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Title: The trade effects of export-related Non-Tariff Measures

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Abstract: This study quantifies the marginal effect of export-related Non-Tariff Measures (NTMs) for a geographically dispersed sample of countries for NTMs from the 2007-2016 period. NTMs that are aimed at supporting the exports of a certain good are found to have a marginal effect of 0.04%, whereas NTMs that are aimed at limiting the export of a certain good are found to have a marginal effects of -0.05%. These effect are not the same for all countries, the largest estimates are found for countries from the regions Europe & Central Asia and North America. The smallest effects are found for countries from the regions Sub-Saharan Africa and South Asia. These geographical differential effects are possibly caused by differences in knowledge about and experience with implementing international trade policies. A disaggregation of the main results by income group, a proxy for international trade experience, shows that the trade effects of export-related NTMs is concentrated among more affluent countries.

The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam

Content

1. Introduction

Governments have been using tariffs to protect and stimulate their domestic economy since the beginning of writing. In the Greco-Roman world, for example, some districts charged '*portoria'* (tariffs) of well over 25 percent to import certain goods into the *'imperium Romanum'* (Kitzinger, 2015). In this era, however, tariffs were merely methods to generate extra sources of income rather than an economic policy measure with a larger goal. Towards the 17th century tariffs were not only levied on incoming goods, but also took the form of payments for using transport facilities, such as ports and bridges. During most of the 17th and 18th century mercantilism dominated the economic policy choices of the large European powers. The main objective of mercantilist economics is to obtain a favourable balance of trade, the value of exports should exceed the value of imports. To reach this goal, mercantilist policy discouraged bilateral trade agreements, since governments assisted the local economy through tariffs and quotas (Johnston, 2019). Led by the ideas of Adam Smith and David Ricardo a trend of more liberalized trade was sparked during the early 19th century. Late in the 19th century, a new trade system called imperial preference arose. This system, most prominently implemented by France and Great Britain, involved preferential tariffs on trade flows from and to colonies. Other European countries responded to this preferential treatment of colonies by raising their tariffs on French and British goods, heralding a period of relatively high tariffs that lasted throughout the Great Depression (Columbia University, 2012).

After the second world war, a global initiative to abandon the protectionist policies of before the war arose, the Global Agreement on Tariffs and Trade (GATT). Throughout the 1948-1994 period that this organization was active, over 100 countries agreed to drastically reduce tariffs. At the end of the 20th century, global trade had evolved immensely compared to just after the second world war. Because of this, GATT was no longer sufficient to enforce lawful international trade. This caused the founding of the World Trade Organization (WTO) (WTO, 2021b).

As a result of these agreements, governments started to lose tariffs as a powerful tool to regulate incoming and outgoing trade flows. Because of this, governmental institutions have

become more creative in their attempts to create barriers to trade certain goods to some foreign markets by introducing Non-Tariff Measures (NTMs). But what exactly are NTMs?

NTMs are any policy instrument that can impact trade flows, other than tariffs. There are broadly 3 different types of NTMs: import-related, export-related and behind-the-border NTMs. Import-related NTMs entail policies such as import quotas, import licensing, import prohibitions custom procedure and many more. Examples of export-related NTMs are, among others, export taxes, export quotas and export support. Import- and export-related NTMs are border policies, because they are enforced when goods leave and enter a certain country. The last category of NTMs, behind-the-border NTMs, are applied within the domestic economy. Examples include: environmental standards, internal taxes or domestic subsidies (Staiger, 2018). Another important note is that NTMs are not the same as Non-Tariff Barriers (NTBs). NTBs are a type of NTM that aim to reduce trade, whereas the concept of NTMs is neutral and does not always imply a negative effect on trade (UNCTAD, 2017a).

Given the large variety in the nature of different NTMs, it can be challenging for governments to measure the effect of their trade policies. Several techniques have been used in earlier literature to quantify the effect of NTMs. These techniques are: frequency ratios, coverage ratios, price comparison measures, quantity impact measures and gravity-model residuals (Deardorff & Stern, 1997). More recently, a technique that attempts to estimate an *Ad Valorem Equivalent* (AVE) is frequently used to compare the effectiveness of NTMs to that of tariffs (Ghodsi et al., 2017; Kee et al., 2009). AVEs represent what tariff should be in place to obtain the same trade effect as a currently in place NTM. This allows for an as fair as possible comparison between the effectiveness of NTMs and tariffs, but also between different types of NTMs.

The majority of previous work on quantifying the trade effects of NTMs has focused on the import side of trade relations. One of the main reasons for this is that there are many more incidences of import-related NTMs compared to export-related NTMs. The United Nations Conference of Trade and Development (UNCTAD) formed and coordinated a team called the Multi Agency Support Team (MAST) that was tasked to develop a classification system of NTMs to facilitate the data collection and analysis process of NTMs. This team ended up making 16 different NTM-categories, 15 import-related and 1 export-related (MAST Team, 2019). It is, however, important from a policy perspective to make decisions using all available

information. A good understanding of the trade effects of export-related NTMs is, therefore, a crucial piece of information that thus far has been too often overlooked. The research question for this study will, therefore, be:

"What is the effect of different export-related Non-Tariff Measures on exports from the NTM-imposing to the NTM-affected country?"

Before answering this question, it is important to know the theoretical relation between tariffs, NTMs and trade agreements and the way the WTO treats these factors. When it comes to the link between tariffs, NTMs and trade agreements, there are 2 major economic theories: the terms-of-trade theory and the commitment theory. These theories are a good way to understand the rationale behind the existence of trade decreasing NTMs.

The terms-of-trade theory shows that governments often tend to make free trade agreements to escape from the terms of trade prisoners' dilemma (Bagwell & Staiger, 1999). A prisoners' dilemma is a phenomenon from game theory that describes a situation where 2 players would both improve their payoff if they both changed their actions, but do not do so in absence of collaboration. Such a situation can occur in absence of a trade agreement, but could be fixed by creating such an agreement. The intuition behind this statement is as follows. In absence of a trade agreement, a country will decide by itself what level of tariff they will impose. While establishing the level of the tariff, a government will weigh all costs and benefits of imposing a slightly higher or lower tariff than what is proposed. One cost that is often neglected in this consideration is the cost that is borne by the trading partner, creating an international externality. By neglecting this cost, the unilaterally efficient tariff will be too high from an international efficiency point of view. Negotiating a trade agreement with the affected trading partner forces a government to take these costs into account, resulting in a lower, internationally efficient tariff. As a results of these trade agreement-induced lower tariffs, trade volumes and market access increase, likely creating a mutually more beneficial situation than the situation without trade agreement.

This theory uses tariffs as the main instrument of protection, but also has implications for export-related NTMs. The implications of the terms-of-trade theory support the existence of trade restricting NTMs, such as taxes, quotas and price-controls. The WTO recognizes 2 different approaches when it comes to making agreements based on the terms-of-trade

theory. Firstly, a shallow form of cooperation, meaning that tariff rates are bound and implicit agreements are made around NTMs. Secondly, a deeper form of cooperation, meaning that countries agree on specific tariff rates and NTMs.

The second theory that describes the role of trade agreements in establishing tariffs and NTMs is the commitment theory. This theory states that government commitment problems always appear when a second-best policy is employed. For example, an import-tariff affects both the production margin and the consumer margin, since using an import-tariff reduces competition for domestic producers and, therefore, increases the price of the good for domestic consumers. A more efficient policy measure would be a production subsidy, which only affects the production margin. If we consider a smaller country, however, it could be too costly to implement an import subsidy, forcing them to use the second-best policy, an import-tariff. Announcing an import-tariff, however, creates a government commitment problem. When a government announces the import-tariff they hope that domestic firms anticipate this by investing in the production technology of the affected sector. Once anticipating domestic firms have made their investment, it is the best response of the government to withdraw import-tariff plans, because that would affect both the production and consumer margin, whereas without tariff only the production margin is affected. Domestic firms, however, know this and will not anticipate the tariff by investing early. Committing to a trade agreement will remove this lack of governmental credibility, forcing them to implement an import-tariff. Important to note is that this theory states that trade agreements could also be used to raise tariffs instead of reduce them (Staiger, 2018).

