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The Evolution of Non-Tariff Measures and their Diverse Effects on Trade

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The Evolution of Non-Tariff Measures and their Diverse Effects on Trade

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Abstract

The global trade slowdown and the public resistance against attempts to stimulate trade through mega-regional trade deals are placing the role of non-tariff measures (NTMs) in the limelight of public discussions. In this paper, we examine the question how different types of non-tariff measures affected global trade during the period 1995-2014. We use information on NTMs notified to the WTO from the Integrated Trade Intelligence Portal (I-TIP), which allows us to differentiate between various NTM types, including technical barriers to trade (TBTs) and sanitary and phytosanitary (SPS) measures. The two main contributions of this work are the amendment of the I-TIP database to suit econometric analysis and the estimation of trade effects of NTMs at the HS 6-digit product level for more than 100 countries with a gravity approach. Roughly 60% of all estimates point towards a trade-impeding effect of NTMs. Aggregates by NTM-imposing countries and targeted products suggest that the positive effect on the demand side compensates the negative impact on the surging costs of the supply side for SPS measures. TBTs overall appear to be trade-impeding, in particular for high-income countries in Europe and Central Asia.

Keywords: non-tariff measures, trade barriers, global trade, trade elasticity, gravity model, I-TIP

JEL classification: F13, F14

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1. Introduction

Trade agreements and non-tariff measures (NTMs) have been taking centre stage in public debates of industrialised countries since the onset of negotiations of the Comprehensive Economic and Trade Agreement (CETA) in 2009 between Canada and the European Union (EU), and even more so with the start of negotiations of the Transatlantic Trade and Investment Partnership (TTIP) in 2013 between the United States and the EU.

The importance of tariffs as trade policy tools is decreasing as tariff rates have already considerably declined over the last two decades. This is particularly true for intra-industry trade between developed countries such as Canada, the EU and the US. At the same time, the number of different types of non-tariff measures being applied is increasing. Some literature therefore studies the question whether these relatively new forms of trade policy tools might serve as substitutes for previously negotiated tariff cuts (e.g. Beverelli et al., 2014; Aisbett and Pearson, 2012; Moore and Zanardi, 2011).

By their nature, NTMs cannot be easily compared to tariffs. Typically, they do not only serve as trade policy tools but also serve other purposes, such as the protection of human, animal and plant life. For this reason, fears are articulated in the public that deep trade agreements such as CETA or TTIP might lead to an erosion of standards. Not only the general public but also economists are divided in two camps regarding the question whether NTMs should or should not be on the negotiation table.

In light of the recently experienced trade slowdown, economists who believe that increased international trade is contributing to higher living standards argue for a reduction or harmonisation of NTMs[1] to stimulate trade which has been stagnating since 2011 (e.g. Cadot et al., 2015; Francois et al., 2015; Baldwin and Evenett, 2009). Those who believe that trade has a negative impact on economic prosperity argue not to conclude (in the case of TTIP) or ratify (in the case of CETA) further trade agreements.

Both sides, however, usually presume that NTMs are reducing trade, which – as we shall argue – is not necessarily the case. Only recently, trade economists have started to acknowledge that non-tariff *measures* need not be non-tariff *barriers* (NTBs). For some types of NTMs, such as quotas and prohibitions, the effect on bilateral trade is indisputably negative. Yet, other NTM types, e.g. sanitary and phytosanitary (SPS) measures, bear the potential of quality upgrading, which could boost trade. Likewise, some technical barriers to trade (TBTs) such as labelling requirements provide additional information to consumers, potentially shaping consumption patterns and increasing trust, which might be trade-promoting. The WTO (2012) World Trade Report, which was dedicated to NTMs, concluded that these measures could increase international trade whenever the positive effect on the demand side is bigger than the negative impact on the supply side.

This paper aims at shedding light on the question whether non-tariff measures have been decreasing trade between the mid-1990s and today. The basis of our investigation is constituted by a data compilation of NTM notifications to the WTO, accessible via the Integrated Trade Intelligence Portal

[1] For research on harmonisation of standards and consumer preferences see e.g. Sawyer et al (2008).

(I-TIP). A flaw of this rich dataset is that it is not fully available in a form necessary for econometric analysis, i.e. following a panel structure where NTMs are distinctly assigned to products according to a product classification such as the Harmonised System (HS).

The contribution of our paper is therefore at least twofold. First, it enhances the value of the WTO I-TIP database[2] for econometric analysis of NTM notifications by imputing missing product codes at the HS 6-digit level. Second, we use this extended dataset to estimate the trade elasticity with respect to NTMs for more than 100 importers and over 5,000 products at the HS 6-digit product level over the period 1995-2014.

The remainder of this paper is structured as follows. Section 2 describes the information on NTMs available to us. It further describes the types of NTMs and their differences along country and product characteristics. Section 3 describes the methodology to estimate the impact of different forms of NTMs on import quantities. Section 4 presents empirical results, and the final section concludes. The appendix describes the WTO I-TIP data compilation and upgrading process.

[2] The NTM database as well as estimated trade effects are publicly available: https://wiiw.ac.at/opendata.html.

2. The structure of NTMs

Despite the growing importance of non-tariff measures in international trade, data on non-tariff measures usable for econometric analysis are still scarce. Many researchers set up their own NTM datasets to answer their research questions for specific products, NTM types and countries (e.g. Li and Beghin, 2014; Peterson et al., 2013). One of the first types of NTMs for which a comprehensive database covering a wide range of countries and products traceable over time was collected was antidumping. The databases compiled by Bown (2007) on antidumping measures and later also on other temporary trade restrictiveness indicators are provided by the World Bank (Bown, 2016). Recently, joint efforts were made by the World Bank, UNCTAD, ITC, the WTO and regional development banks to collect data for more types of NTMs and a broader set of countries with special focus on filling the data gaps for developing countries. One of these data collection efforts resulted in the cross sectional CEPII dataset 'NTM-MAP' (Gourdon, 2014) used to evaluate the impact of non-tariff measures (e.g. Cadot and Gourdon, 2016).

A promising data source allowing also for a panel structure of NTM data is the Integrated Trade Intelligence Portal (I-TIP[3]) of the WTO. It is intended to serve as a platform providing all information compiled by the WTO on trade policy measures ranging from regional trade agreements over WTO accession commitments to tariffs and non-tariff measures. We focus on the subsection 'I-TIP Goods', which provides all information on NTMs notified to the WTO that apply to merchandise trade. For simplicity, we will henceforth refer to this subsection as I-TIP database.

2.1. TYPES AND EVOLUTION OF NTMs

The dataset available to us[4] covered the period 1979 to March 2016. It comprised 44,450 measures that have been notified to the WTO secretariat since 1979. The last notification refers to a technical barrier to trade (TBT) initiated by Egypt on 23 March 2016 on vehicles.

For each notification the I-TIP database offers information on the imposing countries, the targeted partner countries and additional information on the NTM imposed. It covers 140 WTO members as NTM-imposing countries or territories, while the countries affected by these measures include also non-members, amounting to 176 trade partners. In addition, there are measures that apply to all trading partners, for which the partner name 'all members' is assigned.

In our analysis we consider seven[5] different forms of NTMs[6] and specific trade concerns (STCs) raised against two NTM types. Public debates on NTMs and consumers' concerns are usually addressing

[3] WTO I-TIP database online: https://www.wto.org/english/res_e/statis_e/itip_e.htm

[4] We are grateful for technical assistance provided by Joaquin Montes at the Economic Research and Statistics Division (ERSD) of the WTO and helpful comments and guidance by Jürgen Richtering, Head Market Access Intelligence Section at ERSD.

[5] In addition, our database includes the NTM types (i) export subsidies (EXS), (ii) tariff-rate quotas (TRQ), (iii) state trading enterprises (STE), (iv) pre-shipment inspection (PSI) and (v) import licensing (LIC), with the former four mainly

sanitary and phytosanitary (SPS) measures, which primarily target the agri-food sector, and technical barriers to trade (TBTs), which to a great extent aim at the manufacturing sector. The literature on the impact of these measures is quickly growing, mainly with a focus on one specific product and/or region (e.g. Dal Bianco et al., 2016; Arita et al., 2015; Gelan and Omore, 2014; Peterson et al., 2013). These two types of NTMs are notified most frequently to the WTO (see Figure 1), but – as we shall argue later – are not necessarily the most trade-restrictive ones.

(i) SPS measures aim at protecting human, animal and plant life and can take different forms. If products or characteristics thereof pose a threat to human, animal or plant health, countries can impose temporary prohibitions or restrictions, e.g. in the case of areas affected by avian flu. They can also take the form of standards, e.g. tolerance limits for residues of substances in foodstuffs, labelling or hygienic requirements related to food safety. A recent example is a bilateral SPS measure of the EU, blocking the import of dried beans from Nigeria due to pesticide residues at levels exceeding the reference dose as stated by the European Food Safety Authority.[7] However, SPS measures need not address a single product or specific exporting country. The EU, for example, takes measures to prevent the spread of transmissible diseases, such as spongiform encephalopathies[8]. More than 30% of all NTM notifications in our dataset concern SPS measures.

(ii) Technical barriers to trade (TBTs) can take similar forms as SPS measures (prohibition, labelling requirements etc.), but serve a different purpose. An example is an energy labelling requirement for storage cabinets, including those used for refrigeration. The stated aim of the EU is to pull the market towards more environmentally friendly products by providing more information to end-users.[9] While SPS measures mainly target the agri-food sector, TBTs typically affect the manufacturing sector, especially machinery and electrical equipment. TBTs form the biggest group of NTM notifications in our dataset with a share of more than 45%.

We also consider specific trade concerns (STCs) raised at the SPS and TBT committees of the WTO. Member countries of the WTO can raise questions regarding other WTO members' proposed NTMs or their implementation of NTMs. Unfortunately, the reporting of NTMs to the WTO is not complete and sometimes the imposing country becomes reluctant in notifying the imposed NTM, especially when the measure is very trade-restrictive or when it is concealing some discriminatory protectionism. Therefore, it is not easy to match all the STC notifications to their imposed NTMs that are directly notified to the WTO.

In the case of TBTs, 306 STCs can be matched to notified TBTs, meaning that there are 306 TBTs for which an STC was raised at least by one trade partner. However, it is not clear in the TBT database which countries raised concerns on those TBTs. In addition, there are 393 TBT STCs for which we

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applicable to the period prior to the establishment of the WTO and the latter lacking information on the date of initiation and entry into force.

6 A detailed classification of types of NTMs, including examples, is provided by UNCTAD (2013): http://unctad.org/en/PublicationsLibrary/ditctab20122_en.pdf.

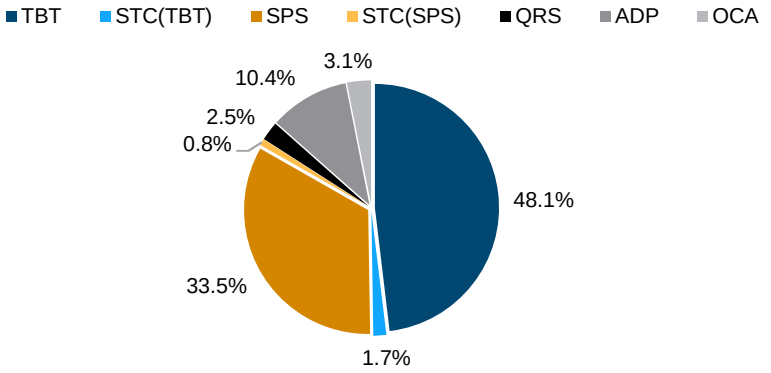
7 WTO Document: G/SPS/N/EU/131, 29 June 2015.

8 WTO Document: G/SPS/N/EU/67, 4 March 2014.

9 WTO Document: G/TBT/N/EU/178, 28 January 2014.

cannot easily match corresponding notified TBTs. With respect to SPS measures, we find 170 SPS notifications directly notified to the WTO against which STCs were raised by at least one country, while 179 concerns are not directly linked to SPS measures. Adding up STCs regarding SPS measures and those regarding TBTs, this group represents 2.5% of all notifications in our data.

Figure 1 / NTM notifications, by type



Source: WTO I-TIP, wiiw calculations. Note: Total number of notifications to the WTO up to March 2016.

(iii) A third group comprises the so-called counteracting measures, also known as contingent protection measures. Their purpose is to temporarily counteract the negative impact on the importing economy from increased imports. Within this group, antidumping (ADP) is the most prominent trade policy tool, accounting for about 10% of all notifications in our dataset. It is used to combat predatory dumping that causes damage to the domestic industry of the importing country. In case of price dumping (and a proof of the damage to the domestic industry), the importing country can impose antidumping duties, thereby increasing the import price and lowering imports.

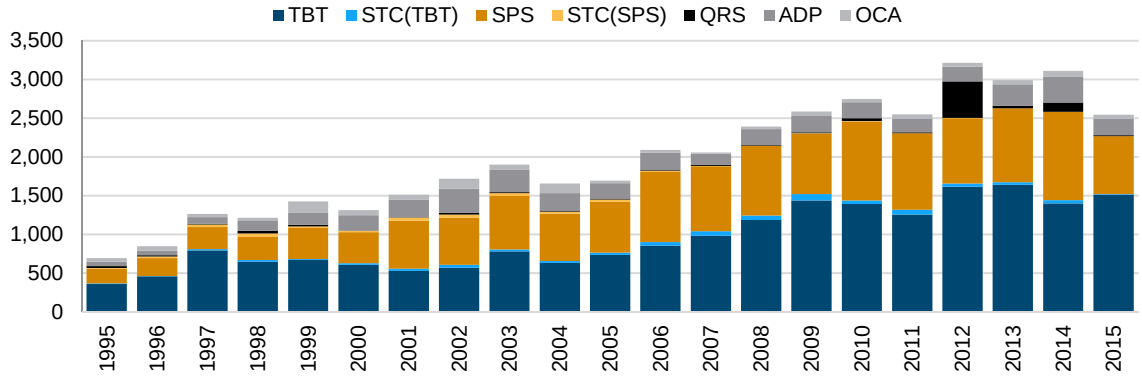
Another practice that is considered 'unfair' by WTO norms is to subsidise exports. In this case, the counteracting measures are called countervailing duties (CVDs). Safeguard measures (SGs) are temporary non-discriminatory policies that apply to a specific product but to all exporters of this product in order to facilitate the importing economy to adjust to a strong increase of imports. Special safeguards (SSGs) apply to agricultural products on a bilateral basis in response to a rise in imports or a fall of import prices. Throughout the paper, notifications of these three types of contingent protection are often summarised as 'other counteracting measures' (OCAs) due to their small number. Around 1.5% of all notifications are attributable to SSGs, while SGs and CVDs account for a share of 0.9% and 0.8%, respectively.

(iv) In addition to the relatively new NTM types described above, the WTO I-TIP database also covers traditional NTMs such as licencing, quotas or prohibitions, which we refer to collectively as quantitative restrictions (QRs), representing merely 2.5% of the notifications.

