigation, for example, economic comparability, comparable merchandise, significant producers, and data availability.

"fair value" (the usual case), the USDOC concludes that the investigated firm has dumped the subject merchandise in the US market. Then, the NME dumping margins will be computed based on the difference between the export prices and the "fair value."

As discussed, and examined empirically in Blonigen and Haynes (2002, 2010), all firms in a market economy facing AD duties may adjust their prices in their home market associated with the increase in the export prices for the US market to lower or eliminate AD duties through the US practice of administrative reviews. Unlike the market economy country approach, the surrogate country approach for NME countries is totally unpredictable and all exporters from the NME country cannot control the fair value in order to benefit from lower or no duties in the future. This means that if the NME exporter attempts to completely remove the AD duty, one would have to see that the NME country's export price rose by much more than 100% of the AD duty imposed or increased. For the case of Vietnamese shrimp exports to the US, some investigated firms from Vietnam earned a duty of zero in some administrative reviews. Therefore, one would expect that the coefficient for AD duty increases in the case of Vietnamese shrimp exports to the US may be much greater than one.

The use of the firms' home price in calculating the future AD duties for a market economy makes the exporters' pricing decision in the US market dependent on the demand of both their home market and the US market (Blonigen and Haynes 2002). This resulted in a substantial change in the exchange rate pass-through after the imposition of the final AD duties. However, in contrast to the market economy case, the pricing decision model for the NME exporters facing the final AD duties does not change because the method used for the NME firms does not use their pricing in the home market to calculate the future AD duties under review. Therefore, there may be no structural change in the estimated coefficient of exchange rate pass-through for the affirmative products from the NME country.

Lastly, the asymmetric pass-through of exchange rates for the products subject to AD duties may be possible in complicated scenarios. Suppose, for simplicity, we assume that all factors which are used in deriving the fair value are constant, except for exchange rates. By increasing (decreasing) the exchange rate pass-through when the NME country's exchange rate is expected to appreciate (depreciate), NME exporters can benefit from lower duties in the administrative review if the surrogate country's exchange rate depreciates, or they may mitigate the impact of AD duties if the surrogate country's exchange rate appreciates.

2.3. The US AD case of Vietnamese shrimp products filed in 2003

On December 31, 2003, the Ad Hoc Shrimp Trade Action Committee - a representative group of American shrimp producers - filed an AD petition on certain frozen and canned warmwater shrimp products from six major shrimp exporting countries in the US market including Brazil, Ecuador, China, Thailand, India, and Vietnam (USDOC 2004). After receiving the petition, the USDOC and USITC conducted AD investigations on 13 of the total 19 shrimp products disaggregated at the ten-digit Harmonized Tariff Schedule (HTS) level involving foreign exporters or producers from these six countries. The list of 19 shrimp product codes is shown in Table 8. In addition to China, Vietnam was treated as a non-market economy, and the USDOC used Bangladesh as the surrogate country for the calculation of the dumping margins. On July 16, 2004, the USDOC released their affirmative preliminary determination on 13 ten-digit HTS products, with the preliminary AD duties for Vietnamese shrimp exporters ranging from 12.11% to 19.6% for four investigated firms, 16.01% for seventeen firms who applied for a separate rate, and 93.13% for other firms from Vietnam who did not participate in the investigation. So, for all subject merchandise which entered the US from July 16, 2004, importers were required to deposit the preliminary AD duties. Then, on December 8, 2004, the USDOC announced the affirmative final determination with significant decreases in the estimated AD duties. On January 21, 2005, the USITC finalized their determination and concluded that the canned warmwater shrimp and prawns under the ten-digit

HTS code 1605.20.10.40 imports from Vietnam (China and Thailand) did not cause material injury for the American canned shrimp industry. Then, the USITC excluded it from the scope of the investigation and ruled an affirmative determination on the remaining 12 shrimp products. Finally, on February 1, 2005, the USDOC issued a final AD duty order which imposed on three Vietnamese shrimp exporters and producers a duty ranging from 4.3% to 5.24% for these 12 shrimp products. A weighted-average rate equal to 4.57% was levied on 31 Vietnamese exporters or producers in Section A respondents (separate rate groups) and 25.76% was the Vietnam-wide rate for non-participating firms. Over the period of 2005 through 2011, the USDOC conducted and announced the results of five administrative reviews as shown in Table 9.

Table 8: Shrimp HTS Codes to Producer Price Index Codes (NAICS) Concordance

10-digit HTS codes	Producer Price Index Codes	
0306130003^{ADD} **0306130006^{ADD}** **0306130009^{ADD}** **0306130012^{ADD}** **0306130015^{ADD}** **0306130018^{ADD}** **0306130021^{ADD}** **0306130024^{ADD}** **0306130027^{ADD}** **0306130040^{ADD}** **0306230020** **0306230040** **1605201010^{ADD}** **1605201020** **1605201030^{ADD}**	NDU311712.311712.31	Prepared frozen shrimp
1605200510 **1605201040^{PRE}** **1605201050**	NDU311711.311711	Seafood Canning
1605200590	NDU311712.311712.4	Other prepared frozen seafoods

^{ADD} indicates the shrimp products subject to the final AD duty.
^{PRE} indicates the shrimp products subject to the preliminary AD duty, but not the final duty.
Source: Author's compilation based on the concordance information from the US Bureau of Labor Statistics (2004) and FREIT (2017).

Table 9: Results of the AD Investigation and Administrative Reviews

	Preliminary (Jul 16, 2004)	Final (Feb 1, 2005)	1st Review (Sep 12, 2007)	2nd Review (Sep 9, 2008)	3rd Review (Sep 15, 2009)	4th Review (Aug 9, 2010)	5th Review (Sep 12, 2011)
Manufacturers/ exporters	**Duty (%)**	**Duty (%)**	**Duty (%)**	**Duty (%)**	**Duty (%)**	**Duty (%)**	**Duty (%)**
Camimex	19.6(M)	5.24(M)	5.24	0 (M)	0.08*(M)	4.27	0.83(M)
Minh Phu	14.89(M)	4.38(M)	4.38	0.01*(M)	0.43*(M)	2.96(M)	1.15(M)
Kim Anh	12.11(M)	VWR	VWR	4.57	4.57	4.27	1.04
Seaprodex Minh Hai	18.68(M)	4.3(M)	4.3	4.3	4.3	4.27(M)	1.04
Grobest	-	-	0 (M)	0	0	4.27	1.04
Fish One	-	_-	0 (M)	0	0	4.27	1.04
Phuong Nam	-	4.57	4.57	4.57	0.21*(M)	4.27	1.04
Amanda	16.01	4.57	4.57	4.57	4.57	VWR	1.04
C.P. Vietnam	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Cadovimex	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Cafatex	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Cataco	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Cuu Long Seapro	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Minh Hai EFSP	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Minh Hai Seaproducts	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Nha Trang Fisco	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Nha Trang Seaproduct	16.01	4.57	4.57	4.57	4.57	5.58(M)	0*(M)
Sao Ta Foods	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Seaprodex Da Nang	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Soc Trang Aquatic	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Thuan Phuoc	16.01	4.57	4.57	4.57	4.57	4.27	1.04
Pataya VN	16.01	4.57	4.57	4.57	-	-	-
Viet Nhan Company	16.01	4.57	-	-	-	-	-
Seaprodex Hanoi	16.01	4.57	-	-	-	-	-
Bac Lieu Fisheries	-	4.57	4.57	4.57	4.57	4.27	1.04
Cofidec	-	4.57	4.57	4.57	4.57	4.27	1.04
Cam Ranh Seafoods	-	4.57	4.57	4.57	4.57	4.27	1.04
Incomfish	-	4.57	4.57	4.57	4.57	4.27	1.04
Ngoc Sinh Private Enterprise	-	4.57	4.57	4.57	4.57	4.27	1.04
Phu Cuong Seafood	-	4.57	4.57	4.57	4.57	4.27	1.04
UTXI Aquatic	-	4.57	4.57	4.57	4.57	4.27	1.04
Viet Foods Co., Ltd.	-	4.57	4.57	4.57	4.57	4.27	4.27
Vinh Loi	-	4.57	4.57	4.57	4.57	4.27	4.27
Viet Hai Seafood	-	4.57	-	-	-	-	-
APT	-	4.57	-	-	-	-	-
Song Huong ASC	-	4.57	-	-	-	-	-
Kien Giang	-	4.57	-	-	-	-	-
Cafish	-	-	-	-	-	4.27	1.04
Gallant Ocean Vietnam	-	-	-	-	-	4.27	4.27
Nhat Duc	-	-	-	-	-	-	1.04
Vietnam-wide Rate	93.13	25.76	25.76	25.76	25.76	25.76	25.76
Average (excluding Vietnam-wide rate)	**16.07**	**4.58**	**4.27**	**3.97**	**3.8**	**4.27**	**1.3**

*De minimis- a zero cash deposit is required**;** (M): Rates for mandatory respondents**;** VWR: Vietnam-wide rate; Companies' names are abbreviated or shortened
Source: USDOC (2004, 2005, 2007-11)

2.4. Methodology and Data

2.4.1. Methodology

This section discusses our empirical approach used to examine the effects of the US AD investigations on the prices received by Vietnamese shrimp exporters. Using disaggregated and detailed panel data of US imports of shrimp products from Vietnam, we estimated the following price equations based on Feenstra (1989):

$$lnp_{it} = \beta_0 + \beta_1 \ln(1 + tariff_{it}) + \beta_2 \ln(1 + ADD_{it}) + \beta_3 lne_t + \beta_4 lnexpend_t + \beta_5 lnCPI_t + \beta_6 lnp_{it}^{US} + \beta_7 lnp_{it}^{ROW} + \varepsilon_{it} \quad (1)$$

for product ***i*** and time ***t*** in which:

$\boldsymbol{p_{it}}$ is the tariff and AD duty-exclusive import price measured in US dollars. This differs from Feenstra (1989), who used prices inclusive of tariffs, and Blonigen and Haynes (2002), who included not only the regular tariff but also the AD duty in their dependent variable. However, there are several reasons for our choice of prices exclusive of tariff and AD duty to construct the dependent variable. First, Kelly (2010) gave a comment on an incorrect assumption of Blonigen and Haynes (2002) that the USDOC deducts AD duties in calculating the export prices in the US market, which led to an inappropriate hypothesis that the AD duty pass-through might be 200% in order to eliminate the AD duties. Then, in the reply, Blonigen and Haynes (2010, 1283) concluded that using the AD duty-inclusive price is not appropriate to estimate the AD duty pass-through. Second, there are only two non-affirmative products that are imposed with the ad valorem tariff, and the other 17 shrimp products do not have a tariff over the sample period. In addition, this research is only interested in the pricing behavior of exporters to the US AD duties and pass-through of exchange rates to the price received by Vietnamese exporters; thus, we use the US customs-based unit value (exclusive of AD duty and tariff) to construct our dependent variable.

$\boldsymbol{tariff_{it}}$ is the regular tariff rate of the US. The tariff coefficient is expected to be negative, indicating that a reduction in the regular tariff rate will lead to an increase in export prices.