The commitment theory can also be used to demonstrate why the WTO treats tariffs and export support, a specific type of export-related NTM, differently (Potipiti, 2012). The Potipiti (2012) model uses a small country set up to explain the theory. As explained earlier, the anticipation of protection can cause inefficient investment for which the government does not receive any political gain from the affected industry (Maggi & Rodriguez-Clare, 1998). Potipiti (2012) proposes a choice for a government: sign a trade agreement that reduces import tariffs or an agreement that reduces export support measures, in order to prevent inefficient ex-ante investing. The decision that a government makes is based on the welfare gains from preventing inefficient investing and the loss of political contributions from parties that are negatively affected by a trade agreement. Considering falling transportation costs,

Potipiti (2012) argues that export sectors grow and import-competing sectors decline. Because of this, export support measures would attract new entrants and investments into the affected exporting sectors. As a result, the government will receive only a small amount of political contributions, since the new entrants start competing will the existing firms, eroding protection rent. For the declining import-competing sectors, on the other hand, return on capital drops. Given the fact that the capital is sunk, firm exits are minimized, allowing the government to maintain its protective import tariffs without attracting too many entering firms, thus maintaining protection rent and political contributions. The described differences, based on falling transportation costs inducing sectoral asymmetries, between import-competing and export sectors could be an explanation for why the WTO treats import tariffs and export support measures differently.

The terms-of-trade theory and the commitment theory show that there are close links between trade agreements, tariffs, NTMs and the way the WTO treats them. These theories mainly explain the intuition behind trade reducing export-related NTMs, but a different strand of the economic literature also focusses on trade increasing measures, such as export promotion.

A researcher that studied export promoting measures in great detail is Christian Volpe Martincus. One paper he worked on studies the effectiveness of export promotion during a period of economic downturn, the 2009 global recession. His team finds that firms that used the services of export promotion agencies showed better export performance during the crisis. The mechanism that explains this result is that supported firms are more likely to survive on the export market and are more likely to continue exporting to countries that are hit by the financial crisis (Van Biesebroeck et al., 2016). A different study focuses more on the channels that are affected by export promoting measures. Analysing bilateral trade for the 1995-2004 period using a sample of Caribbean and Latin American countries, the economists find that there is a larger effect on the extensive margin of trade than on the intensive margin (Volpe Martincus et al., 2011). Additionally, another study confirms these findings for developing markets, showing that positive trade effects of export promoting measures mainly exist through the extensive margin of trade (Volpe Martincus & Carballo, 2008). A common denominator of these studies is that they mostly look at a limited number of countries that are geographically close to each other or at firm-level data. There have not been attempts to

quantify the effect of trade increasing export-related NTMs using a sample that is representative of the global market. That is why this study focuses on the effect of export-related NTMs on bilateral trade, using a sample of geographically dispersed countries.

Lastly, there is a theory that explains the use of trade increasing NTMs, strategic trade policy. The 2 previously discussed theories, terms-of-trade theory and commitment theory, regard NTMs merely as a substitute of tariffs. In reality, however, NTMs are also often used as strategic instruments. The strategic trade policy theory is based on a two-stage, two-player game. In the first stage, both players choose whether or not to implement an export subsidy for their countries' output of a homogenous good. In the second stage, the companies in both countries decide how much to produce. In this strategical environment, firms take the production choice of their international competitors into account when determining their profit maximizing production quantity. So if one of the countries has an export subsidy in place, it will be attractive for the firms in that country to increase their output, directly decreasing the output of foreign firms. So with a rising export subsidy, the domestically produced quantity increases, prices fall and the domestic firms increase their profits while foreign firms lose profit. So in the end, profits shift from the non-export subsidized country to the export subsidized country (Milner & Yoffie, 1989). Given the fact that the first country to implement an export-subsidy reaps the benefits, there is a first-movers advantage in this game. Because of this, countries often sign trade agreements that prohibit export subsidies to prevent a race to the bottom. A real world example of this theory is the dispute between the European Union and the United States of America about subsidies for aircraft manufacturers Airbus and Boeing (Brunsden et al., 2021).

Given the fact that it is the aim to find the effect of export-related NTMs, it is important to discuss several important factors that have been shown to affect bilateral trade. A prominent strand of literature that studied this, is called the gravity model of trade (Tinbergen, 1962). The basic idea behind this model, and the reason that it is called a gravity model, is that it shows that exports are proportional to the economic mass (GDP) of the exporting and importing country and inversely proportional to the distance between them. A concept that is very similar to Newton's law of gravity. More intuitively, the model tells us that larger countries are expected to trade more and countries that are far away from each other are expected to trade less, possibly due to transportation costs. A huge amount of literature used

this gravity model of trade to study trade. A meta-study analysed the results of 78 papers, including over 1,000 estimates and found that the gravity equation variables are capable of explaining a very large part of the variation in international trade (Disdier & Head, 2008). The model was originally developed to explain international trade between countries in goods, but a more contemporary study showed that it also performs well in explaining international trade in services (Kimura & Lee, 2006). All in all, the vast literature on the importance of economic mass and distance between countries in international trade shows that it is important to address these factors when estimating the trade effects of export-related NTMs.

To study the trade effects of export-related NTMs, the researcher file from the TRAINS database will be used to identify incidences of NTMs. From this file, a variable that reports the number of export-supporting and export-limiting NTMs during a year will be created for every country-pair for which data is available. Due to data restrictions and to avoid possible bias from backdating errors, the period for which export-related NTMs are studied is 2007-2016. To study trade flows, we will consider bilateral exports from NTM-imposing to NTM-affected countries. The export data is downloaded from the COMTRADE database and includes information from both before and after the implementation of export-related NTMs. Therefore, the sample period for the trade data is 2002-2020. The main results are found through a Poisson maximum likelihood estimation with yearly exports as dependent variable and the export-related NTM variables as most important independent variables.

The main finding of this study is that export-supporting NTMs have a significant and positive marginal effect on trade and export-limiting NTMs have a significant and negative marginal effect on trade. The implementation of 1 additional export-supporting NTM is associated with a 0.04% higher export-flow, whereas the implementation of 1 additional export-limiting NTM is associated with a 0.05% lower export-flow. These effects are not the same for every region of the world. The largest effects are found when countries from the regions Europe & Central Asia and North America are the one implementing the export-related NTM, whereas countries from the regions Sub-Saharan Africa and South Asia have the most inefficient or even insignificant export-related NTMs. A possible reason for these geographical differential effects is experience with and knowledge about implementing efficient NTMs. Countries that have been trading internationally for the longest amount of time might be better able to implement the most efficient policies. To provide an indication about this possible 'learning

by doing' explanation, the results are disaggregated according to the income group that countries belong to, since more affluent countries have been trading internationally for relatively longer than less affluent countries. The results of this analysis show that the trade effects of NTMs are concentrated among high income and upper middle income countries. The export-related NTMs from the less affluent countries insignificantly impact their export.

The rest of this paper is structured as follows: section 2 discusses the collection and most important aspects of the data, section 3 explains in detail what method is used to study the trade effects of export-related NTMs, section 4 discusses the results from the estimated equations and section 5 concludes.

