

Compilation of a Database for Non-Tariff Measures from the WTO Integrated Trade Intelligence Portal (WTO I-TIP)¹

Mahdi Ghodsi², Oliver Reiter & Robert Stehrer

The Vienna Institute for International Economic Studies – wiiw

Rahlgasse 3, 1060 Vienna, Austria

www.wiiw.ac.at

Preliminary draft

Version: November 27, 2015

¹ This paper was produced as part of the project "Productivity, Non-Tariff Measures and Openness" (PRONTO) funded by the European Commission under the 7th Framework Programme, Theme SSH.2013.4.3-3 "Untapped Potential for Growth and Employment Reducing the Cost of Non-Tariff Measures in Goods, Services and Investment", Grant agreement No. 613504.

² Corresponding author: ghodsi@wiiw.ac.at

1 Introduction

Non-tariff measures (NTMs) are nowadays of growing importance as trade policy measures particularly in advanced economies due to already relatively low tariff rates on average. Consequently, NTMs are at the heart of discussion in recent negotiations of trade agreements.³ Despite this growing importance of NTMs in international trade, a consistent database with wide coverage across countries, time, and measures is still missing. The World Bank has also put great efforts in compiling data on Anti-Dumping measures (Bown, 2007) and other Temporary Trade Restrictiveness indicators (Bown, 2014). In this paper, we present first results on an effort to construct a database using information from the WTO Integrated Trade Intelligence Portal (WTO I-TIP), point out several data issues and suggest further steps in improving these data.

2 Data available from WTO I-TIP

The Economic Research and Statistics Division (ERSD) of the World Trade Organization (WTO) initiated the Integrated Trade Intelligence Portal (I-TIP) providing trade policy measures.⁴ The aim of I-TIP is to provide detailed information on both tariffs and non-tariff measures (NTMs) with the aim to increase transparency. In addition, summary information on trade, trade agreements, accession commitments, and dispute settlement registry of WTO members are provided within this portal.⁵ In this analysis, we draw on the NTM database provided in I-TIP.

Let us first give some brief explanations on the provided information within this database, its data collection methods, and its main weaknesses. The I-TIP NTM database covers 38,881 measures notified to the WTO secretariat since 1979 starting with three Anti-dumping (ADP) measures imposed by the United States on Sugar products imported from Belgium, France, and Germany. The last notification in the data used here is a Technical Barrier to Trade (TBT) imposed by Thailand on 9 March 2015 on manufacturing products. The following information is provided within the NTM data:

³ For example, Francois et al. (2013) using a CGE modelling argue that “Reducing non-tariff barriers will be a key part of transatlantic liberalisation. As much as 80% of the total potential gains come from cutting costs imposed by bureaucracy and regulations, as well as from liberalizing trade in services and public procurement.”

⁴ This can be found at: https://www.wto.org/english/res_e/statis_e/itip_e.htm

⁵ Due to some technical issues in downloading the whole data on NTM notifications, we are indebted to Joaquin Montes from ERSD who provided us the NTM notifications bulk database, in addition to his useful guidance and comments. Moreover, we are grateful to helpful comments and guidance of Jürgen Richter, Head Market Access Intelligence Section at ERSD.

- Members imposing: 137 WTO members⁶
- Affected partners: 179 countries in the world (including “All Members”)⁷
- Types of the NTMs (Notif.Req.):
 - Sanitary and phytosanitary measures (SPS) with 13,380 notifications,
 - SPS Specific Trade Concerns (STC) with 439 notifications,
 - Technical barriers to trade (TBT) with 18,830 notifications,
 - TBT STC with 460 notifications,
 - Anti-dumping (ADP) with 3,825 notifications,
 - Countervailing measure (CV) with 268 notifications,
 - Safeguard measures (SG) with 297 notifications,
 - Special Safeguards (SSG) with 581 notifications, and
 - Quantitative Restrictions (QR) with 801 notifications
- Dates of initiation, going into force, and withdrawal of measures:
 - For some few notifications, either initiation or into force date is missing. Some measures went in to force before they were notified (initiated). Although according to WTO agreements, measures should first be notified and after a certain time they can be implemented, emergency SPS measures can go into force instantly, while the initiation date would be notified later. However, this issue is also evident in TBT measures where there are no emergencies notified.
 - Another issue is regarding the date of withdrawal. According to the WTO ERSD, there is no information when the measures are withdrawn. However, for 2124 ADP, 156 CV and 184 SPS STC notifications, there is information on the date of withdrawal.
 - There is also another date reported as Column1, which indicates the end date reported in 191 QR, 2 SG, and all 581 SSG notifications. However, according to the ERSD, there is no information whether these measures have been out of force after these dates.
- Short summary of the measures, product description, products within Harmonized System (HS) classification from 2 digits to even 12 digits for 16,309 notifications, WTO interpreted HS codes for 4,790 notifications (27 of which have already HS codes notified), and International Classification Standards (ICS) for 8,681 notifications.
- Sub-requirements (subrq) and keywords of the issues covered in the measure
 - SPS: Emergency or Regular notifications reported in subrq; and 72 keywords of the issues covered in the notifications⁸.
 - TBT: 59 keywords of the issues covered in the notifications⁹.