$\boldsymbol{ADD_{it}}$ is the average rate of the antidumping duty rate imposed on Vietnam's shrimp products. Unlike a regular tariff, the coefficient of the AD duty is expected to be positive.

$\boldsymbol{e_t}$ is the monthly average nominal exchange rate of the Vietnamese dong (VND) against the US dollar (VND/USD). The expected sign of the exchange rate coefficient is negative, indicating that a depreciation (appreciation) of the VND against the US dollar lowers (increases) export prices.

$\boldsymbol{expend_t}$ is the estimated US monthly expenditures (US dollar) on shrimp products at time $\boldsymbol{t}$, which is expected to control for the demand size in the US. The coefficient for US expenditures on shrimp is expected to be positive, implying that the rise of US expenditures raises the export prices of Vietnamese shrimp in dollars.

$\boldsymbol{CPI_t}$ is Vietnam's monthly consumer price index at time *t,* which is used as a proxy of home factor costs. The expected sign of the coefficient of this variable is positive, which indicates that the rise of home factor costs leads to an increase in export prices.

$\boldsymbol{p_{it}^{US}}$ represents the US substitute goods price in USD for product *i* at time *t*. $\boldsymbol{p_{it}^{ROW}}$ is the USD unit value of US shrimp imports from the rest of the world of product *i* at time *t*. The coefficients of the above competing prices are expected to be positive.

Firstly, we use Equation (1) to estimate the coefficients for the full sample of all 19 products, as well as for two subgroups: (1) affirmative sample of those products that received the final duties and (2) non-affirmative sample including those products that were not subjected to the final duties. In particular, we would like to see whether there is a difference in the exchange rate pass-through coefficients between affirmative products subject to the final AD duties imposition and non-affirmative products facing no final AD duties.

Secondly, there may be a structural change in the coefficient of AD duties before and after the final duties were accessed (Blonigen and Haynes 2002). To test that, we relax the assumption that

the AD duty coefficient is restricted to be constant over time by allowing a difference in the AD duty coefficients before and after the imposition of the final AD duties and assume that other things are unchanged. Recall that a preliminary AD duty was levied on the subject merchandise on July 16, 2004, six months before the final duty was announced on February 1, 2005. Specifically, the AD duty coefficient is allowed to vary in the period of 2000M1 to 2005M1 and the period of 2005M2 to 2011M12. By introducing the dummy variables $\boldsymbol{Before}$ and $\boldsymbol{After}$, Equation (1) is modified as follows:

$$lnp_{it} = \beta_0 + \beta_1 \ln(1 + tariff_{it}) + \beta_2' \ln(1 + ADD_{it}) \times Before + \beta_2'' \ln(1 + ADD_{it}) \times After + \beta_3 lne_t + \beta_4 lnexpend_t + \beta_5 lnCPI_t + \beta_6 lnp_{it}^{US} + \beta_7 lnp_{it}^{ROW} + \varepsilon_{it} \quad (2)$$

where $\boldsymbol{Before}$ takes the value of one if the observation is in the period of 2000M1 to 2005M1, and zero otherwise; $\boldsymbol{After}$ takes the value of one if the observation is in the period of 2005M2 to 2011M12, and zero otherwise.

Thirdly, our prediction is that the exchange rate pass-through of affirmative shrimp products in the period before and after the final imposition of AD duties remains constant for the case of Vietnam. It means that no structural change in the exchange rate pass-through occurs in the context of a NME country which differs from the prediction of Blonigen and Haynes (2002). Hence, in order to test the prediction, we also relax the second assumption of a constant coefficient of exchange rates before and after the final determination of the investigation. The following modified equation is estimated:

$$lnp_{it} = \beta_0 + \beta_1 \ln(1 + tariff_{it}) + \beta_2' \ln(1 + ADD_{it}) \times Before + \beta_2'' \ln(1 + ADD_{it}) \times After + \beta_3' lne_t \times Before + \beta_3'' lne_t \times After + \beta_4 lnexpend_t + \beta_5 lnCPI_t + \beta_6 lnp_{it}^{US} + \beta_7 lnp_{it}^{ROW} + \varepsilon_{it} \quad (3)$$

Coefficient $\boldsymbol{\beta_3'}$ indicates the pass-through for exchange rates before the final duty was imposed. Coefficient $\boldsymbol{\beta_3''}$ represents the pass-through for exchange rates after the imposition of the final AD duty.

To distinguish between the exporting firms' price response in the period of the AD duties increase and decrease after the final determination, we interact dummy variables ***Up*** and ***Down*** for the period that exporters received a higher AD duty and a lower AD duty, respectively, with a log variable of the AD duty after the final determination $\mathbf{ln(1 + \boldsymbol{ADD}) \times \boldsymbol{After}}$ in Equation (2):

$$lnp_{it} = \beta_0 + \beta_1 ln(1 + tariff_{it}) + \beta_2' ln(1 + ADD_{it}) \times Before + \beta_2''' ln(1 + ADD_{it}) \times After \times Up + \beta_2'''' ln(1 + ADD_{it}) \times After \times Down + \beta_3 lne_t + \beta_4 lnexpend_t + \beta_5 lnCPI_t + \beta_6 lnp_{it}^{US} + \beta_7 lnp_{it}^{ROW} + \varepsilon_{it} \quad (4)$$

Variable ***Up*** takes the value of one in the period that exporters experience an increase in the AD duty, and zero otherwise; while the variable ***Down*** takes the value of one in the period that exporters experience a lower AD duty, and zero otherwise. The coefficients of these above-mentioned interaction terms reveal how exporters respond to an increasing AD duty and a decreasing AD duty in the post-review period.

Lastly, in order to examine the asymmetric pass-through of exchange rates on the prices received by Vietnamese shrimp exporters between the Vietnam dong (VND) depreciation and appreciation after the imposition of the final AD duties in February 2005, we generated dummy variables ***D*** and ***A***. The dummy variable ***D*** takes the value of one if the VND depreciates in the period of 2005M2 to 2011M12, which is an increase in the exchange rate, and zero otherwise, while ***A*** takes the value of one if the VND appreciates in the period of 2005M2 to 2011M12, which is a decrease in the exchange rate, and zero otherwise. We include an interaction term of the exchange rate with ***A*** and ***D*** dummy variables to Equation (2).

$$lnp_{it} = \beta_0 + \beta_1 \ln(1 + tariff_{it}) + \beta_2' \ln(1 + ADD_{it}) \times Before$$
$$+\beta_2'' \ln(1 + ADD_{it}) \times After + \beta_3 lne_t + \beta_{3a} lne_t \times A + \beta_{3d} lne_t \times D$$
$$+\beta_4 lnexpend_t + \beta_5 lnCPI_t + \beta_6 lnp_{it}^{US} + \beta_7 lnp_{it}^{ROW} + \varepsilon_{it} \quad (5)$$

The expected sign of the coefficient $\boldsymbol{\beta_{3a}}$ is negative and the exchange rate pass-through coefficient in the VND appreciation after the imposition of the final AD duties is equal to $(\boldsymbol{\beta_3 + \beta_{3a}})$, which is expected to be close to minus one (full pass-through). The coefficient $\boldsymbol{\beta_{3d}}$ is expected to be positive and the exchange rate pass-through coefficient in the VND depreciation after the imposition of the final AD duties is equal to $(\boldsymbol{\beta_3 + \beta_{3d}})$, which is expected to be close to zero (no pass-through).

Similar to Blonigen and Haynes (2002), the estimation is performed using the weighted least squares (WLS) method with the weight being the customs values of imported shrimp products, correcting for the possibility of heteroskedasticity to obtain estimators that are more precise than their ordinary least squares (OLS). The rationale for this is that trade values and trade volumes in the sample are highly variable across shrimp products and some are very small or even zero for many months. So, one would expect that the lesser the trade value, the larger the variance in the residual for that observation (Blonigen and Haynes 2002). Therefore, weighting by the customs value of imported shrimp products may help to achieve more precise estimations. In all specifications, we also include product fixed-effects and monthly fixed-effects to control for unobserved variables which might affect our dependent variable.

2.4.2. Data

The United States International Trade Commission (USITC) provides very detailed US international trade data available for years 1989 to the present. In this chapter, we collected monthly data on customs values, quantities, and calculated duties of American shrimp imports for consumption from Vietnam for 10-digit HTS products under subheadings 030613, 030623, and

160520. Under these codes, there are 12 products from Vietnam that received the final AD duties, a single product which was involved in the investigation but did not receive the final AD duty, and the remaining shrimp products that were not involved in the investigation. To maintain the consistency of the HTS code system, the sample period lies from 2000 through 2011.

From the customs data, the monthly US import prices exclusive of tariff for each product from Vietnam are measured in US dollars per kilogram and were calculated as the ratio of customs value to the quantity of the product for each month. The ad valorem tariffs applied to the products were computed by dividing the calculated duty by the customs value. However, the calculation showed that the ad valorem tariff on Vietnamese shrimp products changed for only two products at the time of the US and Vietnam Bilateral Trade Agreement, and all other shrimp products had a zero-tariff rate during the period of estimation.

For the AD duty data on imported Vietnamese shrimp cases filed in late 2003, we obtained the rates from various issues of Federal Register notices related to the results of the investigations and administrative reviews. In the context of a non-market economy like Vietnam, the USDOC computes and publishes three kinds of AD duties for producers and exporting firms in Vietnam. Firstly, a separate AD duty rate is calculated for each investigated firm for which it is compulsory to participate fully in the petition (also called “mandatory respondents”); a trade-weighted average of these mandatory respondents' AD duties is imposed for a list of firms (“Section A” respondents) that apply for a separate rate; and a common rate, called the “Vietnam-wide” rate, which is applied to any non-cooperative or new firms that export the subject products into the US. We exclude the Vietnam-wide rate and then take a simple average of all the AD duty rates of “mandatory” and “Section A” respondents to construct our AD duty independent variable because the Vietnam-wide rate is too high and firms facing the rate will not have an incentive to export the subject shrimp to the US. Moreover, if any new firms seriously want to enter the US market with a long-term strategy, they can easily get a refund for their deposit by requesting that the USDOC conduct an

administrative review on their product. The progress of AD duties over time levied on the subject shrimp products imported from Vietnam is shown in Table 9.

Monthly data on the US substitute goods prices that are used in the regression comes from monthly producer price indexes from 2000 through 2011, available from the website of the US Bureau of Labor Statistics (USBLS). The concordance that matches HTS codes in shrimp products to its corresponding producer price indexes codes North American Industry Classification System (NAICS basis) can be found in Table 8. Besides the US substitute goods prices, another competing price is the unit-value of shrimp imported from other countries, which is calculated by dividing the customs value of shrimp imports (exclusive of Vietnamese import) by quantity. These data also come from the USITC.

Among the independent variables, data for the US monthly expenditures on shrimp was estimated as the US monthly commercial landing on shrimp plus imports and minus exports. The US Department of Commerce provides the US monthly commercial landing data for all kinds of shrimp through the website of the National Marine Fisheries Service Office of Science and Technology (2017). The data for monthly shrimp imports and exports also comes from the same website.