The evolution of NTM notifications (Figure 2) further highlights the increasing importance of non-tariff measures over time, particularly for TBTs and SPS measures. The last years saw a strong increase in TBT and SPS notifications, culminating at a record high of 1,640 new TBT notifications in 2013 and 1,137 new SPS notifications in 2014. Contrasting these figures with the number of specific trade

concerns raised at the WTO, we could argue that there were reservations against 2.5% and 3.5% of all SPS and TBT notifications, respectively.

Figure 2 / Number of NTM notifications per year



Source: WTO I-TIP; wiiw calculations. Note: STC summarises specific trade concerns to the SPS and to the TBT committee. Figure for the year 2016 not shown as it comprises the first quarter (Jan. – Mar.) only.

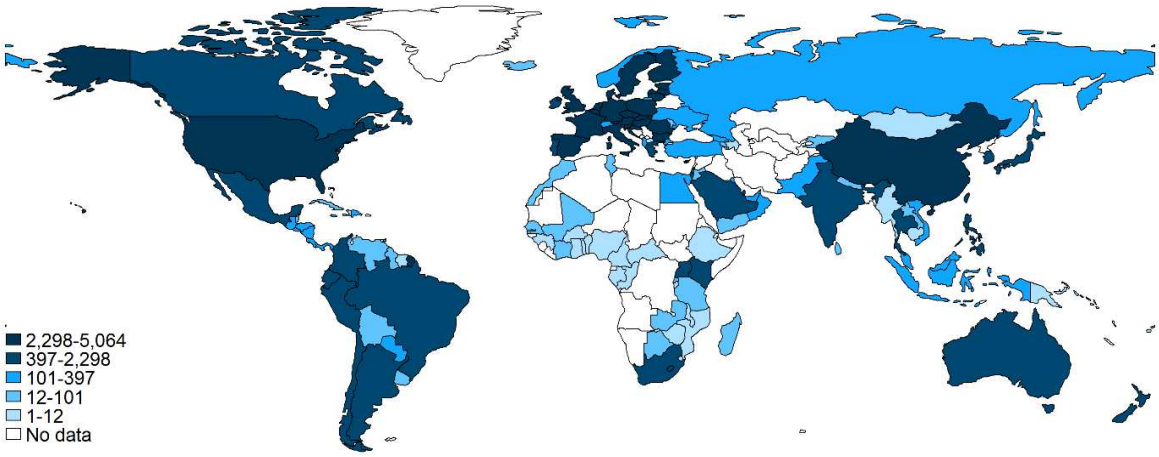
With more than 10% of all notifications, ADP represents the third largest group of NTMs. We note two peaks, in 2002 and again in 2014, with more than 300 notifications each. Other counteracting measures account for around 3% of all notifications. Since 2010 their figures have been driven by countervailing duties, for which an upward trend is observable, with a maximum of 49 notifications in 2014.
30 safeguard measures were notified in 2015. A clear downward trend is, however, visible for specific safeguards, which were heavily used in the late 1990s with 131 notifications in 1999 but have gradually dwindled since then. Quantitative restrictions amount to an even smaller share of around 2.5%. They, however, usually target a greater number of exporters than do counteracting measures, which changes the relative standing of quantitative restrictions when we translate the initial dataset of notifications into a bilateral format used for estimation. A sharp increase in QRs entering into force is observable for the year 2012. Out of 1,040 notified QRs, more than 300 are attributable to only three importing countries: Australia, Hong Kong and Thailand.

2.2. THE GEOGRAPHICAL COMPOSITION OF THE USE OF NTMs

As the I-TIP data are a collection of notifications to the WTO, information on NTM-imposing countries is limited to WTO members. With the accession of Afghanistan on 29 July 2016, the WTO counted 164 members. Our investigation covers the period 1995-2014. During that time the WTO grew from 127 (126 countries plus the European Union) to 160 members. However, the I-TIP database covers only 140 members, as depicted in Figure 3. The top 5 NTM-imposing WTO members are (in descending order) the United States, China, the European Union, Brazil and Canada with more than 1,800 notifications each.

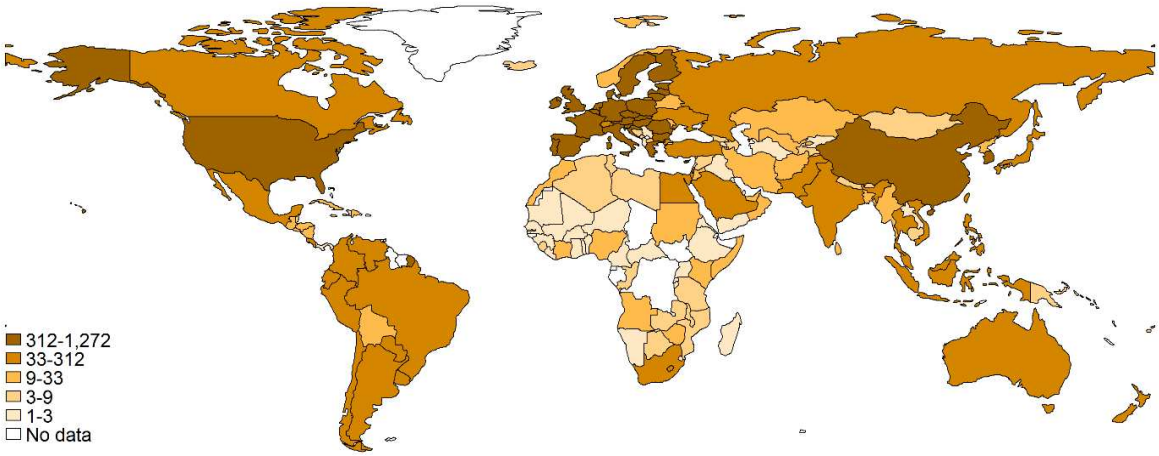
The geographical distribution of countries and territories affected by NTMs is shown in Figure 4, covering 176 trading partners (excluding NTMs applicable to all exporting countries). In our dataset, TBTs exclusively target all trading partners. Given that they also represent about half of all notifications, the entity ‘all partners’ is ranked first. The country most frequently targeted by NTMs is China, followed by the United States, South Korea, the European Union, and Taiwan.

Figure 3 / Countries imposing NTMs



Source: WTO I-TIP; wiiw calculations. Note: Sum over all NTM types (TBT, SPS, QR, ADP, CVD, SG, and SSG) including specific trade concerns; up to March 2016. Colour scheme represents quintiles of the NTM distribution.

Figure 4 / Countries targeted by NTMs



Source: WTO I-TIP; wiiw calculations. Note: Sum over all NTM types (TBT, SPS, QR, ADP, CVD, SG, and SSG) including specific trade concerns; up to March 2016. Colour scheme represents quintiles of the NTM distribution.

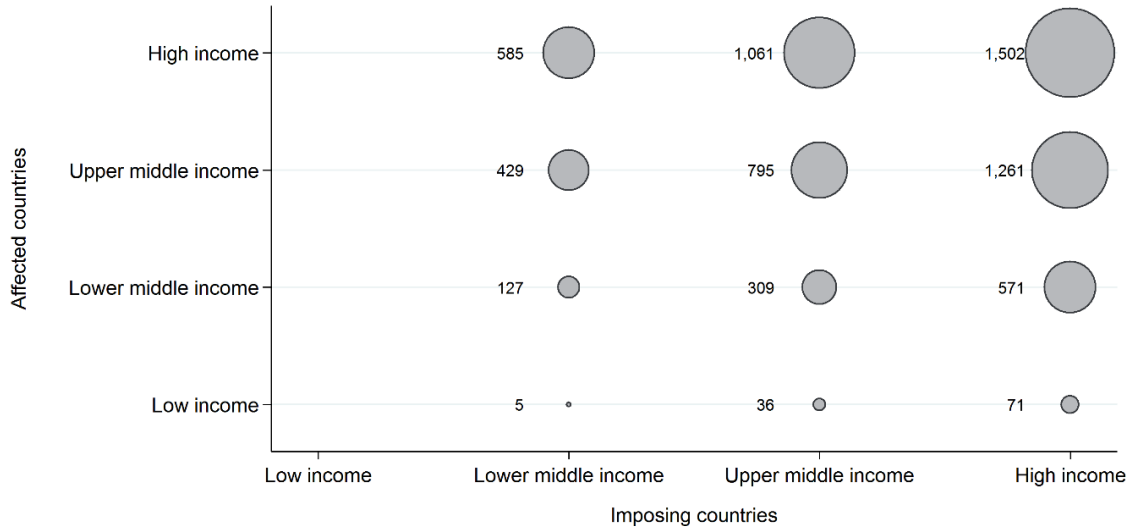
Although there is no perfect fit, Figure 3 and Figure 4 already indicate that richer countries tend to belong to the heaviest users of NTMs, but simultaneously are most frequently targeted by NTMs. One argument is that developed countries can afford and therefore ask for higher standards for products they consume. On the other hand, the dominance of high-income countries in our data is also influenced by differences in reporting, with respect to both accuracy as well as completeness of reporting. Some countries report every NTM applicable, whereas others report only NTMs which depart from international standards.

In Figure 5 we visualise this pattern for NTM notifications in force in 2014. Using the income group classification of the World Bank published in July 2015[10], we group countries in our data into low-, lower-middle-, upper-middle- and high-income countries. For NTM notifications issued by or addressing the

[10] See http://siteresources.worldbank.org/DATASTATISTICS/Resources/CLASS.XLS, accessed July 2015.

European Union as a whole, we assigned the high-income group to the EU. We exclude NTMs addressing all trading partners, which drops TBTs and safeguards from the picture and greatly reduces the number of SPS measures. It also erases NTMs imposed by low-income countries from the picture. What is left are notifications addressing specific countries or regions, predominantly ADP and STCs. We see a strong concentration of NTMs on upper-middle- and high-income countries. While the former are facing the largest number of ADP measures, the greatest number of specific trade concerns is raised against the latter.

Figure 5 / NTMs in force in 2014, by income group of the imposing and affected countries



Source: WTO I-TIP; wiiw calculations. Note: Not including NTMs imposed against all trading partners. Including STCs. When NTMs were issued by or targeting the European Union as a whole, we counted the EU as one single high-income region.

2.3. THE DISTRIBUTION OF NTMs BY PRODUCT CHARACTERISTICS

Further information on NTMs accessible through the I-TIP database includes the type of measure and a descriptive summary of the measure. For SPS measures and TBTs an additional variable lists 72 and 58 keywords[11], respectively, to describe the issues covered by the measure.

'Sub-requirements' further describe the nature of the NTM in question: SPS measures can be reported as regular notifications or as a response to emergency. For special safeguards this variable informs whether the measure is price- or volume-based. For safeguards it describes whether they take the form of specific, ad valorem, or variable tariffs, quotas, or tariff rate quotas. Quantitative restrictions can also apply in different ways. Sub-requirements tell us whether the importer makes use of non-automatic licensing, a ban, a prohibition with exceptions under defined conditions, a global quota, or a voluntary export restraint.

If available, the I-TIP database also presents information on the date of initiation[12], the date of entry into force and, if applicable, the date of the withdrawal of the measure. Notifications also include a product

[11] See Appendix 3 for SPS keywords and Appendix 4 for TBT keywords.

description, but for less than half of all notifications corresponding HS codes. For 18,411 notifications, HS codes of targeted products (ranging from HS 2-digit to HS 12-digit levels) were notified.[13] The first goal of our work was to enhance the usability of the rich I-TIP database for economic analysis by matching missing HS codes.[14]

Table 1 / Composition of HS sources by NTM type

HS Codes	TBT	STC_{TBT}	SPS	STC_{SPS}	QR	ADP	OCA	Total	%
Original notification	5,704	131	8,377	303	823	1,981	1,092	18,411	43.6%
WTO interpreted	4,212	46	552	2	199	0	0	5,011	11.9%
Further matching	4,360	260	2,426	18	0	2,146	161	9,371	22.2%
Missing	6,029	262	2,768	26	18	257	61	9,421	22.3%
Total	20,305	699	14,123	349	1,040	4,384	1,314	42,214	100.0%

Source: WTO I-TIP, wiiw calculations.

As Table 1 shows, there exist 5,011 WTO interpreted HS codes which we make use of. These fill the gap for 12% of our observations. These product codes are typically interpreted by WTO members (in particular trading partners facing the NTMs). The accuracy of these codes therefore cannot completely be accredited to the WTO Economic Research and Statistics Division (ERSD).[15]

Our additional steps complement missing product information for another 9,371 notifications. In particular, three steps proved very useful. The comparison of product descriptions led to the imputation of HS codes for 11% of all notifications. A comparison with the *Temporary Trade Barriers Database* (TTBD) compiled by Bown (2016) and published by the World Bank added another 2%. Improvements of this step mainly addressed notifications up to the year 2008. Since then, all information provided by TTBD can be found within the I-TIP database. Another 6.6% of all NTM notifications could be paired with HS codes through a string set comparison of the product description.[16]

Our work effectively reduces the share of notifications with missing HS codes from more than 55% to less than 25%. The NTM types with the highest proportion of missing HS codes were TBTs (72%), followed by ADP (55%) and SPS measures (41%). For QRs and OCAs, 21% and 17% of notifications, respectively, did not include product codes. We substantially reduced these figure as depicted in Figure 6.

12 For some notifications, either the date of initiation or entry into force is missing. Although measures should be notified before they enter into force, the database contains also measures that were implemented before they were notified to the WTO.

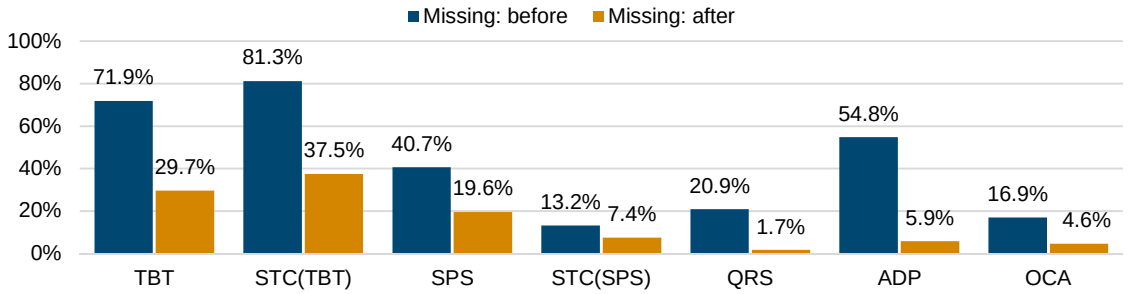
13 Unfortunately it is not reported which HS Revision these reported codes refer to. Our baseline product classification is HS revision 1996. Using correspondence tables provided by the World Integrated Trade Solution (WITS) online platform, we convert all product codes of earlier and later revisions to HS 1996.