2. Data

2.1 Export-related Non-Tariff Measures

This study focuses on the effects of export-related NTMs on bilateral trade flows. To study this the 2000-2020 period will be analysed. The information to create the necessary variables for the NTMs is retrieved from the Trade Analysis Information System of the United Nations (UNCTAD TRAINS). The TRAINS database provides a researcher file that contains all NTMs aggregated at the HS 6-digit product level by researchers and analysts (UNCTAD, 2017b). The collection of this data by the researchers of UNCTAD is done in accordance with the following principles: the measure is applied during at least a year, the measure affects international trade (so it is not just an internal regulation), the measure is issued by the government and is mandatory, and the measure is detailed and specific (not just a general guideline).

The first step of the collection process of NTMs is slightly different per country, but in general information is available at a centralized location. Such a location is often the Ministry of Economy, the Ministry of Trade, the Ministry of Foreign Relations or the National Customs Agency. Once this information is retrieved from the relevant national institution, the measures are identified within a regulation. After reading the regulations, the researchers know what measure is used, the affected products, the affected countries, the imposing country and the year that the measure was implemented. The nature of this data allows researchers to build a panel dataset, identifying the trade effects of NTMs over time by country pair.

The main advantage of this dataset is that the unified way of collecting information on NTMs allows for comparison between different types of NTMs. There are, however, also disadvantages about the collection method that is used to build the dataset. Firstly, due to the labour-intensive way of collecting information it is possible that there are small differences in the way analysts classify information, leading to a small interpretation bias. Secondly, the presence of an NTM is binary, meaning that the dataset reports whether there is a measure in place or not. It does not say anything about the stringency of the measure. Because of this it is important to remain precautious when interpreting the results of this study.

The UNCTAD TRAINS researcher file contains information about every type of NTM, classified according to the MAST-classification. Given the fact that this study focuses only on export-related NTMs, all other observations are dropped from the dataset. The MAST-classification identifies 8 different subtypes of export-related NTMs. These categories are:

- P1: “Export measures related to sanitary and phytosanitary measures and technical barriers to trade”. These are export regulations that refer to technical specifications of products. Examples include export permits and conformity assessments. The goal of this measure is to limit exports.
- P2: “Export formalities”. Examples include: export monitoring requirements and requirements to pass through certain entry points for custom checks. The expected effect of this measure on trade is that it negatively impacts exports. But given the indirect link to prices, it will not be considered as a negatively impacting NTM.
- P3: “Export licences, export quotas, export prohibition and other restrictions other than sanitary and phytosanitary or technical barriers to trade measures”. These are restrictions about the quantity of goods that is allowed to be exported as determined by the exporting country’s government. Reasons to implement this type of measures are: shortage of goods in the domestic market, regulation of domestic prices, prevention of anti-dumping measures and political reasons. Examples include: export quota and export prohibition. The goal of this measure is to decrease exports.
- P4: “Export price-control measures, including additional taxes and charges”. Examples include: export taxes and dual pricing schemes. The goal of this measure is to decrease exports.

- P5: “State-trading enterprises, for exporting; other selective export channels”. This measure mainly concerns enterprises with special rights that influence the level or direction of exports through their sales and purchases. The goal of this measure is to control the level of exports, so it is not necessarily a trade increasing or decreasing measure
- P6: “Export-support measures”. This category of NTMs financial support from a government or other public institution that provides a benefit dependent on export performance. Examples include: export subsidies and tax exemption. The goal of this measure is to increase exports.
- P7: “Measures on re-export”. These are measures that the exporting country imposes on exporting goods that were earlier imported from another country. A practical example could be the prohibition of re-exporting wines and spirits to the producing country. This measure is mainly used to avoid tax evasion. This measure could lead to a reduction of imports of the goods that where initially imported to be re-exported. Give the unclear nature of this measure, it will not be classified as strictly export increasing or decreasing.
- P9: “Export measures not elsewhere specified”. This category includes measures that do not fall into one of the aforementioned subcategories. Since the nature of the measure in this category is ambiguous, this measure will not be classified as strictly export increasing or decreasing.

As explained above, measures P1, P3 and P4 are all measures that are exclusively aimed at limiting bilateral exports, whereas P6 is exclusively aimed at stimulating exports. For this reason the measures P1, P3 and P4 will be aggregated into 1 category, export-limiting NTMs. P6 will be used to proxy for export-supporting NTMs. Given the ambiguous or indirect nature of P2, P5, P7 and P9 NTMs, these categories will not be used in further analysis. Given this information, 2 main hypotheses will be formally tested:

Export-limiting NTM Hypothesis: The export-limiting NTMs that are a combination of the P1, P3 and P4 NTMs according to the MAST-classification have a negative effect on the bilateral trade-flow of the 2 affected countries.

Export-supporting NTM Hypothesis: The export-supporting NTMs that are represented by the P6 NTMs according to the MAST-classification have a positive effect on the bilateral trade-flow of the 2 affected countries.

The distribution of the NTMs over time and by subcategory are shown in table 1 below. For this study NTMs from the 2002-2016 period are considered, since trade data before and after the implementation of the NTM is required to study trade effects.

Table 1: *description of the NTMs*

Panel A: distribution of export-related NTMs over time for the 2002-2016 period		
Year	Number of NTMs	Percentage of NTMS
2002	41,584	0.94
2003	21,373	0.48
2004	37,155	0.84
2005	58,517	1.32
2006	1,134,431	25.59
2007	41,334	0.93
2008	734,839	16.57
2009	19,385	0.44
2010	19,337	0.44
2011	33,167	0.75
2012	144,912	3.27
2013	686,864	15.49
2014	376,792	8.50
2015	836,503	18.87
2016	225,653	5.09
Panel B: Distribution of export-related NTMs by subcategory for the 2002-2016 period		
NTM-type	Number of NTMs	Percentage of NTMs
P1	1,177,611	26.56
P2	24,168	0.55
P3	2,190,699	49.91
P4	278,293	6.28
P5	214,355	4.83
P6	464,112	10.47
P7	15,992	0.36
P9	46,616	1.05
Total	4,411,846	100

Notes: This table shows the distribution of export-related NTMs over time for the 2002-2016 period in panel A and the distribution by NTM subcategory, as classified by MAST, in panel B.

We see in table 1 that a total number of 4,411,846 export-related NTMs are present in the dataset for the 2002-2016 period. Panel A shows the distribution by year and shows a large percentage of the total amount of NTMs is allocated to 2006, which coincides with the founding of the MAST-group. This large increase in 2006 could be caused by the fact that the researcher were not able to specifically allocate old measures to the correct year. Because of this they could have allocated difficult to date NTMs to 2006, the year of the founding of the MAST-group. For this reason, the year prior to 2007 might suffer from a back-dating bias. Therefore, the main specification of this study will exclude the years 2002-2006. Later on, a check that includes the entire sample period (2003-2016) will be performed to verify the robustness of the results. Additionally, there is a strong increase in reported NTMs in 2012-2013, which coincides with the accession of 13 new to the WTO. Panel B shows the distribution of export-related NTMs by subcategory. We find that the P1 and P3 types are the most popular, whereas P2, P7 and P9 occur less often in the dataset.

2.2 Bilateral export-flows

To identify the effect of NTMs on trade, a variable that represents bilateral trade is required. The variable that is used, is yearly exports from the export-related NTM implementing country to the affected country. This export data is retrieved from the COMTRADE database for the years 2002-2020, which entails all the data that is available through the free version of the database. COMTRADE is a database that is created by the United Nation Statistics Division (UNSD). It covers the reported statistics of over 170 countries and areas, including the most prominent economic powers. The UNSD reports all values in US dollars by converting the reported values according to the contemporary currency exchange rates. Due to download limitations in the free version of the database and technical restrictions, the data is aggregated at the HS 2-digit product level.