Table 10: Descriptive Statistics of Variables

Variable Name	Mean	Standard Deviation	Min	Max
Log of export price, **lnp**	2.0681	0.4494	-0.6274	3.8173
Log of tariff, **ln(1+tariff)**	0.0025	0.0138	0	0.1823
Log of AD duty, **ln(1+ADD)**	0.0215	0.0295	0	0.1490
Log of exchange rate, **lne**	9.7007	0.0972	9.5497	9.9433
Log of US expenditures on shrimp, **lnexpend**	19.6634	0.2996	19.0164	20.2577
Log of Vietnam's CPI, **lnCPI**	4.6119	0.0091	4.5941	4.6435
Log of US substitute price, $\mathbf{lnp^{US}}$	4.6051	0.0171	4.5068	4.6987
Log of US shrimp price imported from the rest of the world, $\mathbf{lnp^{ROW}}$	1.9936	0.3784	0.5407	3.1854

Notes: The full sample has 2,043 observations.
Source: Author's own calculation.

Other independent variables include Vietnam's monthly consumer price index (CPI) published by the General Statistics Office of Vietnam (2005-12) and the monthly average nominal exchange rate defined in terms of the Vietnamese dong per US dollar, which is obtained from the International Monetary Fund website. Both dependent and independent variables in the regression are in logarithmic form.

Combining all variables for the period of 2000 to 2011, the dataset includes a total of 2,043 observations due to zero trade and missing data in some variables. Table 10 presents summary statistics of our dependent and independent variables for the full sample of 19 shrimp products.

2.5. Empirical results

Table 11: Estimated Results of Pass-Through Regression for Vietnam's Shrimp Exports to the US

	Full Sample	Affirmative sample	Non-affirmative sample	Affirmative sample	Affirmative sample	Non-affirmative sample
	(1)	(2)	(3)	(4)	(5)	(6)
$ln\,(1+tariff)$	-3.215*** (0.825)		-2.435*** (0.656)			-2.082*** (0.712)
$ln(1+ADD)$	-0.015 (0.129)	0.017 (0.129)				
$ln(1+ADD)\times Before$				-0.143 (0.106)	-0.107 (0.106)	
$ln(1+ADD)\times After$				0.766** (0.31)	-0.571 (1.359)	
lne	-0.544*** (0.066)	-0.543*** (0.067)	-0.525*** (0.199)	-0.61*** (0.075)		
$lne\times Before$					-0.694*** (0.084)	-0.756*** (0.186)
$lne\times After$					-0.687*** (0.079)	-0.745*** (0.185)
$lnexpend$	0.199*** (0.045)	0.187*** (0.045)	0.455*** (0.125)	0.179*** (0.042)	0.179*** (0.042)	0.483*** (0.122)
$lnCPI$	1.478** (0.703)	1.603** (0.72)	-0.823 (1.629)	1.100 (0.761)	1.379* (0.769)	-1.225 (1.593)
lnp^{US}	0.973*** (0.341)	0.951*** (0.348)	0.975 (0.738)	0.993*** (0.348)	0.912** (0.359)	0.95 (0.733)
lnp^{ROW}	0.527*** (0.035)	0.555*** (0.036)	-0.101 (0.075)	0.591*** (0.035)	0.591*** (0.035)	-0.055 (0.074)
R^2	0.75	0.75	0.43	0.75	0.75	0.44
N	2043	1538	505	1538	1538	505

Note: ***, **, and * indicate 1%, 5%, and 10% significance, respectively. The robust standard errors are in parentheses. All specifications include products and monthly fixed effects.
Source: Author's own calculation.

Table 11 reports the estimated results of Equations (1), (2), and (3) by using the WLS for the full sample of all 19 shrimp products, affirmative sample of 12 products subject to the final AD duties, and seven non-affirmative products that did not receive final AD duties from January 2000 through December 2011. As pointed out in Solon, Haider, and Wooldridge (2015), however, the WLS sometimes gives less precise estimates than the OLS if the error terms of observations within a group are not independent of each other. Therefore, as suggested by Solon, Haider, and Wooldridge (2015), we also examine the OLS estimates and then compare the robust standard errors of the OLS estimates with the estimates in Table 11 to determine which method provides a more precise estimation. The estimates show that almost all the robust standard errors are smaller for WLS than for OLS.[8] In addition, a Breusch-Pagan test revealed that the residuals in all the OLS estimates suffer significant customs-value-related heteroskedasticity. Hence, these results suggest that the WLS estimator gives more precise estimations of the coefficients.

In Table 11, Column (1) presents the case where Equation (1) is estimated using the full sample (2,043 observations). All coefficients in this regression, except the coefficient for the AD duty, have the expected sign and are highly significant. The coefficient on the AD duty is negative and not statistically different from zero. The coefficient for nominal exchange rates is estimated to be -0.544, in line with our a priori, and significant at the 1% level, indicating that a 10% depreciation (appreciation) of Vietnam's currency against the US dollar translates into a 5.44% decrease (increase) in prices exporters receive. Lowering export prices (evaluated in US dollars) in the event of an exchange rate depreciation may help Vietnamese shrimp exporters create a competitive advantage in terms of price over the other competing shrimp products in a fiercely competitive market like the US shrimp market.

[8] The OLS estimates are omitted for brevity but are available upon request.

Next, the estimated coefficients of Equation (1) for the affirmative group (1,538 observations) and for the non-affirmative group (505 observations) are reported in Columns (2) and (3), respectively. The exchange rate pass-through coefficients in Columns (2) and (3) are -0.543 and -0.525, both indicating significance at a 1% level. In addition, the above coefficients are quite similar to each other and the one in Column (1) (-0.544). Hence, this result may suggest that the imposition of the AD duties has no impact on the degree of the exchange rate pass-through of affirmative shrimp products, thus supporting our prediction about the exchange rate pass-through in the presence of AD duties for the case of a non-market economy. We now turn to the estimated coefficient of the AD duty. In the non-affirmative sample, there is a product which received a preliminary AD duty but did not have any transactions during that period. So, the coefficient of the AD duty in Column (3) was dropped. The coefficient of the AD duty in Column (2) is now positive, as expected, but small (0.017) and still insignificant. This unexpected result of the AD duty coefficient may come from the period examined, where the subject firms suffered from the preliminary AD duties and might not respond to this high duty rate. So, there may be a structural break in the AD duty coefficient as in Blonigen and Haynes (2002), which may be tested for by relaxing the constant AD duty restriction and estimating Equation (2) for the affirmative sample.

Column (4) shows the estimated results of the unrestricted Equation (2), which allows for a difference in the AD duty coefficient between the period before and after the final determination. This estimation indicates that the AD duty coefficient before the final determination ($\boldsymbol{\beta_2'}$) is negative but insignificant at a 10% level, but becomes statistically significant at a 5% level and a value of 0.766 ($\boldsymbol{\beta_2''}$) after the final determination (similar to Blonigen and Haynes (2002)). We also conduct a partial F-test to compare the estimates of the unrestricted Column (4) to the restricted Column (2). The partial F-test suggests a structural change in the AD duty pass-through, as predicted. The exchange rate pass-through is significant with a value of -0.61, still indicating a high

but incomplete pass-through. Other coefficients are still similar to the estimates in Column (2), except that the coefficient of CPI now becomes insignificant.

Looking at Column (5), the estimated results suggest that the null hypothesis of a constant exchange rate pass-through coefficient for affirmative products cannot be rejected. The two unrestricted coefficients of exchange rate pass-through in Column (5) look numerically similar to each other and the coefficients in Column (4). Furthermore, we cannot reject the null hypothesis that the coefficients of exchange rate movements before and after the final determination are equal at the 10% significance level. In addition, relaxing the restriction of constant exchange rate pass-through resulted in a significant change in the coefficients of AD duty changes. Also, the restriction of constant exchange rate pass-through can be found in Column (6), where the two unrestricted coefficients of exchange rate pass-through for the non-affirmative sample are very similar. We can clearly see that the magnitude and direction of the change in the exchange rate coefficients in Column (6) are nearly identical to the corresponding change in Column (5). Taken together, we can once again conclude that the exchange rate pass-through on the price received by shrimp exporters from Vietnam did not experience a structural break, which was found in the case of a market economy country in several previous studies.

Unlike previous studies, our sample period includes the results of five administrative reviews that allow us to further investigate the pricing behavior of Vietnam's shrimp exporters when the AD duty changes (increase and decrease) after the final determination. Table 12 shows the estimates of Equation (4) for the affirmative sample. The coefficient of preliminary AD duty turns out to be significant at a 5% significance level, but still negative and small (-0.212), indicating a small decrease in the export prices when the preliminary AD duty was in place. After the final determination, the coefficient on an increase in the AD duty is significantly positive with a value of 1.336, suggesting that a 1% increase in the AD duty raises shrimp export prices by about 1.34% ($(1 + 0.01)^{1.336} = 1.01338$). Importantly, this result supports our prediction that the NME

country's export price rises by much more than 100% of the AD duties imposed or increased in an attempt to eliminate the future duties. In addition, the Vietnamese shrimp exporters' price response to a decrease in the AD duty is also set out in Table 12. The coefficient for a decrease in the AD duty is estimated to be -0.881 and significant at a 5% level. Specifically, a 1% decrease in the AD duty raises the prices by about 0.89%. Even so, most investigated firms from Vietnam still received higher AD duties in the fourth administrative review. A possible explanation for this may be the fluctuation of production costs or exchange rates of the surrogate country that lead to a significant increase in the constructed "fair value." Thus, these findings confirm the unpredictability of the NME method for calculating the AD duty.

Table 12: Price Responses of Vietnamese shrimp exports to the AD Duty Changes

	Affirmative Sample
$ln\ (1 + tariff)$	-
$ln(1 + ADD) \times Before$	-0.212** (0.101)
$ln(1 + ADD) \times After \times Up$	1.336*** (0.300)
$ln(1 + ADD)\ \times After \times Down$	-0.881** (0.390)
lne	-0.561*** (0.076)
$lnexpend$	0.138*** (0.039)
$lnCPI$	1.077 (0.726)
lnp^{US}	1.326*** (0.322)
lnp^{ROW}	0.552*** (0.036)
R^2	0.77
N	1538

Note: ***, **, and * indicate 1%, 5%, and 10% significance, respectively. The robust standard errors are in parentheses. All specifications include products and monthly fixed effects. Source: Author's own calculation.

However, it has been demonstrated that lagged exchange rates may affect the firm's pricing decisions, and the omission of lagged exchange rates may lead to a downward bias in the estimates

(e.g., Feenstra 1989; Blonigen and Haynes 2002). To test this, we follow the approach applied in Blonigen and Haynes (2002) and create several lag length moving average variables of the exchange rate, namely three months, six months, and nine months.[9] The estimated results, using these moving average variables instead of the contemporaneous value, still support the major findings of Tables 11 and 12.[10] The moving average exchange rate coefficients of the affirmative products before and after the final determination are nearly identical and have a similar trend with the corresponding coefficients of the non-affirmative products. Additionally, the moving average coefficients increase slightly in comparison with the contemporaneous coefficients for both affirmative and non-affirmative products, and this change becomes bigger with longer lag lengths. In addition, the coefficients of AD duties and other variables are similar to those of previous estimates with the contemporaneous exchange rates.