14 The steps applied to fill the missing information on HS codes are described in the Appendix.

15 Discussions at the second PRONTO workshop in Amsterdam (27-28 May 2015) revealed that data provided by WTO I-TIP correspond to information provided by the NTM-imposing and notifying importing country. WTO interpreted HS codes refer to product codes reported by WTO members and not interpreted by ERSD. Moreover, in spite of the information provided on the date of withdrawal of a measure, there is no solid information whether the NTM indeed does no longer apply.

16 See the Appendix for further explanations and references.

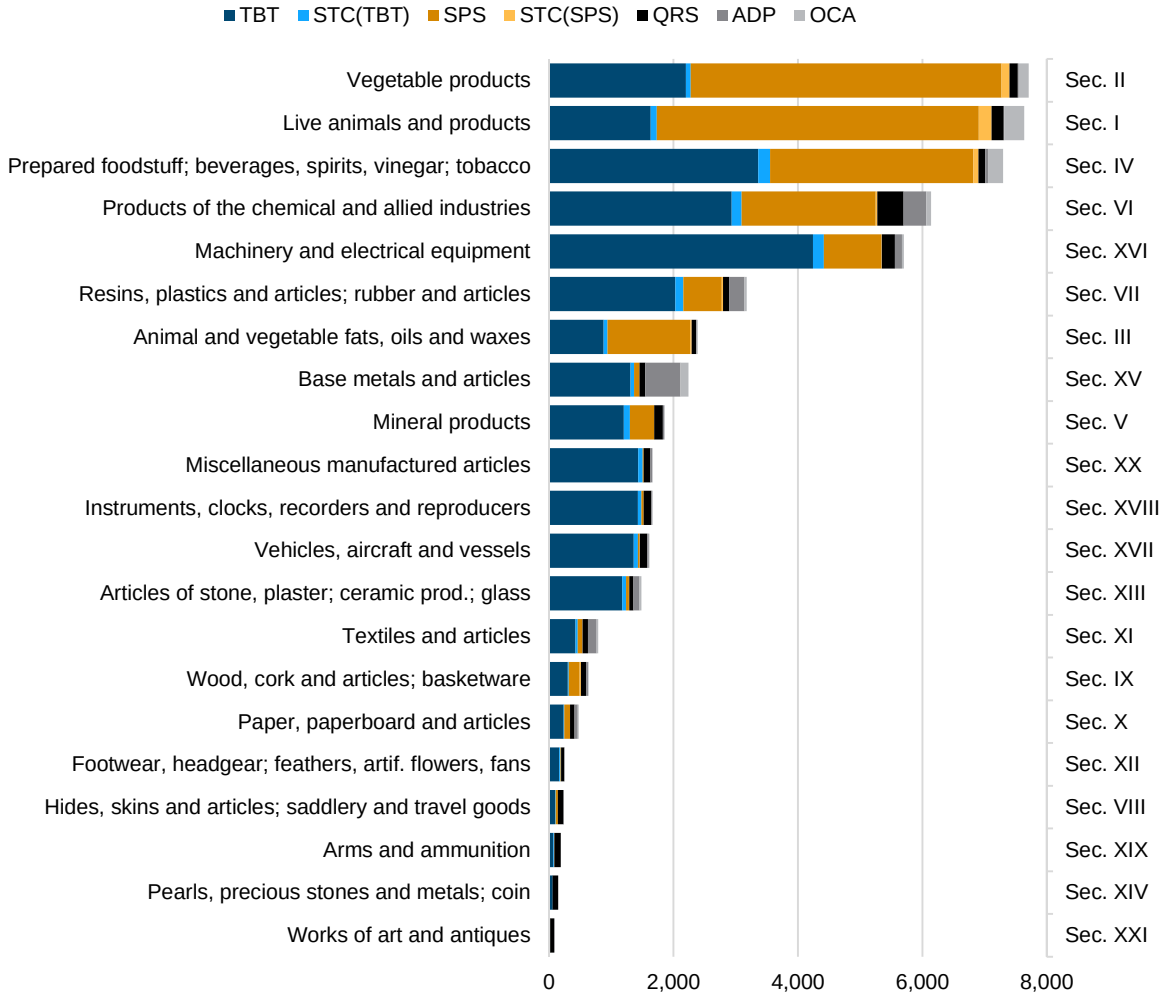
Figure 6 / Notifications with missing HS codes before and after our matching exercise



Source: WTO I-TIP, wiiw calculations.

From now on we focus solely on those notifications for which we could eventually gather information on the products targeted by NTMs. Having this new dataset at hand, an obvious first question to be asked is, which products are primarily subject to NTMs and to which types of NTMs?

Figure 7 / NTMs applying in 2014, by NTM type and HS product section



Source: WTO I-TIP, wiiw calculations.

Splitting NTM notifications according to the 21 product sections of the Harmonised System[17], it is evident from Figure 7 that the three product groups facing the highest number of NTMs in 2014 belong to the agri-food sector, with live animals ranked first, followed by vegetable products, beverages and prepared foodstuffs. Remembering that the primary purpose of SPS measures is to protect human, animal and plant life, it is not surprising that this type is dominating NTM notifications addressing agri-food goods.

Products of chemical industries as well as the HS group formed by machinery and electrical equipment still face more than 5,000 notifications each. They are also subject to SPS measures, however, TBTs form the primary NTM type. Most of the quantitative restrictions (QRs) and a significant number of ADP in our data could be assigned to these two product categories and base metals.

[17] As some notifications apply to products of separate sections simultaneously (e.g. to vegetable products and prepared foodstuff) and therefore feature in multiple sections, the sum of notifications over all sections exceeds the number of notifications reported to the WTO.

3. Gravity framework to estimate the impact of NTMs on trade

The second contribution of our work is the evaluation of the impact of NTMs on import quantities using the complemented I-TIP database. To do so, we amend a standard-like gravity framework to allow for the estimation of importer-specific effects of NTMs:

$$ln(m_{ijht}) = \beta_{0h} + \beta_{1h}\ln(1+t_{ijht_{-1}}) + \sum_{n=1}^{N-1}\beta_{2h}^{n}NTM_{ijht_{-1}}^{n} + \sum_{i=1}^{I}\beta_{2ih}^{n'}\,\omega_i NTM_{ijht_{-1}}^{n'} + \beta_{3h}c_{ijht_{-1}} + \beta_{4h}C_{ijt_{-1}} + \omega_{\mathrm{ijh}} + \omega_{\mathrm{ht}} + \mu_{\mathrm{ijht}}, \quad (1)$$

$$\forall h;\ \forall n, n' \in \{ADP, CVD, SG, SSG, SPS, TBT, QRS; STC_{SPS}, STC_{TBT}\}\ where\ n' \neq n$$

Equation (1) is estimated for each product h at the 6-digit level of the Harmonised System (HS). Imported quantities of product h to country i from exporting partner country j at time t are denoted as m_{ijht}. Trade policy instruments included in the regression analysis are tariffs t_{ijht-1} in the form of ad valorem tariff rates (using UNCTAD 1 methodology[18]) and non-tariff measures $NTM_{ijht_{-1}}^{n}$ as described above.

The NTM variables show the cumulative number of NTM regulations notified to the WTO which are in force[19] at a specific point in time. Where information on the date of entry into force is not available, the date of initiation is used. As we are interested in importer-specific effects of NTMs, we further interact the NTM variables with importer dummies ω_i. Two coefficients capture the effect of NTMs on imports: $\beta_{2ih}^{n'}$ quantifies the importer-specific impact of one NTM type n' under consideration, while β_{2h}^{n} controls for the effect of all other NTM types in place. The procedure is repeated for all seven NTM types and two sorts of specific trade concerns, such that our final results are a collection of all importer-specific coefficients $\beta_{2ih}^{n'}$ for all NTM types.

We opted for lagging the trade policy variables by one period for two reasons. The first rationale is that we expect demand, in particular for intermediate products, to not react immediately after policy changes are introduced. The second reason concerns the very nature of contingent protection. Antidumping or counteracting measures as well as (special) safeguards only apply when imports are already strongly increasing and potentially damaging to the domestic industry. If we did not consider a lag, our results for counteracting measures would suffer from an endogeneity bias. Coefficients could pick up the prior import-increasing effect, e.g. price dumping by the exporting country, rather than the effect of the NTMs imposed as a reaction to the import influx by the importing country. We expect this endogeneity bias to be markedly reduced by lagging the policy variables by one period.

[18] See: http://wits.worldbank.org/wits/wits/witshelp/Content/Data_Retrieval/P/Intro/C2.Ad_valorem_Equivalents.htm.

[19] The I-TIP database provides the date of withdrawal for ADP and CVD measures and end dates for some QRs, SGs and SSGs. For other types of NTMs this information is not available. For our analysis, we assume that they have not been withdrawn since.

In addition to trade policy variables, we control for country-pair characteristics that are changing over time. The variable $c_{ijht_{-1}}$ includes a measure for the market potential, i.e. the sum of trading partners' GDPs (Equation 2). We also consider an index amended from Baltagi et al. (2003) to account for the differences between trading partners of a specific product h with respect to real GDP per capita (Equation 3). Furthermore, we take the (dis)similarities of trading partners with respect to three factor endowments into account, i.e. labour *L*, capital stock *K,* and agricultural land area *A*, relative to GDP (Equation 4).

$$Y_{ijt} = \left(GDP_{it} + GDP_{jt}\right) \tag{2}$$

$$\left(\frac{GDPpc_{it}^2}{\left(GDPpc_{it} + GDPpc_{jt}\right)^2} + \frac{GDPpc_{jt}^2}{\left(GDPpc_{it} + GDPpc_{jt}\right)^2}\right) - \frac{1}{2} \tag{3}$$

$$f_{kijt} = ln\left(\frac{F_{kjt}}{GDP_{jt}}\right) - ln\left(\frac{F_{kit}}{GDP_{it}}\right), F_k \in \{L, K, A\} \tag{4}$$

Other control variables are summarised in $C_{ijt_{-1}}$. It includes dummy variables indicating (i) whether the importer and the exporter are members of the WTO, or (ii) whether they are both members of a Preferential Trade Agreement (PTA).

With Equation 1 being estimated for each product h, the constant $\beta_{0\mathrm{h}}$ represents product fixed effects. Time fixed effects ω_{th} aim at taking up economic shocks influencing all trading partners. Country-pair fixed effects ω_{ijh} should account for time-invariant country-pair characteristics such as their geographical distance, whether they are neighbouring countries, share a common language or colonial history. Finally, μ_{ijht} constitutes the error term.

The complemented I-TIP database on NTM notifications to the WTO translated into a panel data format is the core dataset of our analysis. The Appendix describes the steps with which this dataset was amended to suit econometric analysis. Substantial effort has been undertaken to match missing product codes at the HS 6-digit level to each notification. Although we have information on some NTMs that have been initiated since 1979, the data before 1995 are very incomplete. Even in the early years of the WTO, product descriptions and general information on NTMs were imprecise as members still had to gain experience with the reporting system. The quality of the NTM notification data as well as our interest in transition economies, for which data in general, and trade data in particular, are only available since the mid-1990s, gave rise to restricting our analysis to the period 1995-2014.

Information on ad valorem tariffs is available in the Trade Analysis Information System (TRAINS) database and the WTO Integrated Data Base (IDB) via the World Integrated Trade Solution (WITS) online platform. If applicable and available, preferential tariff rates entered our dataset. Otherwise, we referred to the most-favoured-nation tariff rates, or the effectively applied tariff rates.

Import data were retrieved from the Commodity Trade Statistics Database (COMTRADE) and the Trade Analysis Information System (TRAINS) database. The latest update of the Penn World Tables (9.0) offers data on factor endowments (labour force and capital stock) and GDP up to the year 2014 (Feenstra et al., 2015). The third factor endowment we include in our analysis is agricultural land, for which data are available from the World Development Indicators (WDI) database of the World Bank. Variables on membership to the WTO and Preferential Trade Agreements (PTAs) were set up according to information provided by the WTO.

4. Quantifying the impact of NTMs on trade quantities

To start with our analysis we set up a panel dataset of bilateral import flows between WTO members and their trading partners for all products at the HS 6-digit level during the period 1995-2014. We then estimate the effect of NTMs on import quantities, i.e. $\partial ln(m_{ijht})/\partial NTM^{n'}_{ijht_{-1}}$, of Equation 1, using the Poisson maximum likelihood estimator proposed by Santos Silva and Tenreyro (2006). Throughout we exclude intra-EU trade flows. The main argument to do so stems from the structure of our NTM database: Although we do observe the *quantity* of NTMs imposed by countries, we do not observe the degree of heterogeneity – or, in the case of the EU, homogeneity – of the *quality* of NTMs. As NTMs for EU Member States are typically set at the EU level, the inclusion of bilateral NTMs for EU members would lead to a downward bias of our estimation results.

Our estimation output covers 5,049 products and 131 importers, resulting in 326,346 importer-product pairs for which at least one NTM type applied[20] (Table 2). In our dataset, importers on average targeted 3,506 products with at least one type of NTM. 94% of importer-product pairs can be associated with three NTM types or less. For the majority of importer-product pairs (55%) only one kind of NTM applied. Another 28% of observations were targeted by two NTM types, 12% by three types. Yet there are also importer-product pairs for which we find that four (3.8%), five (1.5%), six (0.3%) or even seven (0.03%) NTM categories were used.

Affected products were imported on average by 73 importers. The greatest number of importing countries is recorded for birds' eggs in shell (fresh, preserved or cooked, HS 040700) with 116 importers, followed by seven other agricultural products[21] imported by 115 countries. For 83% of all importer-product pairs we were able to estimate related trade effects, out of which 67% (corresponding to 56% of all importer-product pairs) have shown to be significantly different from zero.

Table 2 / Sample composition

Stat	Obs	Mean	Median	Min.	Max.	% of Total
Number of importers per product	326,346	73	73	5	116	
Number of products per importer	326,346	3,506	3,873	1	5,023	
Number of estimated trade effects	269,999					82.7%
Number of estimated trade effects (sign.)	181,489					55.6%

Notes: Considering only importer-product pairs for which at least one NTM type applied.

[20] In Appendix 5 and Appendix 6 we show the distribution of NTMs and trade effects over all observations per NTM type, respectively.

[21] One meat product (HS 020736), five vegetable products (HS 070190, HS 070310, HS 070610, HS 070690, HS 070990), and fresh apples (HS 080810).

4.1. EMPIRICAL RESULTS: A FIRST OVERVIEW

In this chapter we aggregate our estimation results along similar dimensions as the descriptive part on our NTM data. It shall give an understanding of the importance of NTMs for trade flows on a global scale. Furthermore, we show some results at more disaggregated levels by presenting our findings for two specific HS 2-digit product categories – dairy and meat products – in subsequent sections.