⁶ The list of countries is reported in the appendix.

⁷ The list of countries is reported in the appendix.

⁸ The list of SPS keywords is reported in the appendix

⁹ The list of TBT keywords is reported in the appendix

- QR: Non-automatic licensing, Prohibition, Global quota allocated by country, Prohibition except under defined conditions, Global quota, and Voluntary export restraint are reported as subrq of notifications;
- SG: Tariff Increase - Specific, Quantitative Restriction/Quota, Tariff Increase - Ad valorem, Tariff Rate Quota, Variable Tariff, and Tariff Increase are reported as subrq of notifications
- SSG: Price based and volume based are reported as subrq of notifications
- Specific Trade Concerns (STC): Members are allowed to raise their concerns on other members' TBT and SPS measures through Committee minutes. This reverse notification system on TBT and SPS is called STC. Whether or not an STC is raised on TBT and SPS notifications is indicated in I-TIP (306 TBT and 170 SPS are indicated as STCs). However, there are 460 TBT STCs and 439 SPS STCs that have been notified by concerned (affected) members to Committee minutes, but their original notifications have not been reported by the imposing members. Therefore, STCs are drawn from two sources: WTO notifications (i.e. where I-TIP notifications are originally from) and Committee minutes recordings (i.e. the reverse notification system for all STCs).

The WTO agreements (TBT and SPS agreements explicitly) oblige members to notify complete information on their imposed measures in order to increase transparency. The information available in the NTM database should reflect this obligation. Providing information within the measures notifications on HS product classification and/or ICS is an important issue discussed within WTO agreements, which is mainly aimed at increasing the transparency. Product classifications are also important for conducting trade economic analyses. However, in spite of all its importance, the I-TIP database exhibits many missing HS codes at the focus of measures: for 22,572 of all notified measures (slightly less than 60% of all notified measures in the database) no HS code is reported.

In order to make this data more comprehensive and widen in coverage to be used in economic analysis, we tackled these missing information problems by matching as many HS codes as possible for those measures with missing HS codes. The procedure adopted is described in the next section.

3 Filling missing HS codes

Due to the missing information of HS codes in slightly less than 60% of the 38,881 notifications a first step is to improve the data with respect to that dimension.

3.1 Finding HS codes:

In order to improve the data we are trying to fill in the HS codes. Since there are many missing HS codes in the data, it would not be simply feasible to find the corresponding HS codes for each of the measures based on the product description manually. Therefore, we go through the following steps to fill in the missing HS codes:

Step 1: WTO interpreted HS

Based on the interpretation of measures and product descriptions the WTO has filled some HS codes. Therefore, where available, we replaced missing HS codes with these “WTO interpreted HS codes”. This fills 4756 of the measures with missing HS codes.

Step 2: Using information from the International Classification Standards (ICS)

TBT and SPS agreements of the WTO ask members to notify the ICS classification of the products at the focus of the measures. However, for most measures where an ICS classification is reported either HS codes or WTO interpreted HS codes are already available. There are only 14 measures that have ICS codes but no HS codes. We map the ICS codes to HS codes using a correspondence table which is available from the WTO website.

Some countries include ICS or CAS (a classification for chemical products) in the product description. We extract the ICS or CAS codes from the description and match the corresponding HS code. This yields, respectively, 826 and 10 measures with HS codes filled in.

Step 3: Finding matches in already filled HS codes

The third step that we take for filling the missing HS codes is to look for the same product descriptions in the measures that already have assigned HS codes. In other words, we match the product description of the measures lacking HS codes with the ones that already have HS codes and fill in the missing ones with the ones already filled in the raw data. For this step, we use a cleaned and stemmed¹⁰ version of the product description. With this step, we can find HS codes for 4564 measures with previously missing HS codes.

Step 4: HS product classifications

HS codes and their descriptions are available for example in World Integrated Trade Solution (WITS). The next step is to match the product descriptions within NTMs lacking HS codes, with the main classifications provided by WITS. Similar to previous step, matching on word stems is considered here. Unfortunately, product descriptions at 6-digit level of HS are very repetitive across higher aggregated levels of HS codes. For instance, there are many product

¹⁰ Stemming reduces a word to its word stem, i.e., it removes inflections. E.g., “fishes” would be reduced to “fish”.

descriptions “others” within each 2-digit product, which makes it infeasible to match with the product description in the I-TIP. Hence, this step proves to be error-prone and the matches we find were very often unreliable. Therefore, we do not use the results from this step.¹¹

Step 5: Product description containing “all”

48 measures have the product description “all” or “all commodities”. We assign all two-digit HS codes for those measures.