Table 13: Testing for Asymmetric Exchange Rate Pass-Through

	Affirmative (1)	*Non-affirmative (2)*
$ln\,(1+tariff)$	-	-2.028***
		(0.683)
$ln(1+ADD)\times Before$	-0.142	-
	(0.106)	
$ln(1+ADD)\times After$	0.781*	-
	(0.472)	
lne	-0.615***	-0.717***
	(0.072)	(0.197)
$lne\times A$	-0.0006	0.0118***
	(0.0021)	(0.004)
$lne\times D$	0.0002	0.012***
	(0.0019)	(0.0029)
$lnexpend$	0.181***	0.501***
	(0.043)	(0.125)
$lnCPI$	1.15	-1.365
	(0.753)	(1.41)
lnp^{US}	0.995***	1.127*
	(0.351)	(0.634)
lnp^{ROW}	0.592***	-0.07
	(0.035)	(0.073)
R^2	0.75	0.45
N	1,538	505

Note: ***, **, and * indicate 1%, 5%, and 10% significance, respectively. The robust standard errors are in parentheses. Source: Author's own calculation.

[9] Contemporaneous exchange rate plus the previous three, six, and nine monthly observations.
[10] The moving average estimates are omitted for brevity but are available upon request.

Lastly, we estimated Equation (5) for our subsets of affirmative and non-affirmative products by using weighted ordinary least squares to test the asymmetry of the exchange rate pass-through after the final AD duties were imposed. The results are shown in Table 13. The interaction terms of the exchange rate variable with dummy variables ***A*** and ***D*** in Column (1) have the expected signs but are small and not statistically different from zero. In addition, we consider an F-test with the null hypothesis of equality between these coefficients in both columns of Table 13. In the end, failure to reject the null hypothesis, even at a 10% significance level, suggests that the final imposition of the US AD duties does not produce asymmetric behavior of the exchange rate pass-through to the export prices of Vietnamese shrimp products. This result comes as no surprise to us because the asymmetric exchange rate pass-through can be found only in complicated circumstances, in which NME firms subject to AD duties attempt to mitigate the negative impact of exchange rate movements of the surrogate country's currency against US dollar.

2.6. Conclusions

Recent years have seen an increase in the number of countries using the AD measures with the purpose of eliminating injury caused to domestic industries due to unfair trade. In that context, this research examines the effects of the US AD investigations on the prices received by Vietnamese shrimp exporters before and during the post-review period. Unlike previous studies in this literature, we focus on the AD cases filed against a non-market economy (NME) country as well as examine the NME exporters' price response to AD duty changes by using a sample of monthly data on American shrimp imports from Vietnam, having some products subject to the AD investigation and final duties in 2005.

Our analysis shows that the most appropriate option for NME exporters to eliminate future AD duties is to increase their prices by much more than 100% of the AD duties, which is supported by our empirical results. The estimates indicate that Vietnamese shrimp exporters decreased their prices by a small amount due to the imposition of the preliminary AD duty. However, the

coefficients of the AD duty changes become very high and statistically significant after the final determination. The estimates indicate that Vietnamese exporters tend to raise shrimp export prices by about 1.34% in response to a 1% increase in the AD duties and continue to increase their prices by about 0.89% when they experience a 1% decrease in the AD duties.

Unlike the case of the market economy (Blonigen and Haynes 2002), our results support our prediction that the final imposition of AD duties does not produce a structural break in the exchange rate pass-through of affirmative products before and after the final determination. The two coefficients are nearly identical in our estimation. As discussed in this article, this differing result may come from the method of calculating AD duties for subject firms from NME countries, which do not alter the firm's pricing equation, in contrast with the method used for market economies which makes the firm's pricing decision dependent on both the demand of its home and exporting market (Blonigen and Haynes 2002). Furthermore, our analysis suggests that there might be an asymmetry of exchange rate pass-through to the border prices of affirmative products after the imposition of the final AD duties in complicated scenarios. However, our empirical results did not support that prediction.

This chapter offers a better understanding of NME exporters' pricing reaction to AD duties and may help trade policymakers when considering the gains and losses of implementing AD duties by using the NME treatment. It is important to note that the higher the price due to AD duties, the larger the net welfare loss of the importing country that implements the AD duties. Our analysis and empirical results revealed that if non-market exporters facing AD duties aim to eliminate the future duty, the prices received by NME exporters tend to increase by more than 100% of the AD duties and, therefore, the net welfare loss for implementing AD duties is generally more substantial.

Chapter 3: Aid for Trade and Export Sophistication in Recipient Countries[11]

3.1. Introduction

The pivotal role of international trade in achieving sustainable development and reducing poverty in developing countries is well-recognized. However, a lack of trade-related infrastructure and services, effective regulations and productive capacity hinders developing countries' ability to promote economic growth through trade expansion. This is particularly true for the least developed countries (LDCs). With this in mind, the World Trade Organization (WTO) 2005 Ministerial Conference in Hong Kong launched the Aid for Trade (AfT) Initiative which has been considered a powerful instrument for helping those countries to overcome their constraints so as to gain from trade. According to the OECD and WTO (2019), from 2006 to 2017, there were 178,141 AfT projects worth over USD 409.45 billion, with a total of USD 108.4 billion specifically for LDCs, targeted at improving trade capacities of the recipient countries. Real AfT disbursements in 2017 (based on constant 2017 USD) amounted to over USD 43 billion, up from USD 15.1 billion in a 2002-2005 baseline average. This significant growth led to a proliferation of empirical studies on the effectiveness of AfT in recipient countries.

In this chapter, we further contribute to the empirical literature of AfT effectiveness by assessing how AfT disbursements and its subcategories affect the export sophistication of recipient countries, particularly LDCs. Much of the empirical research on the effectiveness of AfT has generally focused on recipient countries' export performance in terms of the export value (see Cali and Te Velde 2011; Vijil and Wagner 2012; Helble, Mann, and Wilson 2012; Pettersson and Johansson 2013; Huhne, Meyer, and Nunnenkamp 2014; Martinez-Zarzoso, Nowak-Lehmann, and Rehwald 2017). It has been found that AfT has significantly contributed to the increase of recipient

[11] This chapter has been published in Journal of International Trade and Economic Development.

countries' export value. Although the increase in export value can contribute to economic growth, recent studies on trade and economic development highlight the more critical role played by the composition of a country's export basket on its economic performance. Hausmann, Hwang, and Rodrik (2007) showed that countries whose export basket contains more sophisticated products enjoy higher economic growth. In other words, a country that specializes in products with high-productivity and a complex production level, which are assumed to be exported by rich countries, will have a higher export sophistication and tend to grow higher and faster. Similar conclusions have been reported by many other studies (for example, Minondo 2010a, 2010b; Santos-Paulino 2010, 2011; Jarreau and Poncet 2012; Grancay, Grancay and Dudas 2015).

Since AfT aims at helping developing countries to build quality infrastructure and services (AfT for economic infrastructure) as well as a conducive business environment and simplify custom procedures and technical regulations (AfT for trade policy and regulations), it can reduce trade costs and affect export sophistication of the countries. Hausmann and Rodrik (2003) argue that in addition to fundamental economic factors, export sophistication of a country may be mainly explained by some idiosyncratic factors that encourage the formation and development of new goods with a high sophistication level. It was confirmed by Hausmann, Hwang, and Rodrik (2007) who found a relatively small effect of economic fundamentals, namely per capita GDP, country size, human capital and natural resources, on export sophistication. Also, they argue that institutional quality may influence the level of export sophistication, but empirically did not find a significant relationship. A study by Zhu and Fu (2013) obtains evidence suggesting that export sophistication is positively associated with improved institutional quality. Weldemicael (2012) reports similar results with Zhu and Fu (2013), but only in manufacturing products. Additionally, he finds that export sophistication is enhanced by a fall in trade costs. Therefore, as a result of AfT, the reduction of transport costs as well as regulatory costs (Cali and Te Velde 2011; Busse,

Hoekstra and Koniger 2012) can encourage firms to engage in the production of new products associated with high productivity.

In addition, AfT, especially AfT for trade policy and regulations, may promote more liberal trade policies (Gnangnon 2018). In particular, the component of trade aid targeted to enhance trade policy and regulations is provided to support trade agreement negotiations, thereby lowering trade costs through the elimination of tariffs and non-tariff barriers under free trade agreements. Thus, the sophistication of exports can be affected through technology and knowledge diffusion from more imports of high-tech goods and FDI inflows. Nguyen (2016) found empirical evidence that further trade liberalization significantly promoted Vietnam's export sophistication, especially for non-manufacturing sectors. Several other studies have also reported the positive effect of trade openness on export sophistication (Makhlouf, Kellard, and Vinogradov 2015; Fan, Anwar, and Huang 2018; Su et al. 2019). The positive effect of foreign direct investment (FDI) on export sophistication has been found in several studies, for example, Xu and Lu (2009), Wang and Wei (2010), Iwamoto and Nabeshima (2012), Harding and Javorcik (2012), Weldemicael (2012), and Zhu and Fu (2013).

Another way that AfT may directly affect export sophistication is through the transfer of new technology and knowledge from AfT provided for building productive capacity in recipient countries, which could, in turn, lead to the improvement of support policy, technology and productivity in developing countries. As a result, the countries are capable of producing complex or sophisticated products, which are often associated with high technology and productivity.

However, the effect of AfT on recipient countries' export sophistication remains ambiguous. Gnangnon and Roberts (2017) argue that the export strategy adopted by recipient countries will determine how AfT affects the pattern of recipient countries' exports. In addition, Brenton and Von Uexkull (2008) and Cali and Te Velde (2011) found evidence that the allocation of AfT for building productive capacity is skewed toward sectors that already have a good performance in exports. The

more aid given to those sectors, the more effective those sectors operate. If these sectors have a low level of sophistication, their existence and development may squeeze the development of other sectors that have a higher level of sophistication. Thus, if this is the case, this type of AfT may contribute to the reduction in the export sophistication level. Even so, we may expect some positive effects of AfT on export sophistication of recipient countries, notably least developed countries (LDCs) which have a heavy economic reliance on exports of primary products. Moving away their export from this low sophisticated sector is the optimal choice for the countries. Thus, AfT can provide necessary support for the transformation of the countries toward manufacturing products with higher sophistication levels and export sophistication will rise considerably as a result. Furthermore, since lower income countries have, in general, a less sophisticated export basket (Hausmann, Hwang, and Rodrik 2007), they thus have more room for improvement. As such, we expect that total AfT or its categories may be more effective in increasing the export sophistication of poorer economies.

A study of the effects of AfT on recipient countries' export sophistication has not been done extensively. As far as we know, the only exception is Kim (2019) who empirically examines the impact of AfT on the export structure of 133 recipient countries from 1996 to 2013. In a subsection, the author concludes that AfT and its subcategories do not have any impact on export sophistication of recipient countries because AfT affects the export structure by redistributing the shares of existing products having a comparable level of sophistication in the export basket. However, this result might not be robust because data on AfT disbursements before 2002 is not available and those missing values were estimated based on available information or assumed to be zero. In addition, the author fails to differentiate between countries such as LDCs versus non-LDCs or otherwise different levels of development as discussed above. Ignoring the differentiated effects of trade aid between recipient countries can lead to a distorted evaluation and an incomplete conclusion about the effectiveness of AfT.