The coefficients of our Poisson estimation procedure $\beta_{2ih}^{n'}$ show how much the log of import quantities $ln(m_{ijht})$ is expected to decrease or increase due to an additional NTM. In order to show the effects on import quantities, we transform our coefficients according to Equation 5, such that trade effects $TE_{ih}^{n'}$ can be interpreted as changes in percentages:

$$TE_{ih}^{n'} \; in \; \% = \left(e^{\beta_{2ih}^{n'}} - 1\right) * 100 \tag{5}$$

We dealt with extreme values and potential outliers by dropping the tails of the trade effects distribution, which we defined as values three times the interquartile distance (IQ) below the first quartile or above the third quartile of the distribution. No additional maximum or minimum values are imposed. However, by definition, the minimum value for our trade effects is -100%, i.e. the NTM leads to a complete stop of imports. On the positive side, trade promoting effects of NTMs can exceed 100%.

Table 3 summarises our results when we compute mean and median values of trade effects over all observations, i.e. importer-product combinations, per NTM type. On the left, we consider all computed trade effects, whereas on the right, we consider only trade effects statistically different from zero at the 10% level, which we will henceforth refer to as binding trade effects.

Roughly 60% of our estimates show negative effects of NTMs on imports, comparable to findings in the recent literature (e.g. Bratt, 2014; Beghin et al., 2014). This share increases to around 67% when only binding trade effects are considered. The share of negative binding trade effects is highest for antidumping measures (72%), countervailing duties (75%) and quantitative restrictions (75%).

Table 3 / Simple average over trade effects of NTMs

All estimates				*Significant impact of NTMs (p < 0.1)*			
NTM	*Mean*	*Median*	*Obs.*	*NTM*	*Mean*	*Median*	*Obs.*
SPS	-4.95	-2.23	74,744	SPS	-14.22	-19.19	35,814
TBT	-7.17	-4.43	201,229	TBT	-16.82	-19.92	99,382
QR	-14.03	-12.78	39,230	QR	-32.41	-64.67	20,767
ADP	2.99	-48.76	23,287	ADP	1.86	-70.90	18,326
CVD	-12.20	-51.89	2,239	CVD	-19.60	-81.82	1,569
SG	64.88	9.83	1,817	SG	103.19	52.17	937
SSG	19.98	-10.47	436	SSG	17.01	-45.20	212
STC_{SPS}	51.00	-12.86	8,363	STC_{SPS}	68.91	-52.15	5,007
STC_{TBT}	18.00	-24.13	46,412	STC_{TBT}	19.58	-57.43	29,940
Obs.			397,757	Obs.			211,954

Notes: Considering only importer-product pairs for which at least one NTM type applied. As one importer-product pair can be affected by multiple NTM types, the total number of effects by NTM type (Table 3) exceeds the number of effects by importer-product pairs (Table 2).

4.2. EMPIRICAL RESULTS: DIFFERENCES ACROSS IMPORTING COUNTRIES

The country sample of 124 countries for which trade effects could be computed comprises 39 countries of Europe and Central Asia.[22] Canada and the United States form the aggregate for North America. For Latin America and the Caribbean, trade effects were computed for 25 countries. Within Asia, 18 countries belong to East Asia and the Pacific and another four to South Asia. Twelve countries represent the Middle East and North Africa and another 24 countries the region of Sub-Saharan Africa.

For the geographical display we consider two ways of aggregation. The first is to take the simple average over trade effects per importing (i.e. NTM-imposing) country, which in turn enters the mean trade effect of a region, as shown in the upper panel of Table 4. In the lower panel we show the results, arrived at when we impose import weights using the import values per HS 6-digit product per importing country. The average figures per region correspond to the simple average over all countries of the region, meaning that within a region each country has equal weight.

Both options have their merits. Applying import weights to the trade effects might better reflect the economic importance of a product within an economy than does the simple average figure over all products. On the other hand, if NTMs are trade-impeding, using import weights automatically biases the effect of NTMs towards too small effects. We therefore opt for showing both.

The greatest trade-reducing effects are reported for SPS measures and QRs of Sub-Saharan Africa. The most trade-supportive effects are found for the region of South Asia for SPS measures and TBTs against which trading partners raised concerns at the WTO. Furthermore, standards and restrictions adopted by Europe and Central Asia seem to be more import-impeding than North American policies.

Although the majority of effects of contingent protection measures are negative – ADP (72%), CVDs (75%), SGs (47%) and SSGs (67%), respectively – there are still numerous positive trade effects, resulting in positive regional aggregates. Three possible explanations, two economic and one econometric in nature, come to our mind. First, our trade effects are importer-specific and not bilateral in nature. Therefore, using contingent protection against one exporter might stimulate imports from other origin countries, ultimately resulting in an aggregate positive impact. Second, counteracting measures such as ADP or CVDs may lead to price undertakings or to quality adaptions of the exporter in order not to face a duty. In the latter case, a downgrading of the product quality might be a response to circumvent duties and simultaneously boost exports. Finally, it might be that lagging the NTM variable by one year is not sufficient to exclude the possibility that we are measuring the effect '*unfair trading practices*' (such as price dumping or export subsidies) rather than the effect of the NTM imposed to counteract the adverse effects of these policies.

The problem of possible endogeneity also arises for the estimation of the effect of specific trade concerns raised at the SPS and TBT committees. Some researchers look specifically at STCs, arguing that if countries complain at the WTO against NTMs they are facing, these must be the most trade-restrictive ones (e.g. Fontagné and Orefice, 2016; Ghodsi, 2015). Overall, more than 50% of estimated trade effects of STC_{SPS} and more than 60% of STC_{TBT} show negative signs. Yet, if an importing country makes use of e.g. TBTs, resulting in drops in imports for the affected product, complaints at the WTO

[22] Country groupings according to the World Bank List of Economies (July 2015).

against this measure might again increase imports. This problem could be overcome if a 1:1 match of STCs with respective SPS measures or TBTs of the importing country existed.

Table 4 / Binding trade effects by region and NTM type

	Region	SPS	TBT	QR	ADP	CVD	SG	SSG	STC_{SPS}	STC_{TBT}
Simple average	Europe & Central Asia	-2.55	-13.38	-4.30	0.00	-0.30	0.56	0.00	2.81	2.80
	North America	-0.63	-2.89	-0.19	1.88	-0.29	-0.37	0.17	0.39	2.87
	Latin America & Caribbean	-3.93	-17.57	-1.10	1.24	0.08	2.81	-0.16	0.00	12.65
	East Asia & Pacific	-4.65	-10.57	-0.23	-0.03	-0.03	0.02	0.15	0.68	2.10
	South Asia	33.12	0.36	-0.25	0.77	0.11	2.99	.	11.06	56.57
	Middle East & North Africa	-5.81	-5.81	-5.63	-0.39	-0.64	3.70	-0.06	0.24	0.17
	Sub-Saharan Africa	-22.50	-13.55	-45.28	0.18	0.00	0.04	.	.	-0.55
	Region	SPS	TBT	QR	ADP	CVD	SG	SSG	STC_{SPS}	STC_{TBT}
Import-weighted average	Europe & Central Asia	-0.40	-9.17	-5.37	0.48	0.01	0.40	0.03	2.04	1.11
	North America	-0.70	-0.87	0.14	1.16	-0.60	-0.09	0.17	0.50	1.87
	Latin America & Caribbean	1.69	-2.86	-2.57	1.18	0.84	1.49	0.48	0.43	5.25
	East Asia & Pacific	-1.07	-1.57	3.32	3.39	-0.67	0.15	0.07	-0.12	2.09
	South Asia	50.02	1.63	-18.74	2.07	0.21	0.21	.	11.62	25.94
	Middle East & North Africa	-1.47	-4.66	-3.82	-0.07	3.93	3.39	-0.01	0.06	2.99
	Sub-Saharan Africa	-10.77	8.94	-18.26	0.43	0.12	0.08	.	.	-0.22

Notes: Figures refer to binding trade effects (statistically different from zero at 10%).

Another way of aggregating our country- and product-specific trade effects is to group them by income groups according to the country classification of the World Bank, as shown in Table 5. Simple average figures suggest that the trade-impeding effects of SPS measures decrease with higher income levels. Conversely, TBTs seem to be more trade-restrictive for richer countries. Quantitative restrictions bring imports to low-income countries practically to a halt, while these countries do not (effectively) apply any contingent protective policies. For regions applying these policies, average figures are (as already discussed for Table 4) counterintuitively positive.

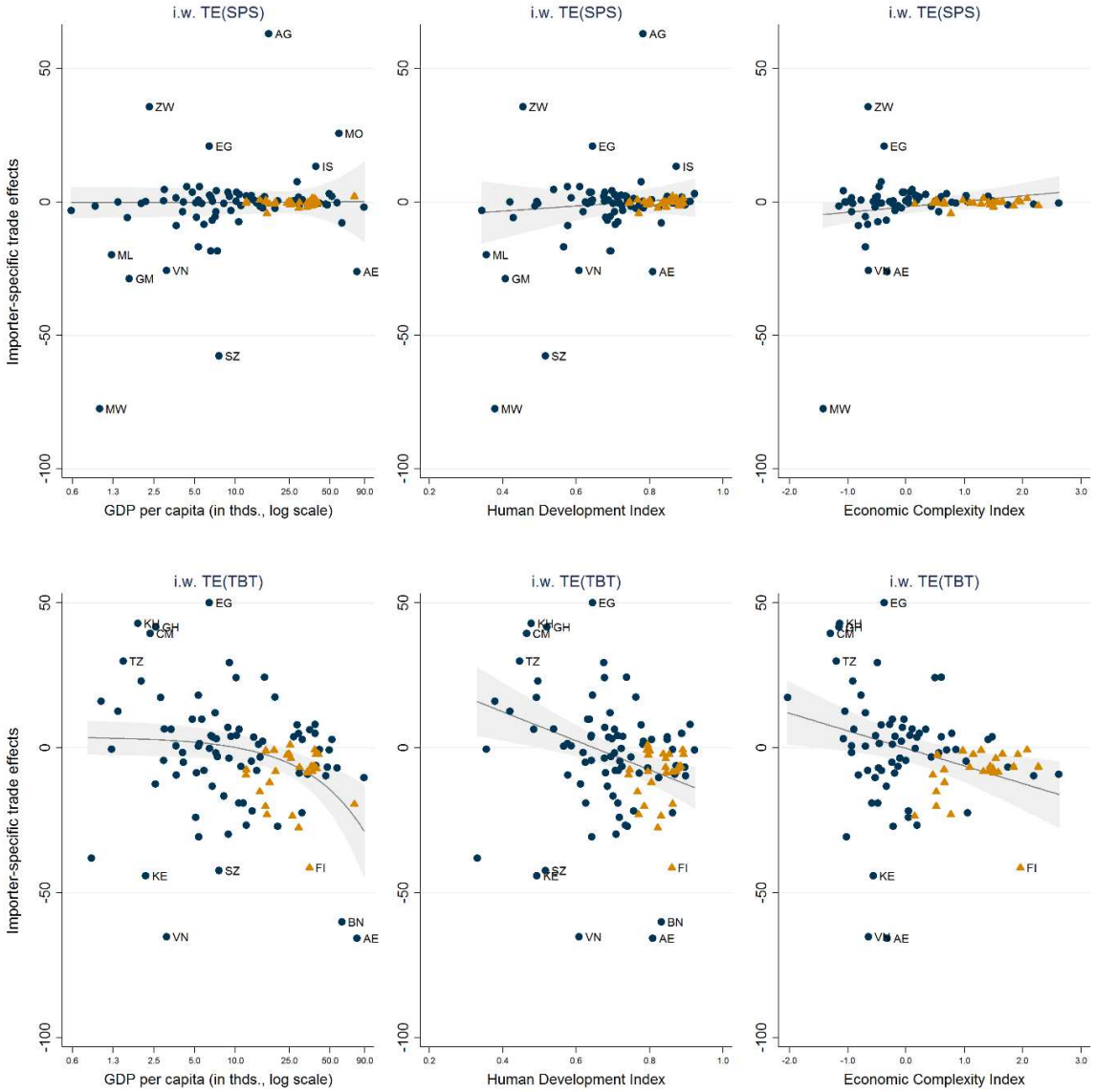
Table 5 / Binding trade effects by income group and NTM type

	Income group	SPS	TBT	QR	ADP	CVD	SG	SSG	STC_{SPS}	STC_{TBT}
Simple average	Low income	-10.48	-3.45	-99.99	.	.	.	.	.	.
	Lower middle income	-12.68	-7.16	1.81	0.18	0.11	1.72	0.17	1.46	11.31
	Upper middle income	-5.07	-11.08	-1.87	1.34	-0.01	2.67	-0.09	0.55	10.76
	High income	-1.39	-16.89	-3.43	-0.06	-0.29	0.25	0.01	2.01	2.23
	Income group	SPS	TBT	QR	ADP	CVD	SG	SSG	STC_{SPS}	STC_{TBT}
Import-weighted	Low income	5.83	23.53	-99.66	.	.	.	.	.	.
	Lower middle income	-4.51	-0.86	9.59	1.06	0.21	0.96	0.67	0.67	6.85
	Upper middle income	-1.09	-1.30	-1.26	3.69	0.44	1.49	-0.11	0.73	4.08
	High income	0.98	-9.04	-3.48	0.10	0.07	0.46	0.04	1.52	1.52

Notes: Figures refer to binding trade effects (statistically different from zero at 10%).

Given the prominence of SPS measures and TBTs both in terms of their number as well as in public discussions, we additionally plot estimated trade effects per importing country against three measures of economic development.

Figure 8 / Import-weighted binding trade effects of SPS measures and TBTs by importer



Notes: Figures refer to binding trade effects (statistically different from zero at 10%). i.w. refers to import-weighted by import values. Varying country sample depending on the availability of each index. EU Member States are highlighted as orange triangles.

(i) The first measure on the left-hand side of Figure 8 is real gross domestic product (GDP) per person in purchasing power parities (PPP) in thousand 2011 US dollars. (ii) In addition to income, the Human Development Index (HDI) published by the United Nations also covers the health and educational dimension of a country's development. (iii) To capture an economy's development rather than human development, the Centre for International Development at Harvard University looked at the diversification of an economy with respect to the number of products exported and the complexity of domestically produced products, from which they derived the Economic Complexity Index (ECI). For each importing country we calculated the average value of each indicator over the period 1995-2014, corresponding to the time span of our analysis.

A central statement of the WTO World Trade Report of the year 2012 was that NTMs could be trade-enhancing whenever the positive demand shock exceeds the negative supply shock. This seems to hold true for SPS measures to protect human, animal and plant life. TBTs of richer countries, by contrast, seem to result in higher costs without providing additional benefits for which consumers or firms are willing to pay.

4.3. EMPIRICAL RESULTS: DIFFERENCES ACROSS PRODUCT TYPES

The effects of non-tariff measures might not only vary by the characteristics of the NTM-imposing countries but also by the type of product targeted by the policy. Every year during the period 1995-2014, imports of intermediates represented more than 52% of global imports and the importance of global value chains as exemplified by intermediate goods trade has been increasing over time. Table 6 therefore summarises our estimates according to the use of the product as either (i) intermediate product entering the production of another product, (ii) good ready for final consumption, or (iii) a component contributing to gross fixed capital formation (GFCF). Concordance tables from HS Rev. 1996 to the Broad End-use Category (BEC) classification are used to form these three categories of products.