2.3 Countries

The final sample consists of 35 countries exporting to 233 partner countries. Figure 1 below shows the geographical distribution of the exporting countries.

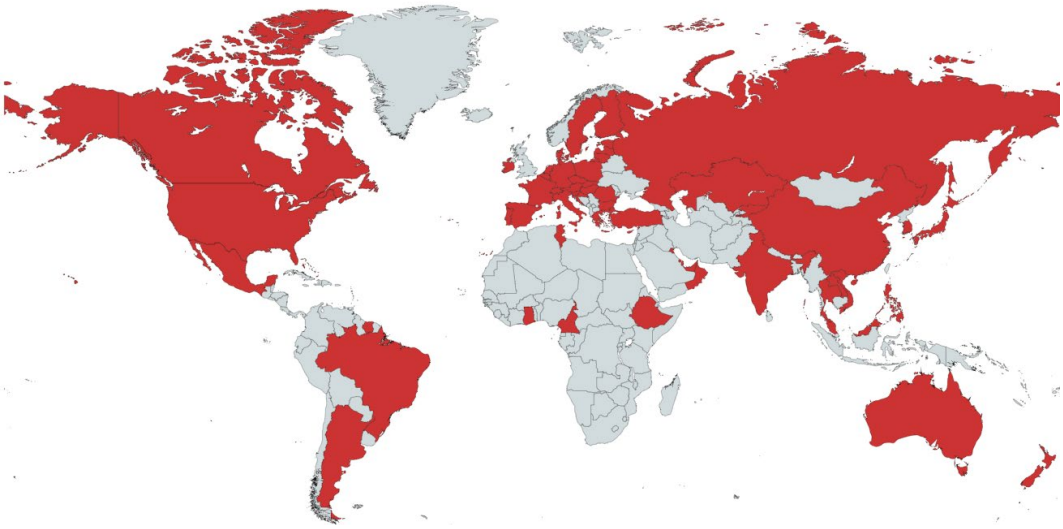

Figure 1: This figure gives a graphical representation of the 35 exporting countries in the sample. The countries in red are the countries that are included in the sample, whereas the countries in grey are not.

As can be seen in the world map, the exporting countries in the dataset cover a wide range of countries. Most of the areas of the world are properly represented, only lacking a strong representation of Africa. Additionally, it is important to note that TRAINS does not report NTMs separately for members of the European Union, because the European Union collectively decides on their NTM usage. A table with all the exporting countries in the dataset is available in appendix A.

3. Method

3.1 Main method

The main method that is used to analyse the effect of export-related NTMs on bilateral trade is the estimation of a gravity-like equation (Ghodsi et al., 2017). The equation that will be estimated is the following:

$$\ln(x_{ijht}) = \beta_{0h} + \beta_{1h}\ln(1 + t_{jiht-1}) + \sum_{n=1}^{N-1}\beta_{2h}^{+}NTM_{ijht-1}^{+} + \sum_{i=1}^{I}\beta_{3ih}^{-}NTM_{ijht-1}^{-} + \beta_{4h}c_{it-1} + \beta_{5h}c_{jt-1} + \beta_{6h}C_{ijt-1} + FE + \varepsilon_{ijht} \quad (1)$$

Where:

$\ln(x_{ijht})$ represents the natural logarithm of the export value of HS 2-digit product h from country i to trading partner j during year t.

$\ln(1 + t_{jiht-1})$ represents the natural logarithm of the ad valorem tariff rate imposed by country *j* on country *i* for product *h* in the year *t-1*.

$\sum_{n=1}^{N-1} \beta_{2h}^{+} NTM_{ijht-1}^{+}$ represents the total number of export-stimulating NTMs *n* that are in force at time *t-1*, imposed by country *i* on country *j* on product *h*. A country can impose an NTM on a single other country or on a group of countries. If the NTM is imposed on multiple countries, the NTM is added to every affected country-pair for this variable. An example of a measure that only affects 1 country is when Argentina decided to implement export licenses on the export of honey to Israel in 2002. An example of a measure that affected multiple partners is when Russia implemented export support measures in 2014 on the export of iron and steel to all its trading partners. In such a case, every country-pair that refers to the exports of Russia in 2014 (and all following years in which the measure is in force) with any affected partner will have 1 export-supporting NTM added to the running total.

$\sum_{i=1}^{I} \beta_{3ih}^{-} NTM_{ijht-1}^{-}$ represents the total number of export-limiting NTMs *n* that are in force at time *t-1*, imposed by country *i* on country *j* on product *h*.

c_{it-1} and c_{jt-1} represents controls for the Gross Domestic Product (GDP) and GDP per capita of the exporting and importing nations, respectively.

C_{ijt-1} represents 2 other control variables. Firstly, a dummy that equals 1 if both the exporter and the importer are member of the WTO and 0 otherwise. Secondly, a dummy that equals 1 if there is a Preferential Trade Arrangement (PTA) between the 2 trading countries.

FE represents all the fixed effects that will be used in the estimation of equation 1. The fixed effects that are used are: exporter-time fixed effects (FE_{it}), importer-time fixed effects (FE_{jt}), exporter-importer fixed effects (FE_{ij}), product-time fixed effects (FE_{ht}), exporter-importer-time fixed effects (FE_{ijt}), exporter-importer-product fixed effects (FE_{ijh}). Dependent on the specification that is tested, some controls might be left out. The main interpretation of the coefficients of interest will be performed on the specification with most restrictive set of fixed effects. This is because the extensive set of fixed effects absorbs a large part of the variation in the data that is caused by,

for example, supply- and demand shocks, geographical distance, economic mass, common languages, colonial history, common treaties and more. So the variation that remains is most likely attributable to the NTM-categories that are being studied.

ε_{ijht} represents the error-term.

The effect of a specific export-stimulating NTMs on bilateral export flows is shown through β_{2h}^{+}, whereas the effect of a specific export-limiting NTMs on bilateral export flows is shown through β_{3ih}^{-}. The regressors are lagged 1 time-period to address possible endogeneity concerns. The equation will be estimated using the Poisson Maximum Likelihood Estimator (Santos Silva & Tenreyro, 2006). To be able to interpret the β_{2h}^{+} coefficient as the effect of export-stimulating NTMs on bilateral export flows, a small transformation is required. Therefore, the marginal trade effects will be calculated as follows:

$$Marginal\ Trade\ Effect_{ih}^{n'}\ in\ \% = \left(e^{\beta_{2h}^{+}} - 1\right) * 100 \qquad (2)$$

The calculation of the effect of export-limiting NTMs on bilateral trade is the same, but β_{3ih}^{-} is used instead of β_{2h}^{+}. To obtain a time-series of the aggregate trade effects, the marginal trade effects will be multiplied by the average number of NTMs that are in place, for each country-pair per product type per year:

$$Aggregate\ Trade\ Effect_{iht}^{n'} in\ \% = Marginal\ Trade\ Effect_{ih}^{n'}\ in\ \% \times \sum_{n=1}^{N-1} NTM_{ijht}^{+} \qquad (3)$$

Where:

$Aggregate\ Trade\ Effect_{iht}^{n'} in\ \%$ is the aggregate trade effect in percent per country-pair, per year, per product type.

$Marginal\ Trade\ Effect_{ih}^{n'}$ is the marginal trade effect in percent per country-pair, per year, per product type.

$\sum_{n=1}^{N-1} NTM_{ijht}^{+}$ represents the total number of export-stimulating NTMs n that are in force at time t, imposed by country i on country j on product h (the equation will be repeated for export-limiting NTMs).