Our empirical analysis relies on the sophistication index of exports proposed by Hausmann, Hwang, and Rodrik (2007) and a sample of 73 AfT-recipient countries from 2005 to 2017. It makes use of the two-step system generalized methods of moments (GMM), which is widely adopted to tackle potential endogeneity problems. In contrast to the findings of Kim (2019), however, positive effects of AfT targeted to enhance trade policy and regulations were observed exclusively in LDCs or countries with low per capita income. Furthermore, our estimates suggest that the effectiveness of the above category is decreasing with the income level. In contrast, the effect of AfT for economic infrastructure on the sophistication of recipient countries' export basket seems to be increasing with the income level with positive significant effects for AfT-recipient countries with a relatively high income. Aid for enhancing productive capacity produces no significant impact on the export sophistication of recipient countries. However, at the sectoral level, this type of AfT shows a negative significant impact on sectoral export sophistication.

The chapter is structured as follows. The next section addresses methodology, variables and data used in this study. The empirical findings are shown in Section 3.3. Conclusions are drawn in section 3.4.

3.2. Variables, methodology and data

3.2.1. Methodology

Based on the previous literature, we estimate the following equation to investigate the impact of aid for trade on the export sophistication of recipient countries.

$$lnexpy_{i,t} = \beta_0 + \beta_1 lnexpy_{i,t-1} + \beta_2 aft_{i,t} + \beta_3 X_{i,t} + \mu_i + \gamma_t + \epsilon_{it} \qquad (1)$$

where i and t denote the AfT-recipient country and time, respectively; $expy$ is the export sophistication index; ln denotes natural logs; μ_i represents time-invariant unobserved effects of country i; γ_t are time fixed effects; and ϵ_{it} is the error term capturing all unobserved factors that

influence export sophistication. The one-lagged dependent variable is introduced as an independent variable to capture the dynamic effect of export sophistication.

Our principal variable of interest, denoted by aft, represents the aid for trade variables including the total disbursement (aft_total) or its subcategories, namely aid for economic infrastructure (aft_ei), aid for building productive capacity (aft_bpc), and aid related to trade policy and regulation (aft_pr). All these variables are expressed as a percentage of the recipient country's real GDP. Data for trade aid and real GDP is measured in constant 2018 US dollars.

Based on previous studies, we introduce a set of control variables, denoted by the vector $X_{i,t}$. First of all, real GDP per capita (gdppc) as a proxy for a country's level of economic development is included and expected to have a positive impact on export sophistication. Another important macroeconomic factor that determines the level of export sophistication is the size of the economy. Thus, total population (pop) is used to control for the size of an economy.

As mentioned in the previous section, the sophistication of exports is also affected by institutional quality, trade liberalization and foreign direct investment. Hence, we include an index of rule of law (rol) as a proxy for institutional quality. As a proxy for trade liberalization, trade openness variable (open) which is defined as total trade as a proportion of GDP is included. Inward foreign direct investment (fdi) enters the regression model as another important external capital inflow for developing countries. The coefficient of these three control variables are expected to be positive.

Next, the natural resources of a country must also be considered. In most cases, the abundance of natural resources tends to lead to the concentration of production factors, such as labor and capital, in natural resource sectors, which make it difficult to have enough resources to grow manufacturing sectors. In addition, as pointed out by Sachs and Warner (1995), most natural resource-rich countries have no strong incentive to develop industrial sectors other than resource-based sectors. Habiyaremye and Ziesemer (2006) used a sample of sub-Saharan African (SSA)

countries and found that countries with abundant natural resources tend to have a high concentration of exports in the primary sectors. Many other studies showed that abundant natural resources squeeze manufacturing sectors and lead to deindustrialization unless there is good institutional quality (Corden and Neary,1982; Sachs and Warner, 1995; Horvath and Zeynalov, 2016). This phenomenon is the so-called "Dutch disease". Hence, we use total natural resource rent (nrr) as a share of GDP to control for the natural resources of a country. The total natural resource rents are defined as the sum of natural gas rents, oil rents, mineral rents, coal rents and forest rents. The natural resources of a country are expected to have negative impact on export sophistication.

The human capital level of a country is usually considered as a determinant of export sophistication. The commonly used variable to measure the human capital (hc) of a country is average years of education received by people over 25 years old and is expected to have a positive impact on export sophistication (Hausmann, Hwang, and Rodrik, 2007; Zhu and Fu, 2013; Fan, Anwar, and Huang, 2018).

Finally, another factor that affects the export competitiveness of a country and hence the sophistication of export products, is the exchange rate. Several studies found evidence of an increase in exports of medium and high-tech products due to the depreciation of the real exchange rate (Cimoli, Fleitas, and Porcile 2013; Hooy, Baharumshah and Brooks 2016). Thus, one should expect that the depreciation of the real exchange rate can improve the export sophistication. However, a recent study by Gan and Cheng (2020) found that the appreciation of the RMB real effective exchange rate promotes R&D investment and then improves the export sophistication of China. Therefore, the real effective exchange rate (reer) index of AfT recipient countries enters the model as a control variable in our regression. Real GDP per capita, population size and human capital variables are in logs. Inward foreign direct investment, openness to trade and total natural resource rent are measured as a percentage of the recipient countries' GDP.

However, the above specification suffers from several endogeneity problems. First, the lagged variable of export sophistication is endogenous to the error term ϵ_{it}. This correlation causes a dynamic panel bias, especially in the case of a short sample period (Nickell 1981; Bond 2002). Second, there may be reverse causality from export sophistication to our variable of interest, AfT. Similar to argument in Gnangnon and Roberts (2017), AfT may be allocated more towards countries that are attempting to shift their export structure from primary products toward manufactured products in order to further facilitate policies aimed at enhancing export sophistication in those countries. At the same time, those countries may also attract more foreign direct investment than other countries since they adopted new policies to facilitate the development of manufacturing industries. Also, the endogeneity problem may stem from the reverse causality between other explanatory variables (gdppc, hc, open, reer, nrr and rol) and the dependent variable.

The estimation is performed using the two-step system GMM estimator proposed by Blundell and Bond (1998), thereby addressing the problem of endogeneity as well as the possible omitted variables biases and obtaining estimators that are unbiased and consistent. In this chapter, we treat all right-hand side variables except population size as endogenous variables.[12]

To guarantee the validity of the GMM estimator, there are some tests and conditions that need to be satisfied. First, the standard Hansen-J test of overidentification which helps to determine the appropriateness of instrument set used in the estimations is reported. The test should not reject its null hypothesis. Second, Arellano and Bond (1991) argue that there should be first order correlation (a significant AR(1) test) but no second order correlation among residuals (an insignificant AR(2) test). Lastly, Roodman (2009) notes that the number of instrument variables should be set no larger than the number of groups in the estimation. Thus, we apply the 'collapse' command in Stata to reduce the number of instruments and report it along with the tests above.

[12] According to Hausmann, Hwang, and Rodrik (2007), a causal effect from export sophistication to population size is very unlikely to occur.

3.2.2. Export sophistication, aid for trade and data

Following Hausmann, Hwang, and Rodrik (2007), the sophistication level of country *j*'s exports (EXPY) is measured, as follows:

$$EXPY(j) = \sum_{k} \left(\frac{x(jk)}{X(j)} \right) PRODY(k) \quad (2)$$

where *x(jk)* is country j' export value in product *k*; *X(j)* is country j's total export. *PRODY(k)* represents the productivity level of product *k*, which can be constructed as the weighted average of per capita income of product k's exporters, with the weight being the country' revealed comparative advantage in good *k*. Specifically, for any export good k, the productivity index *(PRODY)* is formulated as follows:

$$PRODY(k) = \sum_{i} \frac{\frac{x(ik)}{X(i)}}{\sum_i \left(\frac{x(ik)}{X(i)} \right)} Y(i) \quad (3)$$

where *Y(j)* represents the per capita GDP of country *j*.

The focus of this chapter is primarily on estimating the effects of AfT disbursements on the sophistication level of the recipient countries' export baskets. Hence, first, we compute the export sophistication index for a sample of 119 countries in the period of 2005 to 2017 due to the availability and consistency of data. Export data at the HS six-digit level (version 1996) comes from the United Nations Commodity Trade Statistics (UNComTrade) database. The real per capita GDP data comes from the World Development Indicator database. Among these countries, only 77 AfT-recipient countries that have data on AfT disbursements at least one year during the sample period are used in the regression analysis. A list of countries used in this chapter are shown in Table 14.

Figure 4 shows the average levels of all AfT-recipient countries' and sub-groups' export sophistication from 2005 to 2017. The sample countries are divided into LDCs and non-LDCs as

defined by United Nations (2019a, 2019b). In general, all countries and groups experience a gradual increase in the export sophistication over the sample period. The decline in world trade and GDP due to the 2008 financial crisis led to the reduction in the export sophistication of all countries and sub-groups, especially for non-LDCs. As can be observed from Figure 4, the average export sophistication of all countries as well as non-LDCs decreases sharply in 2009, and then quickly recovers in subsequent years. In contrast, the effect of the financial crisis on the export sophistication of LDCs seems to be modest since only a slight decrease is observed in 2009. In addition, negligible declines in LDCs' export sophistication in 2011 and 2014 may come from the graduation of Maldives and Samoa from the LDC status, respectively. The average export sophistication of non-LDCs is twice that of LDCs.

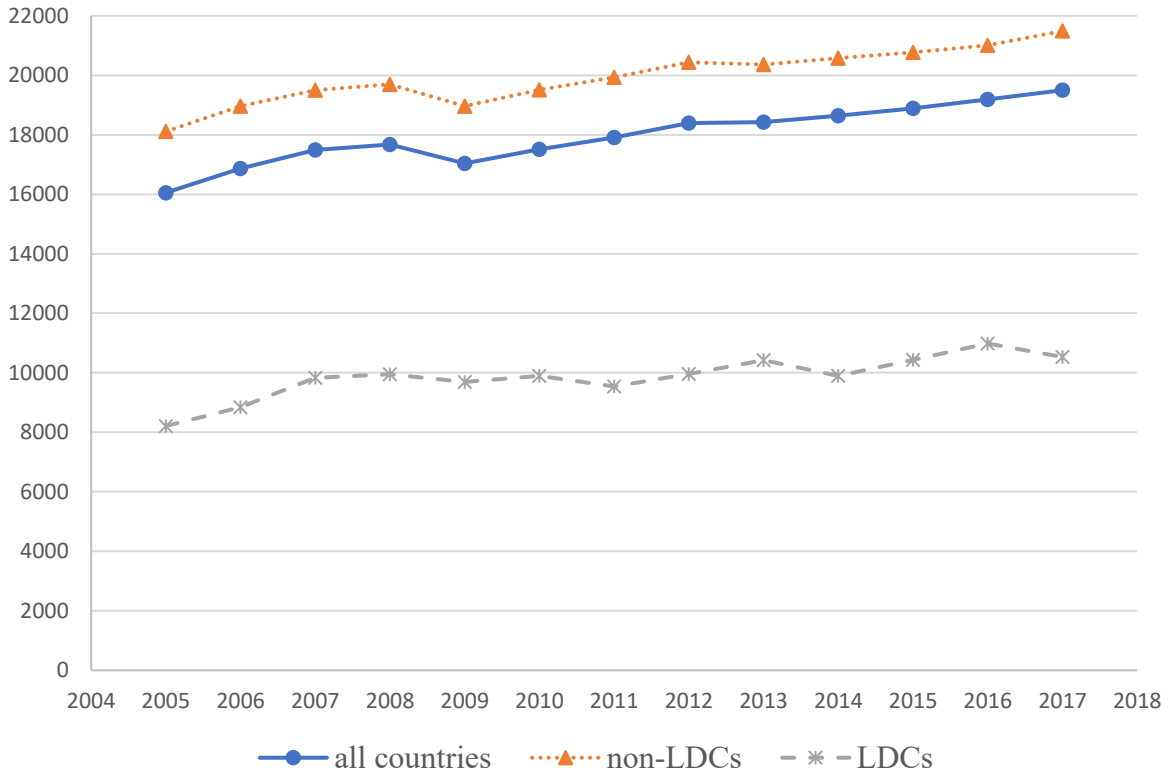

Figure 4: Export Sophistication Index for all sampled countries and groups, 2005 – 2017.