Table 6 / Binding trade effects by product use and NTM type

	Product use	SPS	TBT	QR	ADP	CVD	SG	SSG	STC_{SPS}	STC_{TBT}
Simple average	Intermediates	-3.11	-16.43	-2.99	0.35	-0.19	0.31	0.00	0.90	1.90
	Final consumption	-2.96	-7.34	-3.16	-0.31	-0.02	0.62	0.04	2.66	3.21
	GFCF	-0.27	-7.75	-3.29	2.01	-0.08	0.06	.	-0.02	6.80
	Product use	SPS	TBT	QR	ADP	CVD	SG	SSG	STC_{SPS}	STC_{TBT}
Import-weighted	Intermediates	-0.19	-2.87	-0.04	4.12	-0.02	0.11	-0.01	0.52	1.89
	Final consumption	-0.41	-1.51	-0.97	0.05	0.40	0.28	0.15	3.62	4.20
	GFCF	-0.65	-6.55	-6.64	1.28	-0.04	0.01	.	0.00	0.62

Notes: Figures refer to binding trade effects (statistically different from zero at 10%).

Simple averages across all calculated trade effects emphasise the trade-impeding effects of SPS regulations and TBTs for intermediates, while quantitative restrictions show similar effects across product types. In import weighted terms, effects of SPS measures, TBTs and QRs on imports of intermediate products and final consumption goods are scaled down considerably, while the negative trade effect for fixed capital becomes even more pronounced.

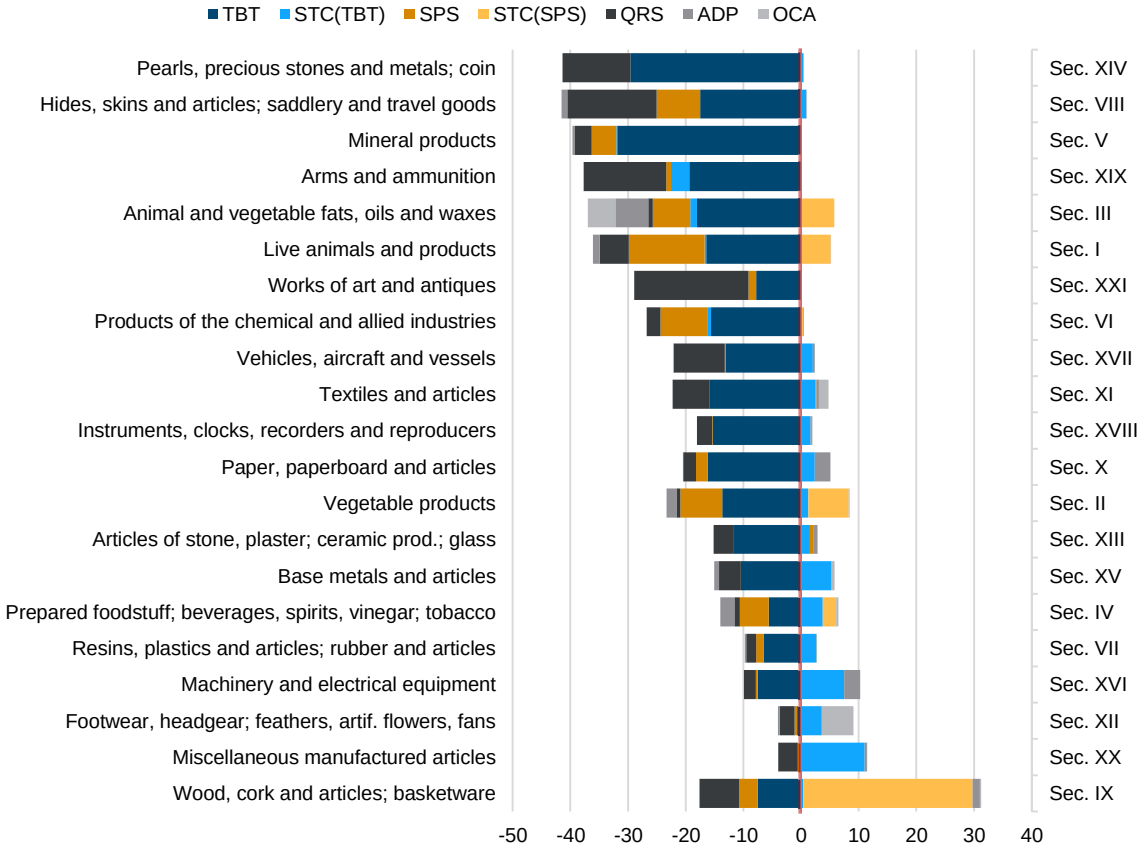
A rationale for the difference in the reduction of the effects when using import weights across product types is the difference in the demand elasticity for those imports. We expect the fastest reaction to price increases for the demand of households, while reactions of firms' demand for intermediates might be slower due to established international production networks. For large investments in assets based on longer-term planning, import demand might be less price elastic, such that the reduction in import quantities might be slower than the policy-induced increase of the import price of these goods (see e.g. Ghodsi et al., 2016).

The Harmonised System (HS) for international product classifications allows to further aggregate results along main product characteristics. The HS system is organised in 99 chapters which are grouped into 21 sections. Figure 9 presents simple average trade effects for each HS section.

Luxury products, minerals as well as arms and ammunition represent HS sections showing the greatest import-reducing effects of NTMs, largely attributable to quantitative restrictions and TBTs. These are followed by animal and vegetable fats, as well as live animals, while vegetable products are found half way down the product list.

Furthermore, our regression output allows taking a closer look at (groups of) products of specific interest. For illustration purposes, we consider two agricultural products. Meat (HS 02) and products of animal origin, such as milk products and honey (HS 04), belong to the product groups that are affected by a great variety of different types of NTMs and are imported by a vast number of countries worldwide.

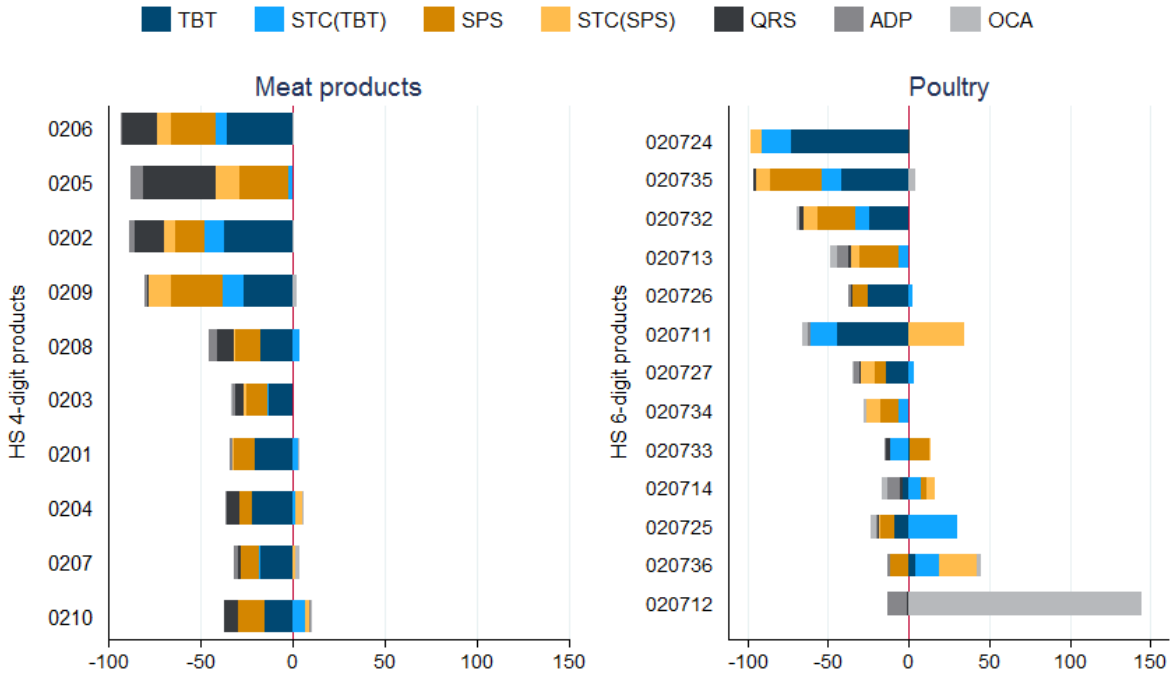
Figure 9 / Binding trade effects of NTMs by HS section



Notes: Considering only importer-product pairs for which at least one NTM type applied. Simple average is computed over all trade effects that are significantly different from zero at the 10% level, grouped by HS section.

Results for meat products, belonging to the HS 2-digit group of meat and edible meat offal, are depicted in the left panel of Figure 10. Meat products in turn represent a group of ten HS 4-digit products. One of them is poultry (HS 0207). The right panel of Figure 10 shows the results across 13 HS 6-digit products out of 19 poultry products in total listed in the Harmonised System.

Figure 10 / Trade effects of NTMs for meat products



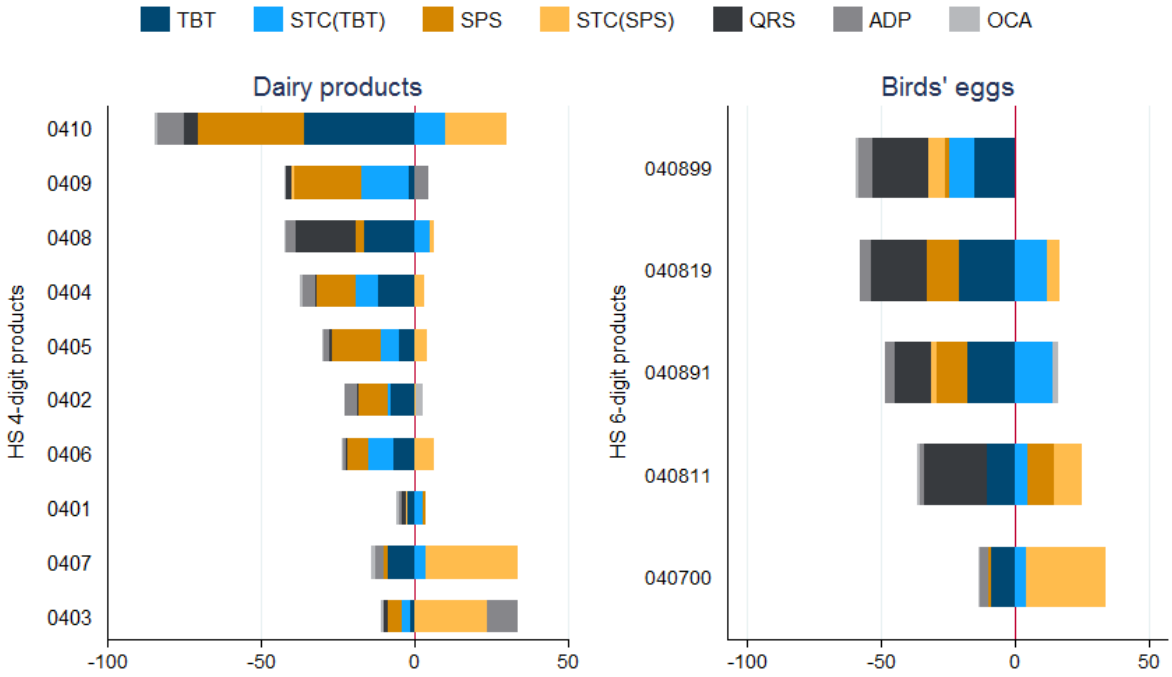
Notes: Considering only importer-product pairs for which at least one NTM type applied. Simple average is computed over all trade effects that are significantly different from zero at the 10% level. Meat products refers to the HS 2-digit group 02 'meat and edible meat offal' and shows trade effects for underlying HS 4-digit products. Poultry refers to the HS 4-digit group 0207 'meat and edible offal of poultry; of the poultry of heading no. 0105, (i.e. fowls of the species Gallus domesticus), fresh, chilled or frozen' and shows trade effects for underlying HS 6-digit products. Product descriptions are listed in Appendix 11.

Similarly, Figure 11 presents results for the HS 2-digit group of dairy product, birds' eggs and natural honey. The left part of the graph shows trade effects across all HS 4-digit sub-groups, while the right part focuses on five HS 6-digit products, out of nine in total, corresponding to the product group birds' eggs (HS 0407 and 0408).

These figures illustrate the diversity of trade effects across products. Overall, TBTs and QRs seem to be of greater importance for meat products, particularly for frozen meat of bovine animals (HS 0202), edible offal of certain animals (HS 0206) and meat of horses, asses, mules or hinnies (HS 0205). The aggregate for poultry (HS 0207) suggests that TBTs are more trade-restrictive than SPS measures. The right panel then shows which products contribute to this result. Particularly high trade-impeding effects for TBTs were estimated for fresh or chilled turkeys (HS 020724), cuts and edible offal of ducks (HS 020735), and fresh or chilled fowls (HS 020711).

For milk products, eggs and honey, estimates look quite different. Compared to meat products, we observe more positive effects of specific trade concerns raised at the SPS committee. In addition, the role of TBTs and QRs is much more limited. One notable exception is birds' eggs and egg yolks not in shell.

Figure 11 / Trade effects of NTMs for dairy products, birds' eggs and natural honey



Notes: Considering only importer-product pairs for which at least one NTM type applied. Simple average is computed over all trade effects that are significantly different from zero at the 10% level. Dairy products, birds' eggs and natural honey refers to the HS 2-digit group 04 'dairy produce, birds' eggs, natural honey, edible products of animal origin not elsewhere specified' and shows trade effects for underlying HS 4-digit products. Birds' eggs refers to the HS 4-digit groups 0407 'birds' eggs, in shell; fresh, preserved or cooked' and 0408 'birds' eggs, not in shell; egg yolks, fresh, dried, cooked by steaming or boiling in water, moulded, frozen or otherwise preserved, whether or not containing added sugar or other sweetening matter' and shows trade effects for underlying HS 6-digit products. Product descriptions are listed in Appendix 11.

5. Conclusion

There is a fast growing literature on the effects of non-tariff measures (NTMs). Data limitations, however, often result in the analysis of one specific type of NTM, for a particular product or region. Our work contributes to filling the data gap by processing notifications of NTMs to the WTO. It results in an NTM database usable for econometric analysis. The data comprise seven NTM types and specific trade concerns (STCs) raised against sanitary and phytosanitary (SPS) measures and technical barriers to trade (TBTs). Data publicly accessible via the Integrated Trade Intelligence Portal (I-TIP) were transformed to a panel dataset, enhanced by imputing missing product codes at the HS 6-digit level of the Harmonised System (HS). Our work effectively reduces the share of notifications with missing HS codes from more than 55% to less than 25%.

The resulting dataset allowed the description of the evolution of NTMs over time, by importer and product groups. 48% of all notifications by March 2016 were TBTs, followed by SPS measures (34%) and antidumping (10%). Product groups affected most frequently by NTMs belong to the agri-food sector, followed by the chemical industries, and machinery and electrical equipment.