3.2 Data for the control variables

The data that is required to build the control variables is retrieved from several different sources. Tariff data is downloaded from TRAINS and the WTO Integrated Database (IDB) via the World Integrated Trade Solution (WITS). If multiple tariff types are available the preferential tariff rate is used, if unavailable the most-favoured-nation tariff and after that the effectively applied tariffs are added (Ghodsi et al., 2017).

Information on GDP and GDP per capita is retrieved from the Centre d'Études Prospectives et d'Informations Internationales (CEPII). This French institution provides several datasets that can be used for economic analysis. One of those datasets contains information that is needed the estimate a gravity-like model, such as GDP and GDP per capita. Lastly, the data for the PTA-dummy is created through information from the Database on Preferential Trade Arrangements from the WTO (PTADB).

4. Results

4.1 Main Specification

To start the analysis of the effect of export-related NTMs on bilateral export-flows, we estimate the main specification, which is the specification that includes the most restrictive set of fixed effects. The full set of possible fixed effects that are used in the main specification: product-time fixed effects (FE_{ht}), exporter-importer-time fixed effects (FE_{ijt}) and exporter-importer-product fixed effects (FE_{ijh}). The results of this analysis are shown in column 1 of table 2 below.

Table 2: *Main Results*

Log (Export)	(1)	(2)	(3)	(4)
Log (tariff + 1)	-0.0409***	-0.3259***	-0.4789***	-0.0515***
	(0.0051)	(0.0036)	(0.0035)	(0.0043)
NTM +	0.0004***	0.0014***	0.0021***	0.0001**
	(0.0001)	(0.0004)	(0.0001)	(0.0003)
NTM -	-0.0005*	-0.0030***	-0.0043***	-0.0004*
	(0.0002)	(0.0002)	(0.0003)	(0.0002)
GDP Exporter			0.0005***	
			0.0000	
GDP Importer			0.0011***	
			(0.0002)	
GDP Per Capita Exporter			0.0230***	
			(0.0001)	
GDP Per Capita Importer			0.0065***	
			(0.0001)	
WTO		0.1368***	0.7307***	
		(0.0255)	(0.0090)	
PTA		0.1952***	0.3841***	
		(0.0587)	(0.1954)	
Constant	6.2878***	6.7579***	5.9493***	6.2746***
	(0.0106)	(0.0788)	(0.0125)	(0.0091)
Number of Observations	3,691,067	3,691,067	3,691,067	4,238,630
Adjusted R-squared	0.89	0.53	0.24	0.86
Fixed Effects	Product-Time Exporter-Importer-Time Exporter-Importer-Product	Exporter-Time Importer-Time Exporter-Importer	Product-Time	Product-Time Exporter-Importer-Time Exporter-Importer-Product

*Notes: This table shows the main results of this paper. The study is conducted by running a Poisson maximum likelihood analysis over a gravity-like equation for the 2007-2016 period. The dependent variable is the natural logarithm of exports from the NTM imposing to the affected country by product-type by year. The most important independent variables are the 2 continuous variables that represent export-supporting and export-limiting NTMs. The control variables are the natural logarithm of 1 plus the tariff that the affected country imposes on the import from the NTM imposing country, the GDP and GDP per capita of both the importer and the exporter, a dummy that equals 1 if the trading countries are both member of the WTO and a dummy that equals 1 if the trading countries have signed a preferential trade agreement. Standard errors are clustered at the country-pair-product level. *,**,*** represent significance at the 10%-, 5%-, 1%-level, respectively. The regressors are lagged 1 period to mirror the implementation time that is associated with a policy to cause a trade effects. The results of the main specification with all the fixed effects are shown in column 1, columns 2 and 3 use alternative combinations of fixed effects and column 4 runs the main specification of column 1 over the full sample period (2002-2016). Clustered standard errors are in parentheses.*

To start of the discussion of the main results, I will review the coefficients of our main variables of interest, those on export-supporting and export-limiting NTMs from the main specification in column 1. The coefficient of the export-supporting NTM variable is positive and significant at the 1% level. This means that imposing 1 extra export-supporting NTM on the trade of a good with a country, is associated with an increase of exports of that particular good from the imposing country to the affected country 1 year later. To obtain the magnitude of the trade effect of a marginal increase in the number of NTMs that are imposed on the bilateral trade of a country-pair, formula 2 is used. Using this formula we find that 1 extra export-stimulating NTM increases the affected trade flow with: $(e^{0.0004} - 1) \times 100 = 0.04\%$.

Looking at the coefficient of the export-limiting NTM variable, we conclude that this estimate is negative and significant at the 10% level. This means that the marginal effect of adding 1 extra export-limiting NTM is negative, so 1 additional export-limiting NTM is associated with a lower export from the imposing country to the affected country 1 year later. To obtain the magnitude of the effect, we use formula 2. 1 additional export-limiting NTM is associated with $(e^{-0.0005} - 1) \times 100 = -0.05\%$ change in the bilateral export flow. The other control variables, expect the one on tariffs, are omitted in column 1, because the variation that is measured through these variables is already taken into account by the various fixed effects. The statistical software Stata, therefore omits these controls due to possible collinearity. The coefficient of the import-tariff variable is negative and significant. This means that a higher import-tariff of country j on country i is associated with less exports from country i to country j. The sign of this coefficient is intuitive and confirms the effectiveness of import-tariffs. Lastly, the adjusted R-squared of this estimation is quiet high with 0.89, meaning that a large part of the variation in the data is explained by the estimated equation.

To verify the robustness of the main specification, some alternative analyses are run. Column 2 of table 2 shows the results of the first alternative specification. The main difference between the main specification in column 1 and the alternative specification in column 2 is found in the fixed effects that are used. The main specification includes the entire range of fixed effects, whereas the specification in column 2 excludes the fixed effects that cause the WTO-dummy and the PTA-dummy to be collinear. The specification in column 2, therefore, is the most restrictive specification that allows us to estimate the effect of a joined WTO- and

PTA-membership. The exact set of fixed effects that is used is: exporter-time fixed effects (FE_{it}), importer-time fixed effects (FE_{jt}) and exporter-importer fixed effects (FE_{ij}). Both the WTO-dummy and the PTA-dummy are positive and significant at the 1%-level. The mission of the WTO is to: "reduce obstacles to international trade and ensuring a level playing field for all, thus contributing to economic growth and development" (WTO, 2021a). The positive WTO-dummy implies that a common WTO-membership is associated with an increase in bilateral trade, meaning that the WTO is successfully fulfilling its mission (Felbermayr & Kohler, 2010). The positive PTA-dummy confirms earlier findings on the trade effects of PTAs (Medvedev, 2010). The adjusted R-squared of this specification is 0.53 which is considerably lower than the adjusted R-squared of the main specification. This means that the control variables in this second specification do not explain all the variance that was previously captured by the more restrictive set of fixed effects of the first specification. This lower adjusted R-squared in combination with inflated coefficients of the NTM and tariff variables show an omitted variable bias for this specification, emphasizing the strength of the main specification as shown in column 1.

The specification in column 3 of table 2 excludes even more fixed effects, in order to include the GDP related variables into the estimation. The specific fixed effects that are included are product-time fixed effects (FE_{ht}). The coefficients of the GDP variable are positive and significant, confirming the findings from the gravity model of trade that state that exports are proportional to the economic mass (GDP) of the exporting and importing country and inversely proportional to the distance between them. The GDP per capita variables for both the exporting and the importing country are positive and significant, which is consistent with theories that describe the relation between quality and trade (Murphy & Shleifer, 1997). Once again the relatively low adjusted R-squared of 0.24 and the inflated coefficients of the NTM and tariff variables show an omitted variable bias for this specification, emphasizing the strength of the main specification as shown in column 1.