According to Cali and Te Velde (2011), the effects of AfT for building productive capacity are predominantly sectoral effects and aid allocated to one sector may affect not only that sector but also other sectors' competitiveness. Considering the effect of this AfT category on the

sophistication level of a country' whole export basket may give misleading results. Therefore, a sectoral analysis is needed through the estimation of Equation (1) to further understand the effect of AfT for building productive capacity as well as the other two categories of AfT. We calculate the sectoral export sophistication index for five sectors, including agriculture, fishing, forestry, mining and manufacturing, based on the International Standard Industrial Classification (ISIC revision 3.1). The sophistication of country j's exports in industry *i* can be easily calculated as follows:

$$EXPY(ij) = \sum_k \left(\frac{x(jk)}{X(ij)}\right) PRODY(k) \qquad (4)$$

Figure 5 illustrates the relationship between export sophistication and development level of the sample countries. The line in the figure is the log-linear regression of export sophistication on level of development (proxied by real GDP per capita). This figure suggests that countries with a higher per capita GDP tend to have a higher level of export sophistication. This is consistent with the argument of Hausmann, Hwang, and Rodrik (2007).

Figure 5: EXPY and GDP per capita.

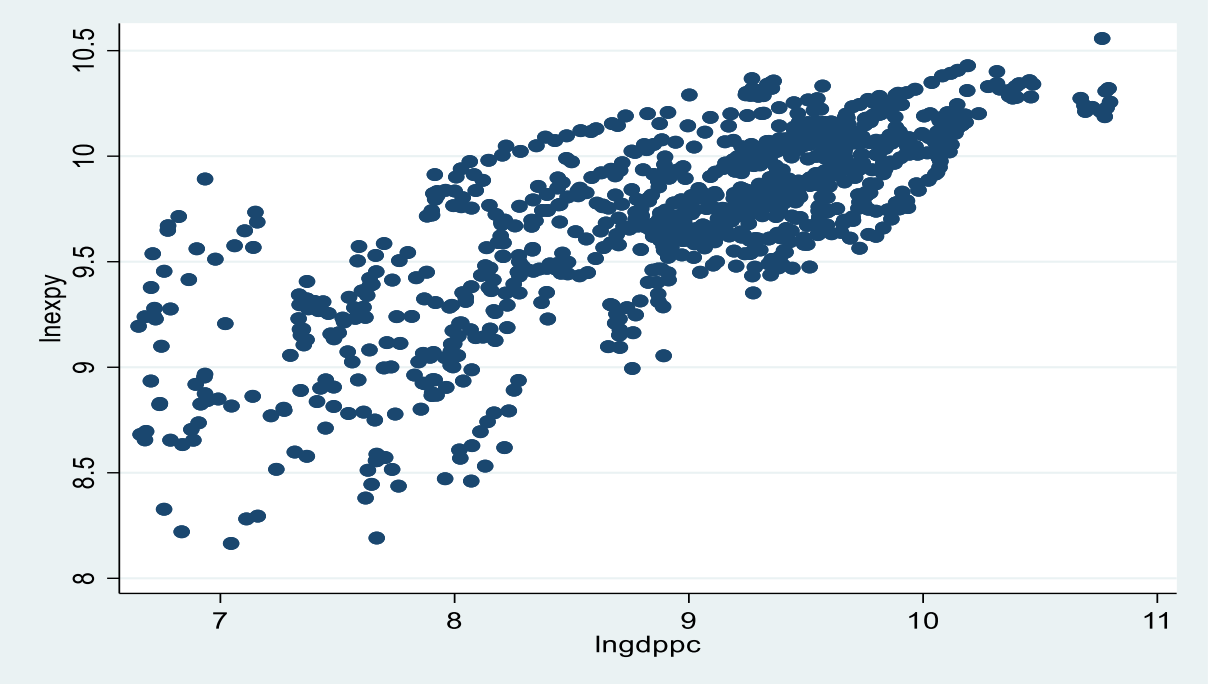

Table 14: List of Countries

119 countries used in calculating export sophistication index			
non-AfT recipient countries	**77 AfT-recipient countries**		
	non-LDCs		**LDCs***
Australia	Albania	Jordan	Benin
Austria	Algeria	Kazakhstan	Burundi
Belgium	Argentina	Kyrgyz Republic	Cambodia
Bulgaria	Armenia	Lebanon	Ethiopia
Bahrain	Azerbaijan	Macedonia, FYR	Gambia, The
Canada	Barbados	Malaysia	Madagascar
Switzerland	Belarus	Mauritius	Malawi
Cyprus	Belize	Mexico	Maldives[2011]
Czech Republic	Bolivia	Moldova	Mozambique
Germany	Bosnia Herzegovina	Morocco	Rwanda
Denmark	Botswana	Namibia	Samoa[2014]
Spain	Brazil	Nicaragua	Sao Tome and Principe[a]
Estonia	Cameroon	Oman	Senegal
Finland	Chile	Pakistan	Tanzania
France	China	Paraguay	Uganda
United Kingdom	Colombia	Peru	Zambia
Greece	Costa Rica	Philippines	
Hong Kong, China	Cote d'Ivoire	Saudi Arabia	
Hungary	Croatia	South Africa	
Ireland	Dominican Republic	Sri Lanka	
Iceland	Ecuador	St. Kitts and Nevis	
Israel	El Salvador	St. Lucia[a]	
Italy	Fiji[a]	St. Vincent and the Grenadines	
Japan	Georgia	Swaziland	
Korea, Rep.	Ghana	Thailand	
Lithuania	Guatemala	Tunisia	
Luxembourg	Guyana	Turkey	
Latvia	India	Ukraine	
Malta	Indonesia	Uruguay	
Netherlands	Jamaica	Vietnam	
Norway		Zimbabwe[b]	
New Zealand			
Poland			
Portugal			
Qatar			
Romania			
Russian Federation	**Note:**		
Singapore	* as defined by United Nations (2019a)		
Slovak Republic	[2011,2014]: Year of Graduation from the LDC status (United Nations, 2019b)		
Slovenia	[a]: missing data on trade openness;		
Sweden	[b]: missing data on real effective exchange rate		
United States			

The source of aid for trade data for this chapter is the Creditor Reporting System (CRS) created by the Organization for Economic Co-operation and Development (OECD). This database provides the disbursed amount of aid aggregated by sector and recipient. We define and compute the total AfT as the sum of its main categories. Missing values are assumed to be zero. Following Cali and Te Velde (2011) and Martinez-Zarzoso, Nowak-Lehmann, and Rehwald (2017), we use the following categories of AfT:

(1) AfT_pr: aid disbursed for trade policy and regulation (coded as 331)

(2) AfT_ei: aid disbursed for economic infrastructure (coded as 200) encompasses *Transport and Storage* (coded as 210), *Communications* (coded as 220), *Energy* (coded as 230), *Banking and Financial Services* (coded as 240) and *Business and Other Services* (coded as 250).

(3) AfT_bpc: aid disbursed for building productive capacity, includes *Agriculture* (coded as 311), *Forestry* (coded as 312), *Fishing* (coded as 313), *Industry* (coded as 321), *Mineral Resources and Mining* (coded as 322) and *Tourism* (coded as 332).

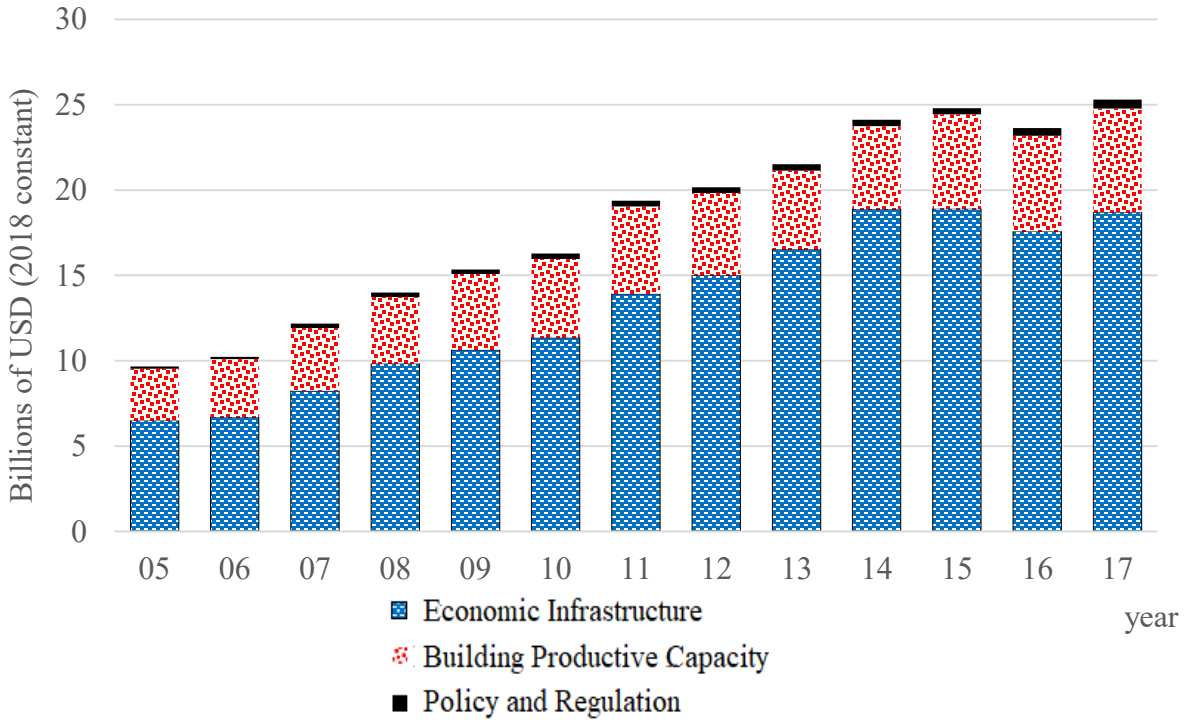

Figure 6: Major Categories of Aid for Trade Disbursements (Constant 2018 USD), 2005 – 2017. Source: CRS-OECD

As shown in Figure 6, disbursements on aid for trade nearly tripled in real terms (based on constant 2018 USD) during the sample period, from USD 9.66 billion in 2005 to USD 25.31 billion in 2017. Compared to other categories, aid dedicated to trade-related infrastructure represented the largest share of total AfT with an average share of about 70% between 2005 and 2017.