We used this new dataset to estimate the trade elasticity with respect to NTMs for more than 100 importers and over 5,000 products over the period 1995-2014. About 60% of all trade effects suggest trade-impeding effects of NTMs, which are particularly pronounced for quantitative restrictions and TBTs. Geographically, the greatest import-restricting effects were found for Sub-Saharan Africa. We also note that standards and restrictions implemented in Europe and Central Asia affect imports more than do North American NTMs. At the product level, we find NTMs to be most trade-restrictive for luxury products, minerals as well as arms and ammunition, followed by products of the agri-food sector.

Although we consider it appropriate to aggregate NTM notifications and corresponding estimates of trade effects along country and product characteristics, we want to emphasise the diversity of NTMs and their effects at the disaggregated HS 6-digit product level. The degree of detail for which we provide NTM data and estimate trade effects is exemplified by the cases of poultry and birds' eggs.

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Appendix

Appendix 1 / HS code matching procedure

In order to allow the rich I-TIP database to be used for econometric analysis, it was necessary to link NTMs with targeted products. Considering the seven NTM types entering our estimation during the period 1995-2014, product codes were missing for more than 55% of all notified measures. We filled the gaps following a multiple step automated procedure.

Step 1: *WTO interpreted HS codes.* The WTO has already undertaken a first step in matching HS codes according to the interpretation of measures and product descriptions. These 'WTO interpreted HS codes' were available for 4,725 notifications.

Step 2: *International Classification Standards (ICS).* The WTO agreements on TBTs and SPS measures require WTO members to notify the ICS classification of the product at the heart of the measure. In addition, some countries use ICS or CAS (a classification for chemical products) in the product descriptions of the NTMs. Extracting these ICS or CAS codes and matching the corresponding HS codes fills the gaps for an additional 828 measures.

Step 3: *Product description*. In this step we use the information provided in product descriptions of different notifications and fill in the product codes matching the descriptions[23]. This fills the gap for 4,144 measures.[24]

Step 4: *Temporary Trade Barriers Database (TTBD)*. The World Bank publishes data on ADP, CVDs, SGs and China-specific Safeguards compiled by Bown (2016). For each NTM type we match observations by the country pair and year of initiation (or entry into force) of the NTM and subsequently compare the corresponding product descriptions with a string kernel[25]. Matches with a sufficiently high goodness of fit (70% or higher) add HS codes to 785 measures.

Step 5: *Set comparisons*. Up to this point, all the matching was based on the comparison of the whole string of the product description. In this step we decompose the product description into sets of words and compare them between notifications containing HS codes and those notifications lacking HS codes. The goodness of fit is measured by the Tversky (1977) index[26]. Considering only matches with a goodness of fit of at least 0.7, this step matches HS codes for another 2,463 notifications.

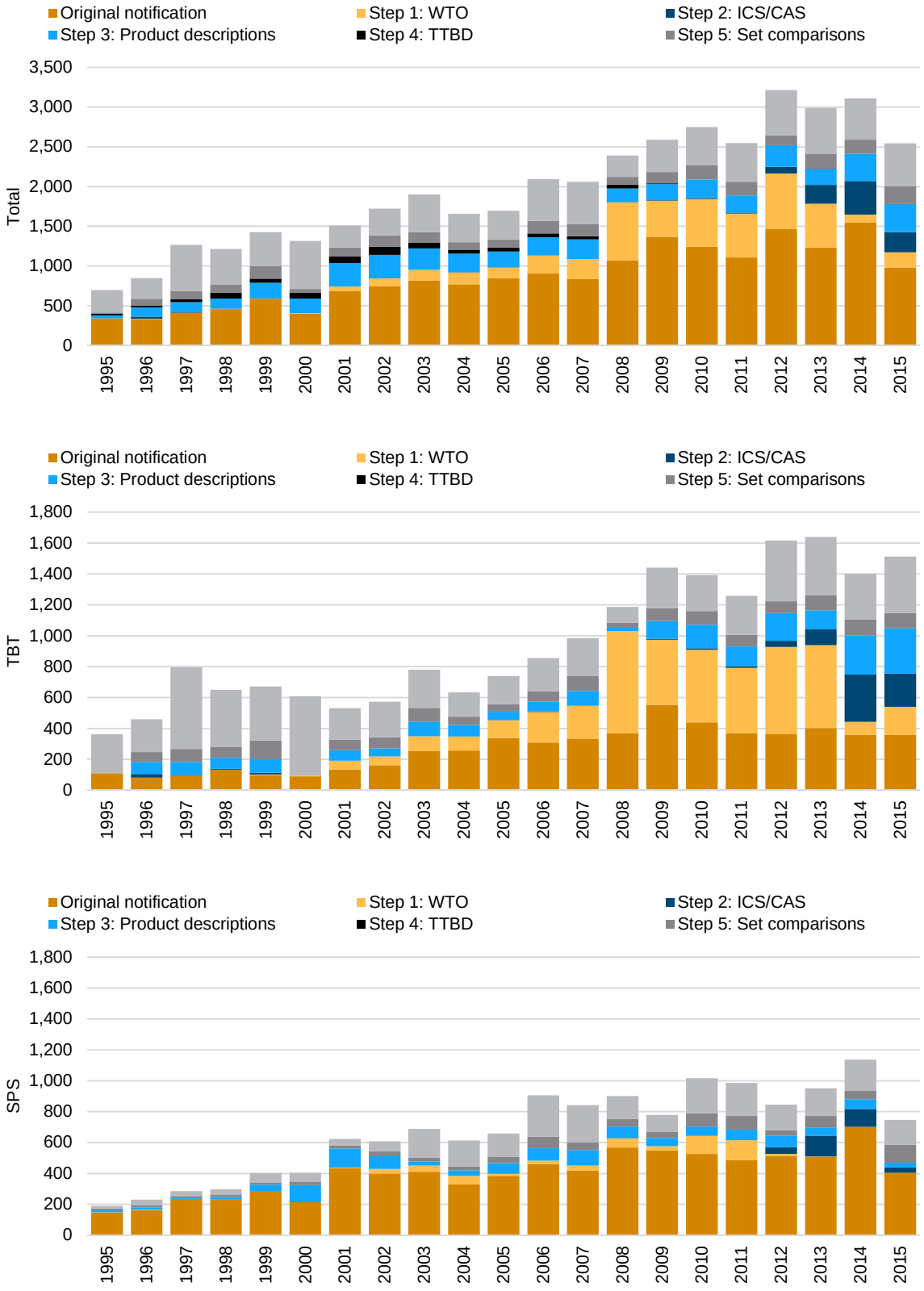
[23] Using a cleaned and stemmed version of product descriptions, e.g. using the word 'fish' instead of 'fishes'.

[24] In a similar fashion, we tried to match product descriptions of the World Integrated Trade Solution (WITS) with product descriptions of notifications with missing product codes. However, the structure of WITS product descriptions at the 6-digit level resulted in matchings too error-prone to be considered in this analysis.

[25] We use a string kernel that takes two strings (the two product descriptions) as arguments and computes the number of matching substrings of length 3 or more. See Karatzoglou and Feinerer (2010) for a discussion of string kernels and their implementation for text mining in R.

[26] We calculate the Tversky index, $(X,Y) = |X \cap Y|/|X \cap Y| + \alpha|X - Y| + \beta|Y - X|$, with $\alpha = \beta = 0.5$.

Appendix 2 / Notifications by matching step over time



Data source: WTO I-TIP, wiiw calculation.

Appendix 3 / SPS keywords

No.	Keyword	Notif.
1	Human health	9,450
2	Food safety	9,145
3	Protect humans from animal/ plant pest or disease	4,746
4	Pesticides	3,853
5	Plant health	3,775
6	Animal health	3,455
7	Maximum residue limits (MRLs)	3,033
8	Animal diseases	2,198
9	Plant protection	2,035
10	Pests	1,657
11	Food additives	1,440
12	Territory protection	1,026
13	Zoonoses	994
14	Regionalisation	792
15	Contaminants	774
16	Protect territory from other damage from pests	737
17	Labelling	732
18	Packaging	604
19	Avian influenza	514
20	Seeds	490
21	Foot and mouth disease	482
22	Animal feed	473
23	Veterinary drugs	471
24	Transmissible spongiform encephalopathy (TSE)	383 357
25	Bacteria	
26	Bovine spongiform encephalopathy (BSE)	340
27	Tolerance exemption	314
28	Genetically modified organisms	235
29	Biotechnology	234
30	Beverages	216
31	Heavy metals	203
32	Plant diseases	182
33	Feed additives	170
34	Toxins	169
35	Fruit fly	136
36	Newcastle disease	110
37	Mycotoxins	107
38	Wood packaging / ISPM15	104
39	Certification	99
40	Control and inspection	99
41	HACCP Plan requirements	87
42	Salmonella	86
43	Dioxins	83
44	Classical Swine Fever	80
45	Escherichia coli	69
46	Aflatoxins	67
47	Irradiation	64
48	Bluetongue	55
49	Traceability	53
50	Fungi	52
51	MEAs implementation and compliance	44
52	Nematode	38
53	Scrapie	35
54	Polychlorinated biphenyls	31
55	Animal protection	27
56	Biological control agents	24
57	Listeria monocytogenes	23
58	Pharmaceutical products	23
59	Invasive species	22
60	Equivalence	21
61	Ochratoxin	20
62	Environmental protection from pests and diseases	16
63	Biodiversity and ecosystem	15
64	Allergens	14
65	Animal welfare	14
66	Chemical	12
67	Toxic and hazardous substances management	12
68	Soil management	11
69	Water management	11
70	Citrus canker	10
71	Sudden Oak Death	10
72	H1N1 influenza	9

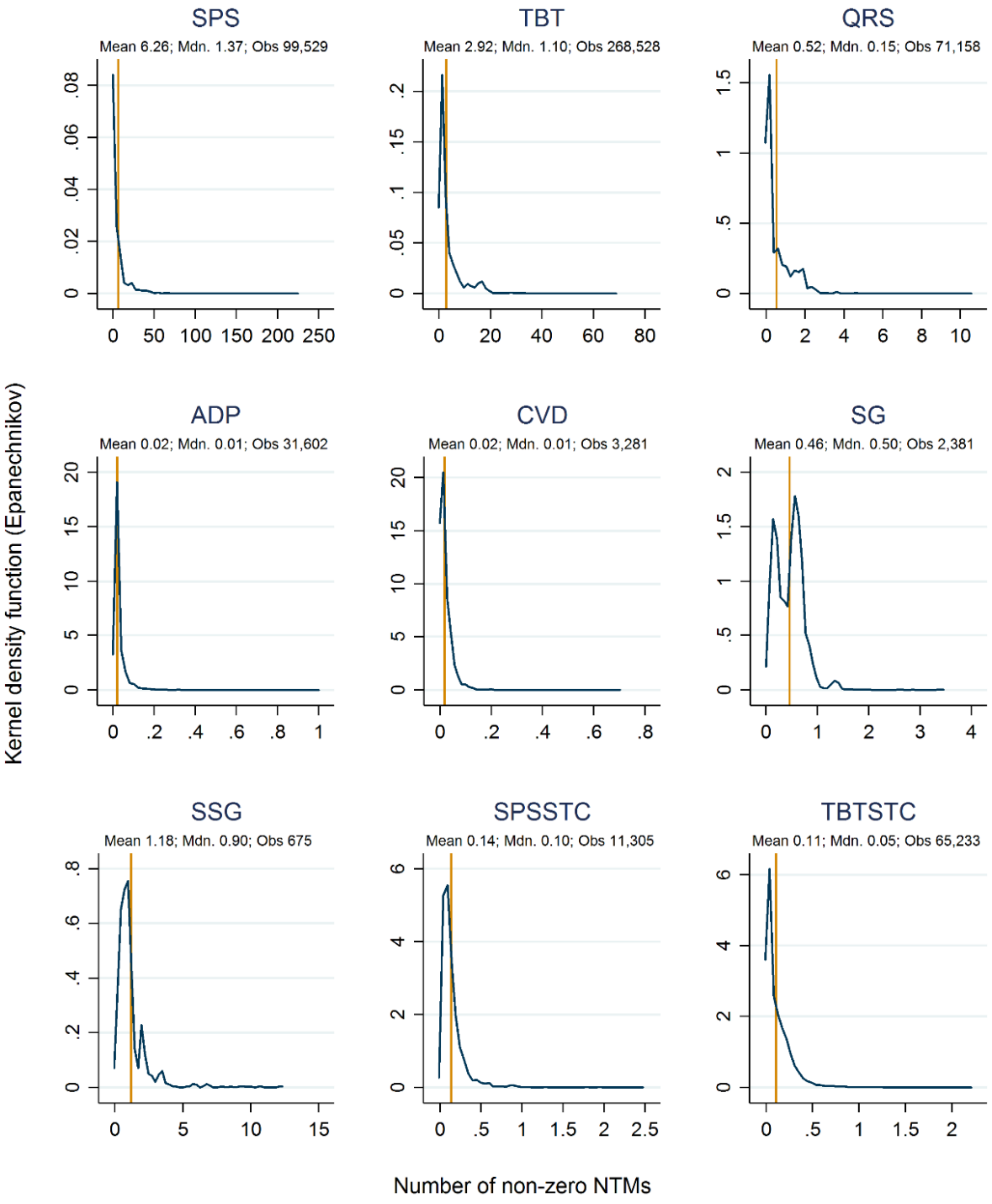
Data source: WTO I-TIP, wiiw calculation.