The main specification excludes the years 2002-2006, due to possible errors in dating NTMs in the early days of the MAST-group. The specification in column 4 uses the entire sample period, including the 2002-2006 period, to estimate the equation of formula 1. The differences between the estimation of the main specification and the estimation over the full sample period are slim. Qualitatively, there are no notable differences between the

specifications in column 1 and 4. Quantitatively, the coefficients of our 2 main independent variables of interest are marginally affected by the change in sample period. The coefficient of the export-limiting NTMs is barely affected, but the coefficient of the export-supporting NTMs is slightly smaller. This confirms the choice to exclude the 2002-2006 period, because daring errors could have introduced a small bias into the main coefficients of interest.

4.2 Aggregate effects

In order to find the aggregate effects of export-related NTMs from the estimated marginal effects, formula 3 is used. As formula 3 explains, the aggregate effects will be calculated for each sample year that is used in the main specification (2007-2016). The time series of the aggregate effects are shown in figure 2 below.

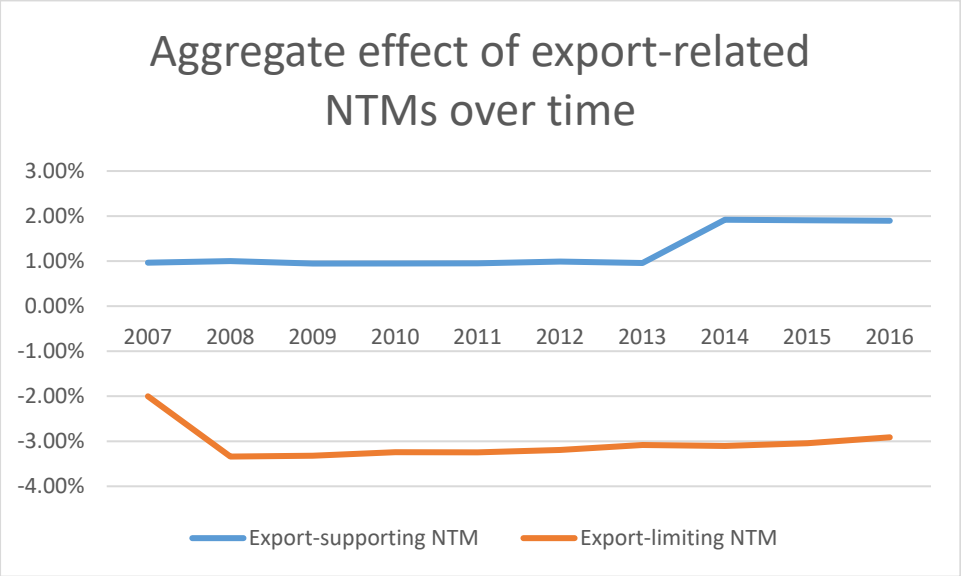

Figure 2: Time-series of the aggregate effects of export-related NTMs for the 2007-2016 period. The blue line refers to the time-series of the aggregate effect of export-supporting NTMs and the orange line refers to the time-series of the aggregate effect of export-limiting NTMs. The calculation of the aggregate effect is performed using formula 3.

The blue line in figure 2 shows the time-series of the aggregate effect of the export-supporting NTMs. During the 2007-2013 period, we find a relatively stable aggregate effect of approximately 1%. From 2013 onward the aggregate effect increases to approximately 2%, coinciding with the accession of new countries to the WTO. The average aggregate effect of export-supporting NTMs over the sample period is 1.25%, meaning that the overall presence of this type of NTMs is associated with a 1.25% increase in bilateral trade between 2 affected

countries. This and previous results do not give any reason to reject the export-supporting NTM hypothesis.

The orange line in figure 2 shows the time-series of the aggregate effect of the export-limiting NTMs. During the 2007-2013 period, we find a relatively stable aggregate effect of approximately -3%. Remarkably, we do not find a significant change in the magnitude of the aggregate effect of export-limiting NTMs around 2013, implying that the newly accessioned countries to the WTO did not have a large amount of export-limiting NTMs in force. This seems intuitive, given the fact that countries that enter the WTO aim to increase their international trade, so having a large amount of export-limiting policies would be counterproductive. The average aggregate effect of export-limiting NTMs over the sample period is -3.05%, meaning that the overall presence of this type of NTMs is associated with a 3.05% decrease in bilateral trade between 2 affected countries. This and previous results do not give any reason to reject the export-limiting NTM hypothesis.

4.3 Geographical differential effects

The results of the estimation of the main specification show that export-supporting NTMs are associated with positive trade effects and export-limiting NTMs are associated with negative trade effects. It could however by the case that not every country is equally active and efficient in successfully imposing export-related NTMs. As explained in the introduction of this study, there have been many views on economics and the way that governments should protect their markets against foreign powers over the years. After the second World War, this led to the founding of the GATT/WTO, which aims at liberalizing trade. However, not every country liberalizes at the same pace, meaning that not all countries have similar levels of experience in implementing foreign trade policy. Most certainly when it comes to relatively new policies like export-related NTMs. For that reason it could be the case that some countries are more efficient at implementing export-related NTMs to reach their goals than others. This could lead to differences in the marginal effects of export-related NTMs on bilateral trade between different countries. For that reason, the results are disaggregated by geographical regions to study regional differences of the effect of export-related NTMs on bilateral export.

The classification of regions is based on information from the researcher file of the TRAINS database. To study the regional differential effects, the main specification is altered to allow for the results to be disaggregated. The equation that is estimated is the following:

$$\ln(x_{ijht}) = \beta_{0h} + \beta_{1h}\ln(1 + t_{jiht-1}) + \sum_{n=1}^{N-1}\beta_{2h}^{+}NTM_{ijht-1}^{+} + \sum_{n=1}^{N-1}\beta_{3h}^{+}NTM_{ijht-1}^{+} \times Region_i + \sum_{i=1}^{I}\beta_{4ih}^{-}NTM_{ijht-1}^{-} + \sum_{i=1}^{I}\beta_{5ih}^{-}NTM_{ijht-1}^{-} \times Region_i + \beta_{6h}c_{ijht-1} + \beta_{7h}C_{ijt-1} + \theta_{ht} + \varepsilon_{ijht} \quad (4)$$

This is a slightly transformed version of formula 1, which represents the main specification of this study. To allow for geographical region based differential analysis, the 2 main independent variables of interest are interacted with the variable $Region_i$. This is a categorical variable that allows the econometrician to disaggregate the total effect of export-related NTMs into regions-based sub-effects. Such a specification omits 1 region from the results and captures the effect of this omitted group in the coefficient of the main variable of interest (the standalone variables for export-supporting and export-limiting NTMs). The effects of the other region will then be estimated relative to the omitted group. The full results of this analysis are shown in column 1 of table 3. In these results, the region East Asia & Pacific is the omitted group.