Table 15: Variable Descriptions and Summary Statistic.

Variable		Obs	Mean	Std. Dev.	Min	Max
$lnexpy_j$	log of export sophistication of country *j*	937	9.75	0.40	8.17	10.56
$lnexpy_{ij}$	log of sectoral export sophistication	4,576	9.62	0.50	7.23	10.92
aft_total	total AfT disbursement, % of real GDP	937	0.79	1.10	0	9.05
aft_ei	AfT disbursed to economic infrastructure, % of real GDP	937	0.50	0.73	-0.02	7.06
aft_pr	AfT disbursed to trade policy and regulations, % of real GDP	937	0.02	0.07	0	1.58
aft_bpc	AfT disbursed to building productive capacity, % of real GDP	937	0.27	0.43	0	3.02
aft_bpc_i	Sectoral AfT disbursed to building productive capacity, % of real GDP	4,576	0.05	0.18	-0.002	2.87
fdi	Foreign direct investment, % of GDP	937	4.68	4.41	-3.18	39.46
$lngdppc$	log of real GDP per capita	937	8.98	0.88	6.65	10.80
$lnpop$	log of population	937	2.36	1.89	-3.06	7.23
$lnhc$	log of average years of schooling	937	1.96	0.39	0.83	2.55
nrr	Natural resources rent, % of GDP	937	7.08	9.12	0	55.34
$open$	Total trade, % of GDP	937	78.78	32.15	22.11	203.86
$lnreer$	Log of real effective exchange rate	937	4.66	0.14	4.10	5.23
rol	Rule of law	937	-0.30	0.57	-1.48	1.43

The data sources for control variables are as follows. Data on real GDP per capita, inward foreign direct investment, total population, openness to trade and total natural resources rent are from the World Bank's World Development Indicators Database. Meanwhile, data for rule of law comes from the Worldwide Governance Indicators Database. Data on real effective exchange rates is taken from the Bruegel datasets (Darvas 2012a, 2012b). A rise (fall) in real effective exchange rate means an appreciation (depreciation) of real effective exchange rate. Data on average years of schooling received by people over 25 years old is obtained from the website of Human Development Report Office, United Nations Development Program.[13] Due to the availability of the data, there are only 73 AfT-recipient countries used in the regression (see Table 14). Table 15 presents variable descriptions and summary statistics.

3.3. Empirical results

3.3.1. Overall impact analysis

As shown in Table 16, all the tests and conditions are met for the validity of the GMM estimator. The AR(1) test rejects the null hypothesis of no first order correlation, while the second order correlation among residuals cannot be rejected in the AR(2) test. In addition, the Hansen-J test cannot reject the validity of the set of instruments used in the estimations.

In Table 16, Column (1) presents the results of equation (1) with variable. The coefficient on total AfT is positive, but not statistically significant at the conventional level. It means that total AfT has no impact on export sophistication of the recipient countries. This result is in line with Kim (2019). The coefficient on FDI inflows is positive and significant with a value of 0.004, which is consistent with previous studies (Xu and Lu 2009; Wang and Wei 2010; Harding and Javorcik 2012; Iwamoto and Nabeshima 2012; Weldemicael 2012; Zhu and Fu 2013). Moving to the three categories of AfT in Column (2) of Table 16, examining effects at a more disaggregated level yield

[13] See http://hdr.undp.org/en/indicators/103006

some interesting results. The coefficient of AfT targeted at enhancing trade policy and regulations has a positive value of 0.126 and is significant at the 1% level. On the other hand, the AfT for economic infrastructure coefficient is negative, but insignificant. The coefficient on aid for building productive capacity is positive, but small and insignificant. Thus, these results may suggest that the insignificant effect of total aid for trade on export sophistication in Column (1) is primarily driven by trade aid for economic infrastructure as this category accounts for the majority of total AfT. The coefficients on control variables are very consistent through our specifications. The coefficient on FDI is still significant with a value of 0.004. The coefficients of per capita GDP and population show positive and significant effects on export sophistication as expected, while human capital, natural resource rent, openness to trade and real effective exchange rates are insignificant. In both Column (1) and (2), institutional quality shows a negative and significant effect on export sophistication of AfT-recipient countries. This result is contrary to the conclusions of Zhu and Fu (2013) and Weldemicael (2012) on the effect of institutional quality, but in line with the estimated results for low and low-middle income groups in Zhu and Fu (2013).

We now turn to the issue of differentiated effects of the AfT on export sophistication between LDCs and non-LDCs (see Table 14 for the list of LDCs). In order to do that, we interact the LDC dummy with the variables of AfT components. The estimated results are shown in Column (3) of Table 16. The coefficient on AfT for economic infrastructure is statistically insignificant, whereas the associated interaction term with the LDC dummy is negative (-0.06) and statistically significant at a 10% level. This means that aid disbursed to building economic infrastructure negatively affects export sophistication in LDCs. Regarding aid for enhancing trade policy and regulations, the coefficient becomes insignificant as its interaction term is introduced. The positive and significant coefficient of the associated interaction means that AfT disbursed to trade policy and regulations improves export sophistication only in LDCs. With no differentiated effect between LDCs and

non-LDCs, trade aid related to building productive capacity has no significant impact on the export sophistication of recipient countries.

Table 16: Aid for Trade and Export Sophistication in Recipient Countries (Using Two-step system GMM)

Dependent variable: Export sophistication index over 2005-2017

	(1)	(2)	(3)	(4)
l(1).lnexpy	0.474***	0.558***	0.608***	0.615***
	(0.076)	(0.110)	(0.105)	(0.106)
aft_total	0.003			
	(0.019)			
aft_ei		-0.011	0.303	-0.339***
		(0.025)	(0.019)	(0.110)
aft_pr		0.126***	0.030	0.792**
		(0.046)	(0.087)	(0.303)
aft_bpc		0.016	0.040	-0.143
		(0.053)	(0.049)	(0.63)
aft_ei*ldc			-0.06*	
			(0.03)	
aft_pr*ldc			0.191*	
			(0.109)	
aft_bpc*ldc			-0.008	
			(0.105)	
aft_ei*lngdppc				0.040***
				(0.014)
aft_pr*lngdppc				-0.087**
				(0.037)
aft_bpc*lngdppc				0.022
				(0.075)
fdi	0.004**	0.004**	0.003	0.0036*
	(0.002)	(0.002)	(0.002)	(0.002)
lngdppc	0.245***	0.234***	0.217***	0.213**
	(0.051)	(0.056)	(0.056)	(0.059)
lnpop	0.02*	0.022*	0.017	0.021*
	(0.012)	(0.012)	(0.014)	(0.011)
lnhc	0.076	0.038	-0.023	-0.055
	(0.065)	(0.061)	(0.121)	(0.105)
nrr	-0.001	-0.002	-0.001	-0.000
	(0.002)	(0.003)	(0.004)	(0.004)
open	-0.001	-0.000	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
lnreer	-0.083	-0.029	-0.009	-0.003
	(0.084)	(0.093)	(0.086)	(0.084)
rol	-0.164***	-0.127*	-0.136**	-0.086
	(0.048)	(0.065)	0.068)	(0.075)
ldc			-0.046	
			(0.146)	
Observations	866	866	866	866
Countries	73	73	73	73
Instruments	47	56	68	68
AR(1) (P-value)	0.023	0.027	0.023	0.028
AR(2) (P-value)	0.340	0.316	0.314	0.260
Hansen-J Test (P-value)	0.733	0.250	0.405	0.170

*Notes: ***, ** and * denote the 1%, 5% and 10% significance levels, respectively. Robust standard errors are in parentheses. Time fixed effects are included in all specifications.*

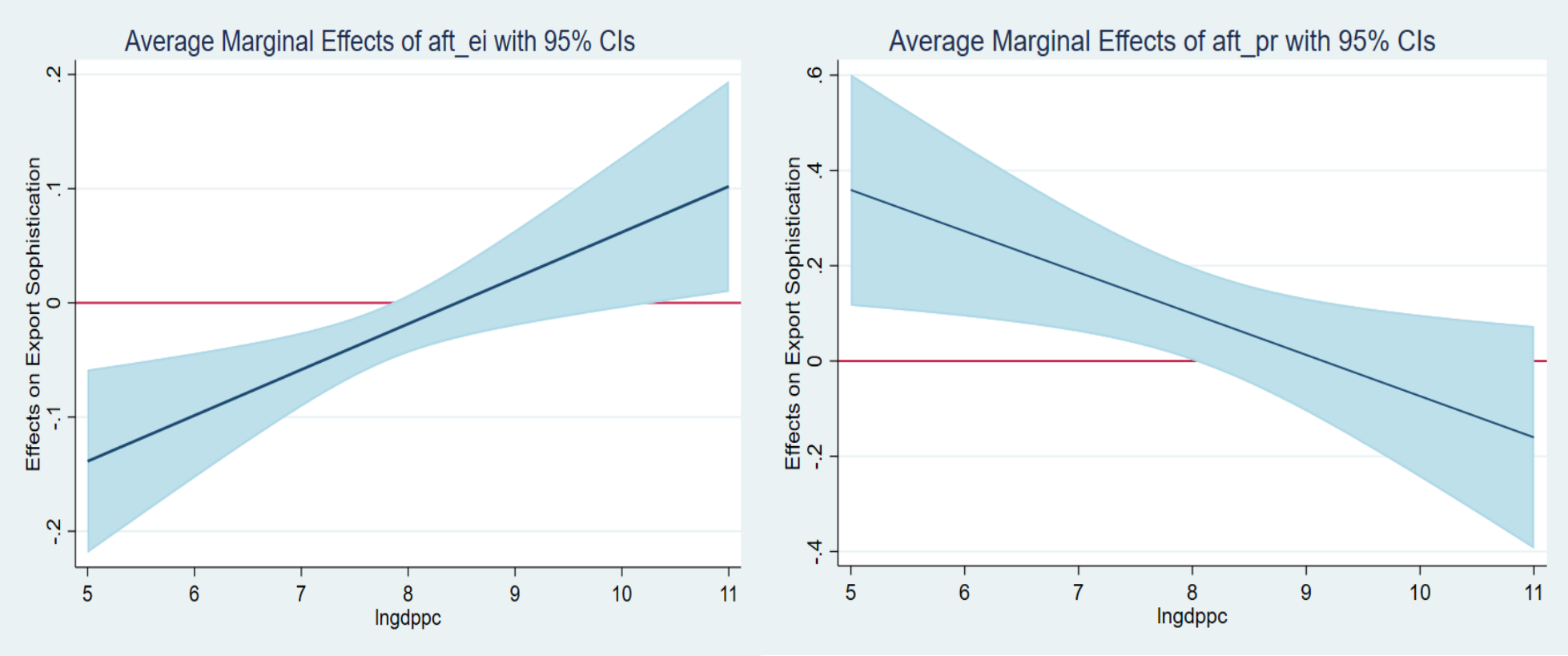

Figure 7: Marginal Impact of the AfT Variables as a Function of per capita GDP.
Source: Author

We also report in Column (4) estimates of a regression that include interaction terms for three components of AfT with respect to real per capita income. As can be seen from the table, the coefficient on trade policy and regulation category is positive and significant, whereas the associated interaction term is negative and also significant. This means that the positive impact of this AfT component on export sophistication seem to be decreasing in real per capita income, as its negative and significant interaction coefficient shows. The effect of AfT for trade policy and regulations on export sophistication becomes negative when the recipient countries` real per capita income is USD 8986.226 ($= e^{(0.792/0.087)}$) or higher. On the contrary, the coefficient on economic infrastructure category is negative (-0.339) and statistically significant at the 1% level, while its interaction term is positive (0.040) and significant at the 1% level. This result indicates that the effect of AfT dedicated to economic infrastructure is increasing in real per capita income and changes to a positive sign once the income reaches USD 4793.423 ($= e^{(0.339/0.040)}$). At the same time, the coefficients of aid for building productive capacity and its interaction term with real GDP per capita are both insignificant at the conventional level.