Appendix 4 / TBT keywords

No.	Keyword	Notif.
1	Protection of human health or safety	6,934
2	Safety	6,456
3	Food standards	4,050
4	Human health	2,346
5	Prevention of deceptive practices and consumer protection	2,101
6	Labelling	1,942
7	Protection of the environment	1,658
8	Quality requirements	1,612
9	Telecommunication/Radiocommunication	794
10	Consumer information	588
11	Metrology	539
12	Adoption of Domestic Law	340
13	Lowering or removal of trade barriers	339
14	Harmonisation	338
15	Protection of animal or plant life or health	269
16	Food contact materials	211
17	Animal feed	206
18	Consumer protection	200
19	Trade facilitation	198
20	Nutrition information	197
21	Chemical	188
22	Toxic and hazardous substances management	188
23	Energy conservation and efficiency	166
24	Plant health	147
25	Conformity assessment	142
26	Animal health	125
27	Organic agriculture	104
28	Genetically modified organisms	89
29	Water management	85
30	Crime protection	78
31	Packaging	77
32	Biodiversity and ecosystem	63
33	Cost saving and increasing productivity	63
34	Air pollution reduction	51
35	Electromagnetic compatibility	47
36	Waste management and recycling	43
37	National security requirements	42
38	Other	42
39	Climate change mitigation	41
40	Animal protection	38
41	Plant protection	30
42	Animal welfare	29
43	Alternative and renewable energy	27
44	Sustainable agriculture management	24
45	Soil management	16
46	MEAs implementation and compliance	11
47	Ozone layer protection	11
48	General environmental protection	10
49	Sustainable and environmentally friendly production	6
50	Other environmental risks mitigation	3
51	Sustainable fisheries management	3
52	Sustainable forestry management	3
53	Biofuels	2
54	Environmentally friendly consumption	2
55	Noise pollution reduction	2
56	Pesticides	2
57	Food additives	1
58	Natural resources conservation	1

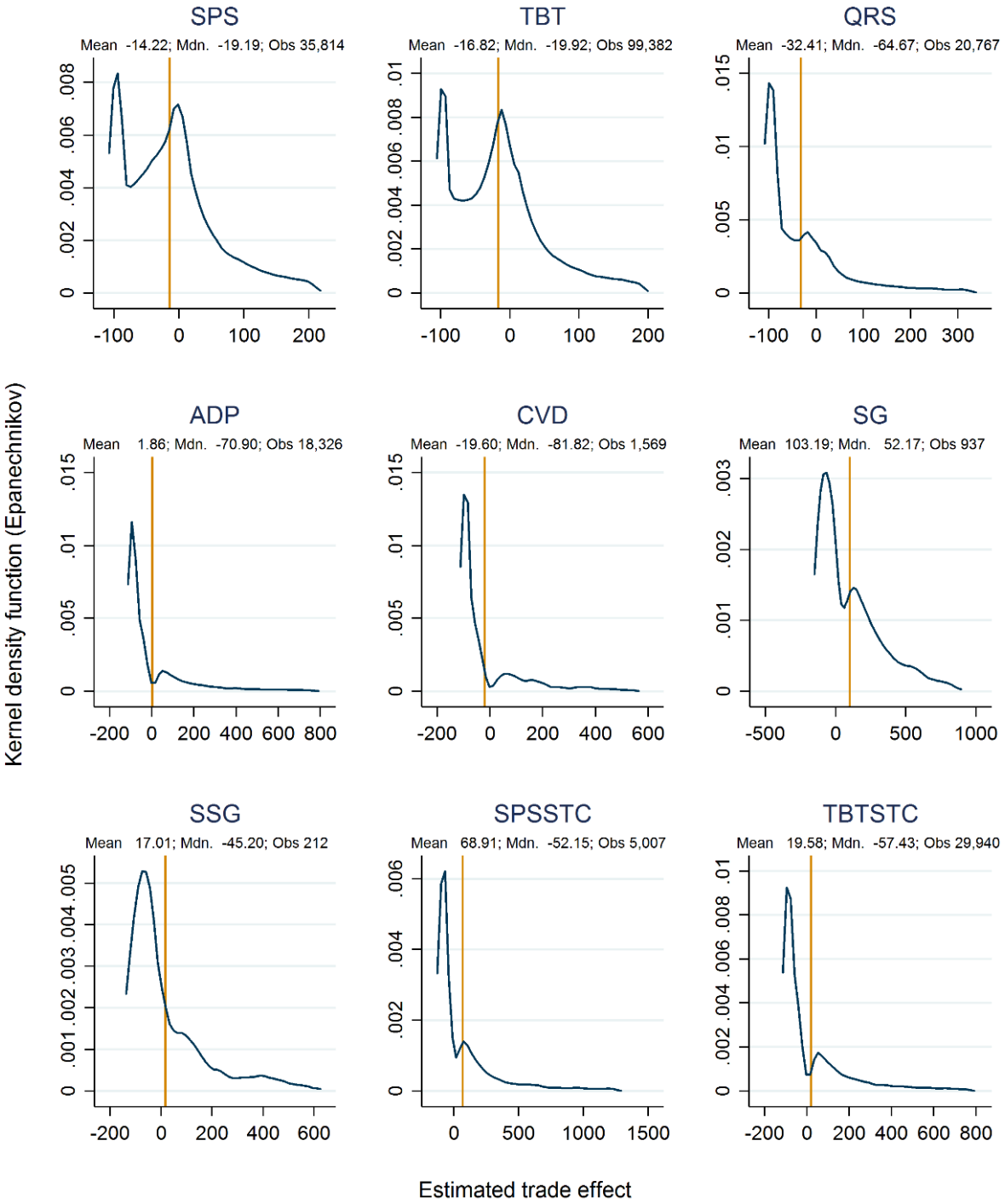
Data source: WTO I-TIP, wiiw calculation.

Appendix 5 / Distribution of NTMs over importer-product pairs



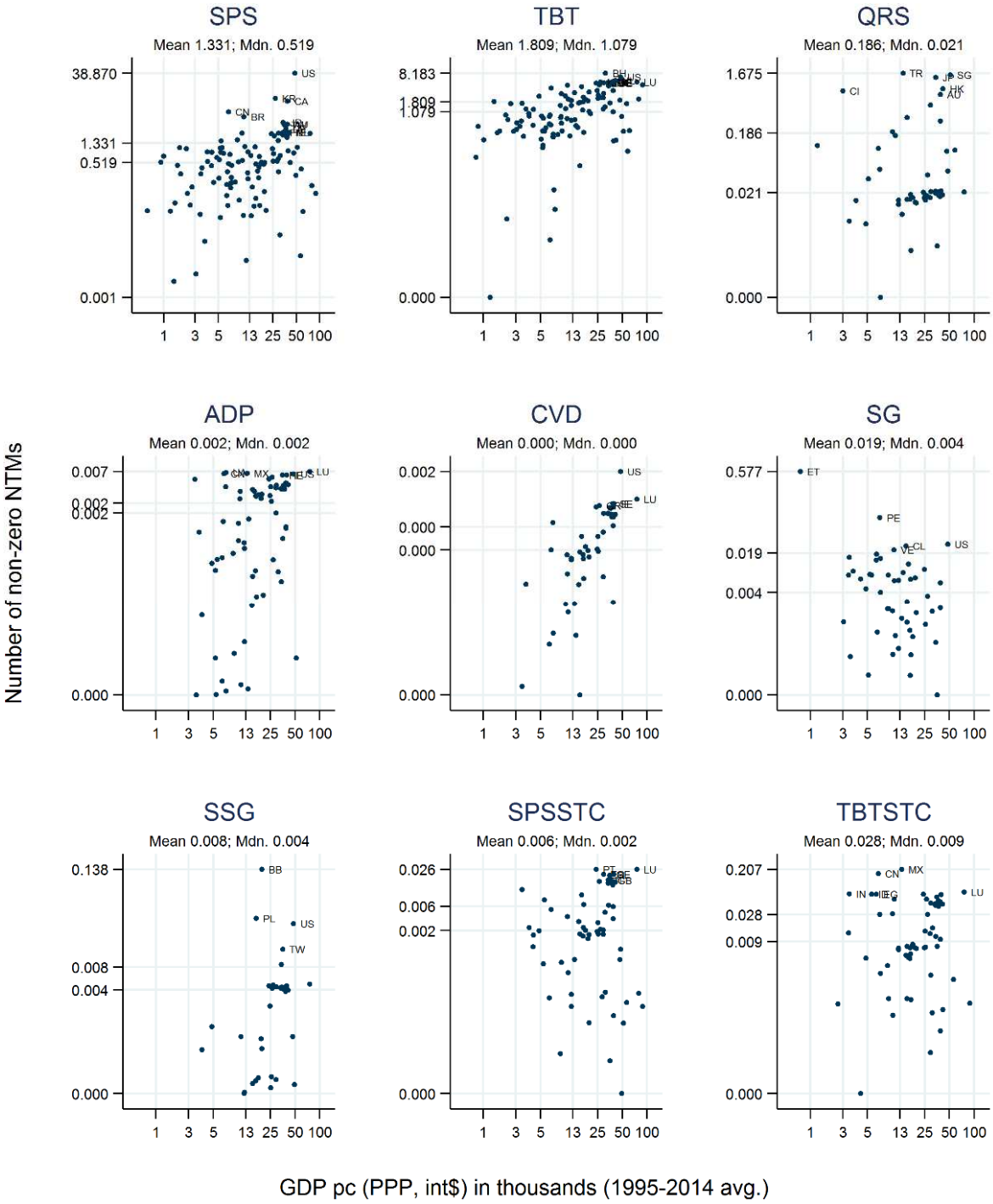
Source: WTO I-TIP, wiiw calculations.

Appendix 6 / Distribution of binding trade effects of NTMs over importer-product pairs



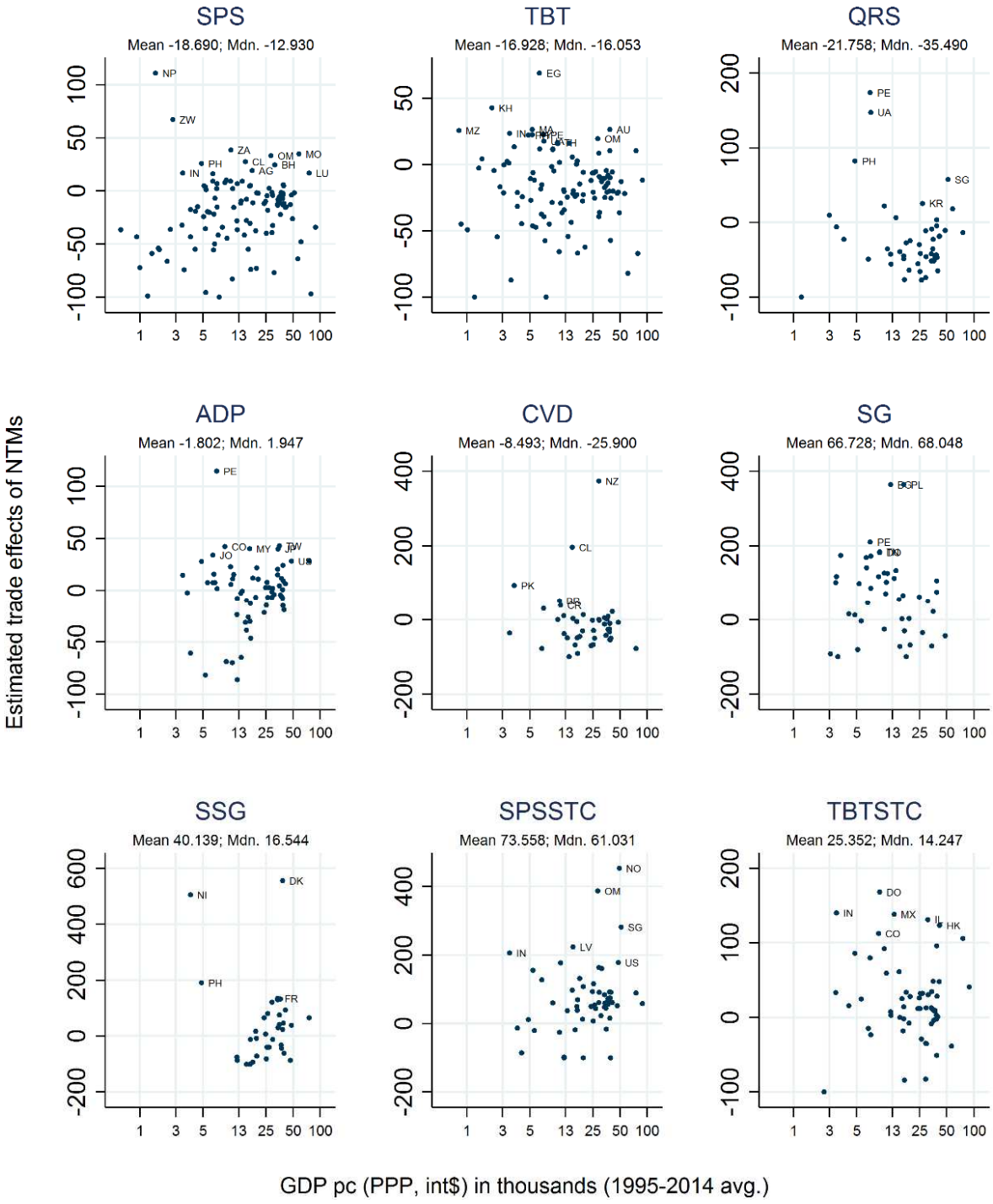
Source: WTO I-TIP, wiiw calculations. Notes: Trade effects significantly different from zero at the 10% level, based on Poisson estimation.

Appendix 7 / Distribution of NTMs over income of the importer



Sources: WTO I-TIP (NTM data), Penn World Tables 9.0 (GDP pc), wiiw calculations.

Appendix 8 / Distribution of binding trade effects of NTMs over income of the importer



Sources: WTO I-TIP (NTM data), Penn World Tables 9.0 (GDP pc), wiiw calculations. Notes: Trade effects significantly different from zero at the 10% level, based on Poisson estimation.