Table 3: *Geographical and income group based differential effects*

Log (Export)	(1)		(2)
Log (tariff + 1)	-0.0519***	Log (tariff + 1)	-0.0518***
	(0.0044)		(0.0044)
NTM +	0.0004***	NTM +	0.0006***
	(0.0001)		(0.0002)
Europe & Central Asia	0.0004***	Upper middle income	-0.0002*
	(0.0001)		(0.0001)
Latin America & Caribbean	0.0000	Lower middle income	-0.0005***
	(0.0001)		(0.0001)
Middle East & North Africa	-0.0001	Low income	.
	(0.0001)		.
North America	0.0003***		
	(0.0001)		
South Asia	-0.0002*		
	(0.0001)		
Sub-Saharan Africa	-0.0003***		
	(0.0001)		
NTM -	-0.0006***	NTM -	-0.0008***
	(0.0002)		(0.0003)
Europe & Central Asia	-0.0002***	Upper middle income	0.0002*
	(0.0000)		(0.0001)
Latin America & Caribbean	0.0001	Lower middle income	0.0007***
	(0.0001)		(0.0002)
Middle East & North Africa	0.0004*	Low income	.
	(0.0002)		.
North America	-0.0002**		
	(0.0001)		
South Asia	0.0005**		
	(0.0002)		
Sub-Saharan Africa	0.0006***		
	(0.0002)		
Constant	6.2753***	Constant	6.2743***
	(0.0092)		(0.0092)
Number of Observations	3,691,067	Number of Observations	3,691,067
Adjusted R-squared	0.86	Adjusted R-squared	0.86
Fixed Effects	Product-Time; Exporter-Importer-Time; Exporter-Importer-Product	Fixed Effects	Product-Time; Exporter-Importer-Time; Exporter-Importer-Product

*Notes: This table reports the full results of the analysis of an altered version of the main specification. An interaction between the NTM variables and the geographical region of the NTM imposing country (column 1) or the income group of the imposing country (column 2) is added to study differential effects. In column 1, the region East Asia & Pacific is the omitted group. In column 2, High income is the omitted group. *, ** and *** represent significance at the 10%-, 5%- and 1%-level, respectively. Standard errors are clustered at the country-pair-product level. The full set of fixed effects are used in both column 1 and 2. Clustered standard errors are in parentheses.*

Firstly, I will discuss the marginal trade effects of export-supporting NTMs, disaggregated by geographical region. The differences in the effect range between 0.01% and 0.08%, where the largest marginal effects are found for the region Europe & Central Asia. For this region, the effect significantly differs from the East Asia & Pacific region at the 1%-level. This means that adding 1 additional export-supporting NTM will have the largest positive effect on trade when the country that is imposing the NTM is part of the Europe & Central Asia group. Some countries that belong to this group are: Swiss, Russia and the European Union. The least effective export-related NTMs are those imposed by countries in the regions South Asia and Sub-Saharan Africa with effects of 0.02% and 0.01%, respectively. For South Asia the effect is significantly different from 0 at the 10%-level, but for Sub-Saharan Africa the effect is insignificant. Some countries that belong to these groups are: India and Ethiopia. The differences in the marginal effects of the group Europe & Central Asia and the groups regions South Asia and Sub-Saharan Africa are significant at the 1% significance level, using a standard t-test. This means that some regions are more efficient in supporting their exports using NTMs than other regions

Secondly, I will discuss the marginal effect of export-limiting NTMs, disaggregated by geographical region. The effect of export-limiting NTMs on trade ranges from 0.00% to -0.08%. The largest marginal effects of export-limiting NTMs on trade are found for the regions Europe & Central Asia and North America. Adding 1 additional export-limiting NTM will have the largest positive effect on trade when the country that is imposing the NTM is part of the Europe & Central Asia or North America region. This means that countries in these regions need less measures to obtain the same trade effect than other, less efficient countries would need. These effects are significant at the 1%-level. On the other side of the spectrum, there are Sub-Saharan Africa and South Asia. These regions have the lowest marginally effective export-limiting NTMs. In fact, the effects of 0.00% and -0.01%, respectively, are insignificant at conventional levels of significance. This means that countries from these regions are unable to successfully alter the magnitude of their export flow by implementing export-limiting NTMs. The difference between the marginal effects of the most and least efficient regions are significant at the 1% significance level, using a standard t-test. This means that some regions are more efficient in limiting their exports using NTMs than other regions

4.4 Income based differential effects

Now that we know that countries from different regions are not equally capable of implementing efficient export-related NTMs, it is interesting to study a possible reason why some countries are more efficient in implementing export-related NTMs than others. This analysis will consider a country's income level as a possible reason for the differential trade effects. It could be the case that more affluent countries, which opened their economies first, are more efficient in implementing export-related NTMs, because they are more experienced and can therefore implement NTMs that are more directly aimed at reaching their goal. For this reason the differential impact of export-related NTMs on bilateral export will be estimated based on different income groups.

To formally test differences in the effect of export-related NTMs on trade between countries of different income groups, an equation that is very similar to formula 3 is estimated. The exact equation that will be used is the following:

$$\ln(x_{ijht}) = \beta_{0h} + \beta_{1h}\ln(1 + t_{jiht-1}) + \sum_{n=1}^{N-1}\beta_{2h}^{+}NTM_{ijht-1}^{+} + \sum_{n=1}^{N-1}\beta_{2h}^{+}NTM_{ijht-1}^{+} \times Income\ Group_i + \sum_{i=1}^{I}\beta_{3ih}^{-}NTM_{ijht-1}^{-} + \sum_{i=1}^{I}\beta_{3ih}^{-}NTM_{ijht-1}^{-} \times Income\ Group_i + \beta_{4h}c_{ijht-1} + \beta_{5h}C_{ijt-1} + \theta_{ht} + \varepsilon_{ijht} \quad (5)$$

Instead of using the categorical variable that signals the region of the imposing country, the variable $Income\ Group_i$ is used to construct an interaction term. $Income\ Group_i$ is a categorical variable that allows the researcher to disaggregate the main result between different groups, based on income. The classification of the groups is based on information from the World Bank. There are 4 groups in total: low income, lower middle income, upper middle income and high income. The results of the estimation of equation 5 are shown in column 2 of table 3. In these results the high income countries form the omitted group.

To start off, I will discuss the marginal effects of export-supporting NTMs on trade, disaggregated at the income-level. We find that high income countries impose the most efficient export-supporting. Imposing 1 additional export-supporting NTM by a high income country is associated with an increase in export from the imposing to the affected country of 0.06%. This effect is significant at the 1%-level. For upper middle income countries, we find a

coefficient of -0.0002 which is significant at the 10%-level. This means that 1 additional export-supporting NTM imposed by an upper middle income country is associated with 0.04% higher exports. The significance of the upper middle income coefficient means that the marginal effect of export-supporting NTMs on trade of high income and upper middle income countries are significantly different from each other. Looking at the coefficient of lower middle income countries, we find a significant coefficient of -0.0005. This means that the coefficient for the lower middle income countries significantly differs from the coefficient for high income countries. Additionally, a standard t-test shows that the coefficient for lower middle income countries is also significantly smaller than the coefficient for upper middle income countries. For low income countries there is unfortunately no available data, making a quantification of the effect of export-related NTMs on trade unfeasible. This means that the positive trade effects of export-supporting NTMs are concentrated among high and upper middle income countries.

Consequently, I will review the marginal effect of export-limiting NTMs on trade, using income groups to disaggregate the main results. A first look at the results shows a similar trend as we found for export-supporting NTMs. The absolute value of the coefficient for high income countries is the largest, followed by upper middle and lower middle income countries. Once again, there is no available data to estimate the effect for low income countries. The marginal effect for high income countries is -0.08%. This means that imposing 1 additional export-limiting NTM by a high income country is associated with 0.08% lower exports from the imposing to the affected country. This effect is significant at the 1%-level. For upper middle income countries this effect is -0.06%, significant at the 10%-level. This means that the marginal effect of an export-limiting NTM, implemented by a high income country is larger than a similar NTM, implemented by an upper middle income country. The coefficient for lower middle income countries is 0.0007 and is significant at the 1%-level. The marginal effect for lower middle income countries of -0.01% insignificantly differs from 0 using a standard t-test. Additionally, the coefficients for upper middle and lower middle income countries differ significantly using a standard t-test. To summarize, we find, similarly to the results for export-supporting NTMs, that the negative trade effects of export-limiting NTMs are concentrated among the high and upper middle income countries.