In order to better understand the effects of AfT disbursements on recipient countries' export sophistication, we show the associated marginal effects of the AfT variables for different levels of recipient countries' real per capita income at the 95% confidence intervals in Figure 7. This figure shows only the marginal effects of two categories, namely AfT for economic infrastructure and AfT for trade policy and regulations, which have significant effects. The marginal effects are said to be statistically significant at the 95% confidence intervals, if the 95% confidence interval does not contain zero. What can be clearly seen from Figure 7 is that the marginal effect of AfT for economic infrastructure on recipients' export sophistication increases as the countries develop (i.e. income increases), while the marginal effect of trade policy and regulations category is decreasing in per capita income. In the left part of the figure, the marginal effects of the largest category of

AfT take negative and positive significant values as recipient countries have a real per capita GDP below USD 2,558.02 ($= e^{(7.84699)}$) and above USD 29,542.64 ($= e^{(10.29359)}$), respectively. At the same time, aid for trade policy and regulations were shown to have a positive and significant impact in recipient countries with per capita GDP less than USD 3,047.72 ($= e^{(8.02215)}$). Otherwise, there was no significant impact on export sophistication. These above results are, in general, contrary to Kim (2019) who concluded that AfT categories does not have any significant impacts on export sophistication of recipient countries.

3.3.2. Sectoral analysis

Table 17: Aid for Trade and Sectoral Export Sophistication
(Using Two-step system GMM)
Dependent variable: Sectoral export sophistication index over 2005-2017

	Full sample		**Primary**		**Manufacturing**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
l(1).lnexpy	0.446*** (0.060)	0.448*** (0.066)	0.437*** (0.069)	0.458*** (0.073)	0.445*** (0.095)	0.483*** (0.088)
aft_ei	-0.008 (0.015)	-0.011 (0.016)	-0.017 (0.016)	-0.036 (0.214)	0.006 (0.022)	0.099 (0.150)
aft_pr	-0.004 (0.055)	-0.067 (0.054)	-0.064 (0.054)	0.021 (0.378)	0.130** (0.052)	0.604** (0.280)
aft_bpc	-0.126*** (0.046)	-0.098** (0.048)	-0.105** (0.045)	0.146 (0.386)	-0.106* (0.061)	-0.046 (0.800)
aft_ei*mnf		-0.001 (0.021)				
aft_pr*mnf		0.212*** (0.072)				
aft_bpc*mnf		0.069 (0.110)				
aft_ei*lngdppc				0.003 (0.024)		-0.010 (0.019)
aft_pr*lngdppc				-0.012 (0.046)		-0.063* (0.035)
aft_bpc*lngdppc				-0.032 (0.049)		-0.000 (0.093)
Observations	4193	4193	3327	3327	866	866
Groups	362	362	289	289	73	73
Instruments	55	68	55	67	55	67
AR(1) (P-value)	0.000	0.000	0.000	0.000	0.032	0.033
AR(2) (P-value)	0.727	0.700	0.690	0.639	0.642	0.634
Hansen-J Test (P-value)	0.595	0.571	0.491	0.412	0.546	0.167

*Notes: ***, ** and * denote the 1%, 5% and 10% significance levels, respectively. Robust standard errors are in parentheses. Time, sector fixed effects and all control variables are included, but are omitted for brevity.*

In this section, we regress the sectoral export sophistication variable on AfT for building productive capacity allocated to the corresponding sector. The estimated results are reported in Table 17 in which Column (1) and (2) present the estimated results for the whole sample; Column (3) and (4) are estimated results for the subsample of primary sectors including agriculture, fishing, forestry and mining; Column (5) and (6) are for the subsample of manufacturing sectors. In Column (1), the coefficient of AfT for building productive capacity is negative and statistically significant at the 1% level and has a value of -0.126. Column (2) shows the estimated result with the inclusion of interaction terms between AfT variables and the manufacturing sector dummy (*mnf*). The coefficient of AfT for building productive capacity is still negative (-0.098) and significant at the 5% level. The interaction term with the *mnf* variable shows a positive, but insignificant coefficient, indicating that there is no differentiated effect between the manufacturing and primary sectors.

Also, more evidence can be found in Column (3) and (5), where the coefficients of aft_bpc for the subsamples of primary and manufacturing sectors are very similar and statistically significant. Taken together, we can conclude that aid disbursed to building productive capacity has a negative impact on the recipient countries' export sophistication at the sectoral level. As pointed out by Brenton and Von Uexkull (2008) and Cali and Te Velde (2011), AfT allocation tends to be skewed toward sectors that have already performed well. It is most likely that those sectors in developing countries, especially least developed countries, have low levels of sophistication. This may be a possible explanation for the negative impacts of trade aid for building productive capacity on sectoral export sophistication.

Next, the coefficient of AfT for enhancing trade policy and regulations is negative, but statistically insignificant in Column (1) and (2). However, the positive and significant coefficient of the interaction with the *mnf* dummy variable indicates that aft_pr has a positive impact on the sophistication level of only manufacturing sector exports in AfT-recipient countries. The insignificant coefficient in Column (3) for the subsample of primary sectors and the positive and

significant coefficient of aft_pr in Column (4) for the subsample of manufacturing sectors also draw the same conclusion. Similar to the results in Section 3.1, the positive effect of aft_pr on manufacturing sectors' export sophistication is also found to be decreasing in per capita income, as shown in Column (6). As discussed earlier, because this AfT category is given to develop trade strategies, support trade agreement negotiations and build a conducive business environment as well as simplify custom procedures and technical regulations, it contributes mainly to lowering trade costs, particularly regulatory costs in AfT-recipient countries. The reduction in trade costs can encourage firms to invest in new sectors associated with a high level of sophistication, such as manufacturing sectors. While the costs of trading are substantially higher in lower income countries, one should expect that AfT for trade policy and regulations can potentially derive greater benefits for LDCs and low-income countries compared to other developing countries. In addition, as a country develops (i.e. income increases), the country tends to produce and export more manufactured products whose prices are, in general, more expensive than primary products. Hence, during the early stages of the transition and development, the room for improving export sophistication by increasing the share of manufactured goods in the export basket will be reduced. As an alternative explanation, given the less sensitivity of more sophisticated products to trade costs (Weldemicael 2014) and the bigger share of manufactured products in higher income countries' export baskets, it is likely that the effectiveness of AfT for trade policy and regulations on the export sophistication will be lower in higher income countries.

Also, the outcomes reported in Table 17 suggests that AfT for economic infrastructure does not have a significant impact on sectoral export sophistication, as shown by the insignificant values of the coefficients related to this type of AfT. The reason may be similar to Cali and Te Velde (2011), in that trade-related infrastructures built using this type of AfT benefited some sectors, while they also harmed other sectors.

3.4. Conclusion

The effects of AfT have been widely discussed and studied in the empirical literature since the concept got off the ground in 2005. This chapter sets out to examine whether AfT helps developing countries in shifting their export structure towards more sophisticated products. By employing the export sophistication index developed by Hausmann, Hwang, and Rodrik (2007), we empirically investigate the effect of AfT disbursements on the export sophistication of recipient countries. The rationale for this study is that export sophistication has emerged as a powerful driver for rapid and sustained economic growth and poverty reduction. However, we found that the effectiveness of AfT on export sophistication is very limited.

Our estimates show that aid for trade policy and regulation seems to be the only type of AfT that is effective in raising export sophistication in LDCs and low-income countries. This category is found to be effective in LDCs or countries where GDP per capita is lower than USD 3,047.72. Below this threshold of per capita income, the poorer the recipient countries, the greater the positive impact of the category on export sophistication. Furthermore, we show that these impacts of AfT for trade policy and regulations are driven particularly by manufacturing sectors. An interpretation may be that this type of AfT reduces the burden of trade cost barriers that prevent firms in LDCs and low-income countries from producing and exporting new products with a high sophistication level.

In contrast, AfT related to economic infrastructure which accounts for the largest share of total AfT inflows benefits only recipient countries with a high per capita income of more than USD 29,542.64. However, for LDCs or countries whose real per capita income is below this threshold, the category may have no impact or even a negative impact on the level of export sophistication. The reason for this result may be because the present study only captures the short-run effect, while AfT projects may take many years to be completed, especially for the economic infrastructure category. In addition, since the largest share of AfT aims at building quality trade-related

infrastructure such as transportation, energy supply, communication, banking and financial services, it may be primarily beneficial to existing sectors that are associated with a low level of export sophistication, which is likely the case in low-income countries. Meanwhile, relatively high-income countries among AfT-recipient countries tend to have more manufactured products and less primary products in their export basket and then may enjoy a positive impact on the level of export sophistication thanks to this type of AfT.

On the other hand, AfT related to productive capacity has no significant impact on the recipient country' sophistication level of their export basket at the 95% confidence intervals. At the sectoral level, this type of AfT seems to have a negative impact on the degree of sectoral export sophistication. This result may suggest that AfT related to building productive capacity is being allocated toward sectors having a low level of export sophistication.

The findings of this chapter have a number of practical implications on the future allocation of AfT. A reconsideration on the allocation of AfT across activities, sectors and countries is necessary due to the limited and heterogenous effect of AfT on the sophistication of recipient countries' exports. Technical support for trade policy and regulations should be the priority for LDCs or countries with a low per capita income since this type of AfT seems to play an important role in these countries' structural transformation of exports through the reduction of trade costs. In addition, trade aid for building economic infrastructure should be given carefully to countries with low-income level, since its short-run negative effect could cancel out the benefit of AfT for trade policy and regulations. Finally, based on the characteristics of each country, the productive capacity building support should be provided to develop potential sectors that have a high level of productivity and technology.

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