Appendix 9 / Binding simple average trade effects per importer

ISO2	Country	SPS	TBT	QR	ADP	CVD	SG	SSG	STC_{SPS}	STC_{TBT}
AE	United Arab Emirates	-38.40	-66.81	.	.	.	.	.	.	.
AG	Antigua and Barbuda	19.03	.	.	.	.	.	.	.	.
AL	Albania	-8.46	-37.34	.	.	.	.	.	.	.
AM	Armenia	1.44	-23.78	.	.	.	-0.14	.	.	.
AR	Argentina	-5.85	-22.10	.	-3.13	-0.07	0.01	.	-0.28	0.36
AT	Austria	1.18	-7.84	-5.75	1.63	-0.81	.	0.05	4.90	9.59
AU	Australia	-0.37	4.53	-3.64	-3.03	-0.11	0.36	.	0.20	-0.07
BB	Barbados	-5.33	-18.12	.	.	.	.	-0.58	-0.36	.
BE	Belgium	-0.29	-12.19	-5.16	-0.87	-0.46	.	-0.04	4.88	2.67
BG	Bulgaria	-3.94	-14.24	-5.98	-0.84	0.07	2.11	-0.07	.	1.99
BH	Bahrain	5.67	-11.69	.	.	.	.	.	0.25	7.66
BI	Burundi	-36.67	.	.	.	.	.	.	.	.
BJ	Benin	-54.06	.	.	.	.	.	.	.	.
BN	Brunei	-1.33	-82.18	.	.	.	.	.	.	.
BO	Bolivia	-18.44	-17.67	.	.	.	.	.	-1.66	.
BR	Brazil	0.78	1.32	.	0.37	0.20	0.22	.	-0.32	8.07
BW	Botswana	.	-36.49	.	.	.	.	.	.	.
BZ	Belize	-35.38	-3.28	.	.	.	.	.	.	.
CA	Canada	-0.22	10.32	0.31	0.96	-0.16	0.43	.	0.45	2.87
CF	Central African Republic	.	-44.87	.	.	.	.	.	.	.
CH	Switzerland	-3.04	-18.84	.	.	.	.	-0.18	0.79	.
CI	Cote d'Ivoire	.	.	9.44	.	.	.	.	.	.
CL	Chile	12.43	2.77	.	-0.09	0.31	0.96	.	1.50	1.87
CM	Cameroon	.	-16.80	.	.	.	.	.	.	.
CN	China	-1.09	-14.31	-6.59	0.95	-0.11	.	.	3.37	-6.80
CO	Colombia	2.08	-1.40	.	0.81	.	0.23	.	.	1.17
CR	Costa Rica	-4.90	-27.36	-4.91	0.02	0.03	0.05	.	0.89	.
CV	Cape Verde	-14.83	.	.	.	.	.	.	.	.
CY	Cyprus	-8.12	-33.32	-8.59	-0.94	0.00	.	0.16	1.42	-10.05
CZ	Czech Republic	-1.60	-5.33	-3.37	0.48	-0.02	0.56	0.03	1.86	6.79
DE	Germany	-0.54	-6.13	-5.97	2.56	0.16	.	-0.01	3.87	3.63
DK	Denmark	-2.34	-18.96	-3.33	-0.98	-0.46	.	0.13	4.80	-0.65
DO	Dominican Republic	1.93	11.04	.	-0.09	.	0.67	.	0.28	1.25
EC	Ecuador	-0.98	-32.06	.	.	.	2.01	.	.	-3.16
EE	Estonia	-1.91	-11.67	-3.60	1.63	-0.31	-0.14	-0.06	1.92	7.74
EG	Egypt	2.51	66.19	.	0.12	.	11.84	.	.	.
ES	Spain	-0.81	-7.15	-4.89	0.42	-0.03	.	0.00	6.82	4.64
FI	Finland	-2.10	-13.04	-3.68	0.70	-0.61	.	0.05	2.69	3.25
FJ	Fiji	-55.57	.	.	.	.	.	.	.	.
FR	France	-2.44	-14.35	-4.66	3.04	0.08	.	0.07	3.42	4.86
GB	United Kingdom	-4.79	-16.50	-5.42	-0.87	0.02	.	0.13	4.59	-1.51
GE	Georgia	-1.54	-7.82	.	.	.	.	.	.	.
GH	Ghana	.	-0.20	.	.	.	.	.	.	.
GM	Gambia	-55.40	.	.	.	.	.	.	.	.
GR	Greece	-3.84	-20.95	-7.19	-0.90	-0.62	.	0.06	3.28	-9.14
GT	Guatemala	0.97	-2.26	.	.	.	.	.	0.18	.
HK	Hong Kong	-1.60	-2.68	-14.61	.	.	.	.	.	0.21
HN	Honduras	-33.94	-18.07	.	-0.04	.	.	.	-0.04	.
HR	Croatia	-15.21	-59.64	-4.50	-1.22	-0.88	-0.02	.	1.28	-5.05
HU	Hungary	-6.43	-25.04	-5.67	-0.93	-0.27	0.02	0.03	0.21	-1.84
ID	Indonesia	-7.05	-6.01	.	0.06	.	-0.06	.	-0.96	9.37
IE	Ireland	-2.57	-21.19	-5.78	-3.19	-0.76	.	-0.03	6.31	0.36
IL	Israel	-0.50	-10.24	.	-0.04	.	0.18	.	0.42	0.21
IN	India	4.54	10.40	-0.25	1.68	-0.02	3.37	.	11.06	56.57
IS	Iceland	2.34	-9.22	.	.	.	.	.	-0.91	.
IT	Italy	-2.66	-8.18	-6.11	3.87	-0.18	.	0.10	5.98	-3.09

(ctd.)

Appendix 9 / ctd.

ISO2	Country	SPS	TBT	QR	ADP	CVD	SG	SSG	STC_{SPS}	STC_{TBT}
JM	Jamaica	-2.24	-18.33	.	0.56	.	0.06	.	.	.
JO	Jordan	0.68	8.22	.	0.14	.	2.53	.	.	.
JP	Japan	-1.00	-12.56	-8.90	0.21	.	-0.04	0.14	1.36	1.85
KE	Kenya	-0.20	-54.56	.	.	.	.	.	.	-0.55
KG	Kyrgyz Republic	.	-21.35	.	.	.	-0.25	.	.	.
KH	Cambodia	.	42.88	.	.	.	.	.	.	.
KR	South Korea	0.45	-5.30	0.76	0.05	.	-0.07	-0.04	0.11	4.17
KW	Kuwait	-0.47	-22.03	.	.	.	.	.	.	-7.19
LC	Saint Lucia	.	-28.63	.	.	.	.	.	.	.
LK	Sri Lanka	-16.17	-20.78	.	.	.	.	.	.	.
LT	Lithuania	-5.24	-18.19	-5.90	-4.04	-0.05	.	-0.11	0.61	3.40
LU	Luxembourg	3.73	9.21	-1.12	3.13	-1.14	.	0.02	4.00	23.86
LV	Latvia	-4.04	-17.58	-5.99	-1.11	0.02	.	-0.07	1.97	0.03
MA	Morocco	-26.29	1.30	.	-0.48	.	1.30	.	.	.
MD	Moldova	-1.53	0.80	.	.	.	0.44	.	.	0.79
MG	Madagascar	-43.30	.	.	.	.	.	.	.	.
MK	Macedonia	-3.56	-3.02	.	.	.	.	.	.	.
ML	Mali	-10.13	-0.09	-99.99	.	.	.	.	.	.
MN	Mongolia	-11.61	-45.57	.	.	.	.	.	.	.
MO	Macau	30.68	.	0.82	.	.	.	.	.	.
MT	Malta	-8.08	-17.75	-5.63	-1.71	-0.64	.	-0.06	0.16	3.13
MU	Mauritius	-1.15	-36.88	.	.	.	.	.	.	.
MW	Malawi	-72.42	.	.	.	.	.	.	.	.
MX	Mexico	-2.04	-21.37	.	-0.34	-0.04	0.14	.	0.08	90.51
MY	Malaysia	0.54	0.28	.	0.23	.	0.10	.	.	-1.13
MZ	Mozambique	.	25.62	.	.	.	.	.	.	.
NG	Nigeria	.	2.27	.	.	.	.	.	.	.
NI	Nicaragua	-7.42	-12.08	-0.37	.	.	.	0.26	.	.
NL	Netherlands	-4.10	-5.08	-1.79	1.26	0.33	.	0.07	4.39	17.26
NO	Norway	-6.71	-35.57	.	.	.	.	.	0.73	.
NP	Nepal	111.00	.	.	.	.	.	.	.	.
NZ	New Zealand	-0.34	2.07	-5.49	-0.18	0.12	.	.	0.65	-0.11
OM	Oman	9.41	19.23	.	.	.	.	.	0.29	.
PA	Panama	2.45	-32.28	.	-0.09	.	.	.	-0.20	.
PE	Peru	0.42	8.81	1.96	19.62	0.04	27.81	.	.	13.72
PH	Philippines	2.24	21.41	0.11	0.20	.	0.06	0.09	0.17	1.66
PK	Pakistan	.	11.45	.	-0.14	0.25	2.61	.	.	.
PL	Poland	0.96	2.04	-6.63	-4.03	-0.79	1.78	-0.13	0.93	-0.87
PT	Portugal	-2.44	-10.00	-5.02	-3.17	-0.79	.	0.02	3.43	3.57
PY	Paraguay	0.08	21.89	.	.	.	.	.	.	.
QA	Qatar	-4.55	-11.81	.	.	.	.	.	0.07	0.07
RO	Romania	-4.62	-17.91	-5.28	-0.25	-0.24	.	-0.10	-0.24	0.53
RU	Russia	-2.28	-13.35	.	-0.30	.	-0.06	.	.	.
RW	Rwanda	.	-49.13	.	.	.	.	.	.	.
SA	Saudi Arabia	-3.85	-36.01	.	.	.	.	.	.	-2.89
SE	Sweden	-1.39	-8.37	-3.49	0.09	-0.36	.	0.02	4.43	0.98
SG	Singapore	-0.24	-2.30	33.59	.	.	.	.	1.24	.
SI	Slovenia	-0.78	-5.76	-3.83	1.09	-0.31	.	-0.06	1.96	8.09
SK	Slovak Republic	-0.32	-5.47	-2.39	3.58	0.11	-0.02	-0.07	1.28	6.66
SN	Senegal	.	.	.	.	.	.	.	.	.
SV	El Salvador	-9.13	-13.21	.	.	.	0.10	.	.	0.02
SZ	Swaziland	-95.92	-4.04	.	.	.	.	.	.	.
TH	Thailand	1.46	13.40	1.57	0.23	.	-0.10	.	.	12.19
TN	Tunisia	.	11.73	.	.	.	2.64	.	.	.
TR	Turkey	1.12	4.78	6.17	-0.02	-0.02	1.60	.	.	.
TT	Trinidad and Tobago	-0.02	-60.83	.	0.07	.	.	.	.	.

(ctd.)

Appendix 9 / ctd.

ISO2	Country	SPS	TBT	QR	ADP	CVD	SG	SSG	STC_{SPS}	STC_{TBT}
TW	Taiwan	-1.02	-4.48	-0.14	0.98	.	0.01	0.43	-0.02	1.75
TZ	Tanzania	.	4.27	.	.	.	.	.	.	.
UA	Ukraine	2.10	15.78	0.13	0.02	.	1.44	.	.	.
UG	Uganda	-0.44	-2.82	.	.	.	.	.	.	.
US	United States	-1.03	-16.09	-0.70	2.81	-0.43	-1.17	0.17	0.33	.
UY	Uruguay	-0.14	-51.92	.	-0.05	.	.	.	.	.
VC	Saint Vincent and the Grenadines	-6.83	-25.24	.	.	.	.	.	.	.
VE	Venezuela	-1.81	-61.30	.	-0.18	.	1.47	.	.	.
VN	Vietnam	-33.23	-78.32	.	.	.	-0.08	.	.	.
ZA	South Africa	4.07	15.02	.	0.18	0.00	0.04	.	.	.
ZM	Zambia	-1.69	-4.46	.	.	.	.	.	.	.
ZW	Zimbabwe	67.13	.	.	.	.	.	.	.	.

Note: Binding trade effects refer to Poisson estimates for which the impact of NTMs on import quantities was statistically different from zero at the 10% level.

Appendix 10 / Description of HS sections

Sections	*HS 2-digit*	*Product group description*
I	HS 01-05	Live animals and products
II	HS 06-14	Vegetable products
III	HS 15-15	Animal and vegetable fats, oils and waxes
IV	HS 16-24	Prepared foodstuff; beverages, spirits, vinegar; tobacco
V	HS 25-27	Mineral products
VI	HS 28-38	Products of the chemical and allied industries
VII	HS 39-40	Resins, plastics and articles; rubber and articles
VIII	HS 41-43	Hides, skins and articles; saddlery and travel goods
IX	HS 44-46	Wood, cork and articles; basketware
X	HS 47-49	Paper, paperboard and articles
XI	HS 50-63	Textiles and articles
XII	HS 64-67	Footwear, headgear; feathers, artif. flowers, fans
XIII	HS 68-70	Articles of stone, plaster; ceramic prod.; glass
XIV	HS 71-71	Pearls, precious stones and metals; coin
XV	HS 72-83	Base metals and articles
XVI	HS 84-85	Machinery and electrical equipment
XVII	HS 86-89	Vehicles, aircraft and vessels
XVIII	HS 90-92	Instruments, clocks, recorders and reproducers
XIX	HS 93-93	Arms and ammunition
XX	HS 94-96	Miscellaneous manufactured articles
XXI	HS 97-97	Works of art and antiques

For details see: http://unstats.un.org/unsd/tradekb/Knowledgebase/HS-Classification-by-Section.

Appendix 11 / Product descriptions of Figures 10 and 11

HS code	*Product group description*
02	Meat and edible meat offal
0201	Meat of bovine animals, fresh or chilled.
0202	Meat of bovine animals, frozen.
0203	Meat of swine, fresh, chilled or frozen.
0204	Meat of sheep or goats, fresh, chilled or frozen.
0205	Meat of horses, asses, mules or hinnies, fresh, chilled or frozen.
0206	Edible offal of bovine animals, swine, sheep, goats, horses, asses, mules or hinnies, fresh, chilled or frozen.
0207	Meat and edible offal, of the poultry of heading 01.05, fresh, chilled or frozen.
0208	Other meat and edible meat offal, fresh, chilled or frozen.
0209	Pig fat, free of lean meat, and poultry fat, not rendered or otherwise extracted, fresh, chilled, frozen, salted, in brine, dried or smoked.
0210	Meat and edible meat offal, salted, in brine, dried or smoked; edible flours and meals of meat or meat offal.
020711	Meat of fowls of species Gallus domesticus, not cut in pieces, fresh/chilled
020712	Meat of fowls of species Gallus domesticus, not cut in pieces, frozen
020713	Cuts and edible offal of species Gallus domesticus, fresh/chilled
020714	Cuts and edible offal of species Gallus domesticus, frozen
020724	Meat of turkeys, not cut in pieces, fresh/chilled
020725	Meat of turkeys, not cut in pieces, frozen
020726	Cuts and edible offal of turkey, fresh/chilled
020727	Cuts and edible offal of turkey, frozen
020732	Meat of ducks/geese/guinea fowls, not cut in pieces, fresh/chilled
020733	Meat of ducks/geese/guinea fowls, not cut in pieces, frozen
020734	Fatty livers of ducks/geese/guinea fowls, fresh/chilled
020735	Meat and edible meat offal of ducks/geese/guinea fowls (excl. of 0207.32-0207.34), fresh/chilled
020736	Meat and edible meat offal of ducks/geese/guinea fowls (excl. of 0207.32-0207.34), frozen

HS code	*Product group description*
04	Dairy produce, birds' eggs, natural honey, edible products of animal origin not elsewhere specified
0401	Milk and cream, not concentrated nor containing added sugar or other sweetening matter.
0402	Milk and cream, concentrated or containing added sugar or other sweetening matter.
0403	Buttermilk, curdled milk and cream, yogurt, kephir and other fermented or acidified milk and cream, whether or not concentrated or containing added sugar or other sweetening matter or flavoured or containing added fruit, nuts or cocoa.
0404	Whey, whether or not concentrated or containing added sugar or other sweetening matter; products consisting of natural milk constituents, whether or not containing added sugar or other sweetening matter, not elsewhere specified or included.
0405	Butter and other fats and oils derived from milk; dairy spreads.
0406	Cheese and curd.
0407	Birds' eggs, in shell, fresh, preserved or cooked.
0408	Birds' eggs, not in shell, and egg yolks, fresh, dried, cooked by steaming or by boiling in water, moulded, frozen or otherwise preserved, whether or not containing added sugar or other sweetening matter.
0409	Natural honey.
0410	Edible products of animal origin, not elsewhere specified or included.
040700	Birds' eggs, in shell, fresh/preserved/cooked
040811	Egg yolks, dried, whether/not containing added sugar/other sweetening matter
040819	Egg yolks (excl. dried), whether/not containing added sugar/other sweetening matter
040891	Birds' eggs, not in shell (excl. yolks), dried, whether/not containing added sugar/other sweetening matter
040899	Birds' eggs, not in shell (excl. yolks), other than dried, whether/not containing added sugar/other sweetening matter

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