4.5 Income based aggregate effects

If experience in using export-related NTMs is an appropriate reason for geographical differential trade effects, it could also be argued that the most efficient country groups should also use export-related NTMs to impact their exports more significantly than less efficient countries. A country will always use as few policies to reach their goal as possible, due to possible externalities of their policy choices. If a country wants to impact their exports, it will choose the policy instrument that can will most efficiently change the bilateral trade. Following this reasoning, the more efficient high income countries are expected to use export-related NTMs to obtain a larger aggregate effect than lower middle income countries. Lower middle income countries are less efficient and are thus more likely to use alternative instruments to obtain their desired level of trade effects.

To verify whether high income countries use export-related NTMs to impact trade more significantly than lower middle income countries, a time-series of the aggregate effects over the 2007-2016 period is made using formula 3. The graphical representation of this time-series is shown in figure 3 below.

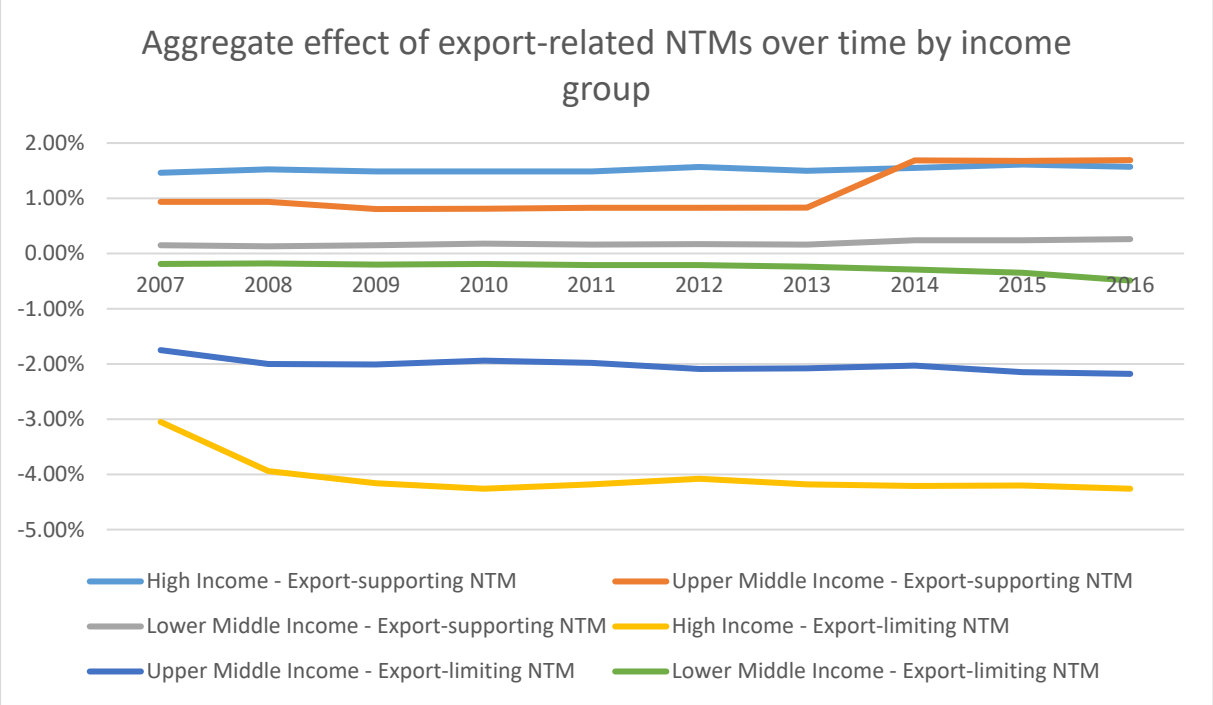

Figure 3: Time-series of the aggregate effects of export-related NTMs for the 2007-2016 period, disaggregated by income group. The different coloured lines refer to different sub-groups. The legend at the bottom explain what line refers to what sub-group. The calculation of the aggregate effect is performed using formula 3.

Looking at figure 3, we find that for all income groups the aggregate effects of export-supporting NTMs are strictly positive and the aggregate effects for export-limiting NTMs are strictly negative. For the export-supporting NTMs we see that the lower middle income countries have the lowest aggregate effects throughout the entire sample period. The effect is very close to 0 which is expected, since the marginal effect of export-supporting NTMs is small and insignificant for the lower middle income countries. The aggregate trade effect for upper middle income countries is lower than for high income countries during the 2007-2013 period. After 2013, however, the aggregate effect is similar for both upper middle income countries and high income countries. This change coincides with the accession of several new member states to the WTO. A possible reason for this phenomenon could be that the difference between upper middle and high income countries becomes smaller over time. It also supports the finding that that the significant marginal trade effect of export-supporting NTMs are found among the high income and upper middle income countries. On average the aggregate effects of export-supporting NTMs for high, upper middle and lower middle income countries are 1.52%, 1.10% and 0.18% respectively.

Looking at the aggregate effects for the export-limiting NTMs we see that the line for the lower middle income countries stays close to 0 throughout the entire sample period. The last few years however, there seems the be somewhat of an increase of the absolute aggregate effect for the lower middle income countries. Whether this trend continues will have to be studied in later studies that have newer data available to them. The insignificance of the aggregate effect for lower middle income countries matches the results of the marginal effects. The aggregate effects of the upper middle and high income groups are consistent with an experience based explanation of geographical differential effects. The aggregate trade effect for high income countries are larger than those for upper middle income countries throughout the entire sample period. On average the aggregate effects of export-limiting NTMs for high, upper middle and lower middle income countries are -4.05%, -2.02% and -0.26%, respectively.

5. Conclusion

This paper shows that Non-Tariff Measures that target a country's exports are effective at reaching their goal. NTMs that are aimed at supporting exports are associated with a larger bilateral trade flow and NTMs that are meant to limit export are associated with a smaller bilateral trade flow. More specifically, when a country implements 1 additional export-supporting or export-limiting NTM, the exports of the implementing country change by 0.04% and -0.05%, respectively. The average aggregate effect of export-related NTMs is 1.25% for export-supporting NTMs and -3.05% for export-limiting NTMs.

Disaggregating the results by geographical region shows that these trade effects are not found all over the world. Export-limiting NTMs from countries from the Sub-Saharan Africa and South Asia regions are not found to have any significant effect on trade. Export-supporting NTMs from countries in the Sub-Saharan Africa region have also not been shown to significantly impact trade. The most efficient NTMs are those implemented by countries from the regions Europe & Central Asia and North America. The marginal effect of export-supporting NTMs from these regions is 0.08% and 0.07%, respectively. For export-limiting NTMs these effects are -0.08% for both regions.

These geographical differential trade effects are possibly caused by experience with and knowledge about implementing NTMs most efficiently. For that reason, the results are disaggregated by income groups, since richer countries have been trading internationally for relatively the longest amount of time. The disaggregated results based on income groups show that the trade effects of export-related NTMs are concentrated among the high income and upper middle income countries. These results are an indication that support possible 'learning by doing' effects. As mentioned, these results are merely an indication that learning by doing could be the reason for geographical differential trade effects. For that reason I would recommend future research to study more directly the exact influence of knowledge and experience on the marginal effectiveness of export-related NTMs.

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Appendix A

Appendix A: this table reports the countries that are present as exporters the dataset.

Argentina	Malaysia
Australia	Mauritania
Bahamas	Mexico
Bahrain	New Zealand
Brazil	Oman
Cameroon	Papua New Guinea
Canada	Philippines
China	Qatar
Ethiopia	Russia
European Union	Suriname
Ghana	Switzerland
India	Thailand
Japan	Tunisia
Kazakhstan	Turkey
South Korea	United Arab Emirates
Kuwait	United States
Kyrgyz Republic	Vietnam
Laos	