Step 6: Using TTBD

Temporary Trade Barriers Database (TTBD) released by the World Bank (Bown, 2014) is another database covering some quantitative NTMs. TTBD provides information on ADP, CV, SG, and China-specific Safeguards (CSG). Similarly to I-TIP, TTBD covers bilateral trade measures on products up to even twelve-digit of HS. We fill the remaining missing HS codes in the I-TIP matching bilateral countries, year of initiation (or in force), and NTM types. The dates reported in both databases are daily-based. Due to slight differences in the days reported by the two databases, the matches between the two are based on the year rather than days reported. We match the two databases on three sets of variables: first, we match by bilateral countries and exact dates. Secondly, we match by bilateral countries and the year of initiation (or in force). Thirdly, we match by the imposing countries and the year of initiation (or in force). After each matching step, we compare the two product descriptions with a string kernel¹² and include matches with a sufficiently high correspondence (goodness of fit). The outcome of matching is generating 1045 measures with filled HS codes in the I-TIP.

Step 7: Matching by set comparisons

A product description is a string, but also a set of words. Until now, we only matched on the whole string. In this step, we separate each product description into a set of words and compare the set of a product description of a measure *without* HS codes with the set of a product description of a measure *with* HS codes. The “goodness of fit” of the two descriptions is measured by the Tverky (1977) index with parameters $\alpha = \beta = 0.5$ ¹³. We only include matches where the maximal goodness of fit is above 0.7. 2289 measures can be filled with HS codes with this step.

¹¹ We tried a few methods to match the HS descriptions with the NTM descriptions. Unfortunately, the way the HS database is created (especially the hierarchical system) makes it difficult to do this matching. What would be possible, however, would be to take another product classification (ICS, GTAP, SITC), try to match with the description and convert the matches to HS codes using correspondence tables.

¹² We use a string kernel that takes two strings (the two product descriptions) as arguments and computes the number of matching substrings of length of at least 3. See Karatzoglou and Feinerer (2010) for a discussion of string kernels and their implementation.

¹³ The Tversky index is calculated as $S(X, Y) = \frac{|X \cap Y|}{|X \cap Y| + \alpha|X - Y| + \beta|Y - X|}$

In the raw I-TIP data, only 16,309 of a total of 38,881 measures had HS codes. The rest, 22,572 measures, had missing HS codes and were thus unsuitable for an economic analysis. With our efforts, we reduced the number of measures with missing HS codes down to 9037 (or less than 25% of notified measures). Table 1 gives an overview of the origin of HS codes in our database after carrying out steps 1 through 7¹⁴.

Table 1- NTM Coverage by classification

HSOrigin	ADP	CV	QR	SG	SPS	SPS STC	SSG	TBT	TBT STC	Sum
HS Original	1494	114	618	222	7506	335	581	5363	52	16285
HS missing before	2331	154	183	75	5874	104	0	13467	408	22596
after taking steps 1 – 8:										
Step 1: WTO	0	0	159	0	565	0	0	4039	0	4763
Step 2: ICS/CAS	0	0	0	0	307	0	0	543	0	850
Step 3: Match	813	34	0	33	1751	0	0	1797	136	4564
Step 4: all	0	0	0	0	16	0	0	32	0	48
Step 5: TTBD	1020	25	0	0	0	0	0	0	0	1045
Step 6: Approx Match	203	56	0	18	729	0	0	1210	73	2289
HS missing after	295	39	24	24	2506	104	0	5846	199	9037
Sum	3825	268	801	297	13380	439	581	18830	460	38881

Source: WTO I-TIP; wiiw calculations.

3.2 Revisions of HS codes

The HS classification system has been revised a few times since it came in effect in 1988. To guarantee the greatest possible coherence of the data, we check if all HS codes are valid according to one of the revisions. We choose the HS Revision 2002 to be our baseline and convert HS codes from other revisions to the HS 2002 revision.

HS revision of the notified measures is not known, as different countries use different revisions during years. Using correspondence tables provided by WITS, we convert all product codes to HS revision 2002.

4 Coverage of WTO I-TIP data

¹⁴ Please note that the number of NTMs that have filled-in HS codes at the beginning of the process are 16,309, while the table indicates 16,285. This is because the HS codes of these Notifications did not belong to any of the HS revisions we use. Thus, they are treated as invalid and were removed.

Table 1 provides the number of measures by the end of 2014 by type of non-tariff measures and missing or imputed HS codes; this information is summarized in terms of frequencies in Table 2.

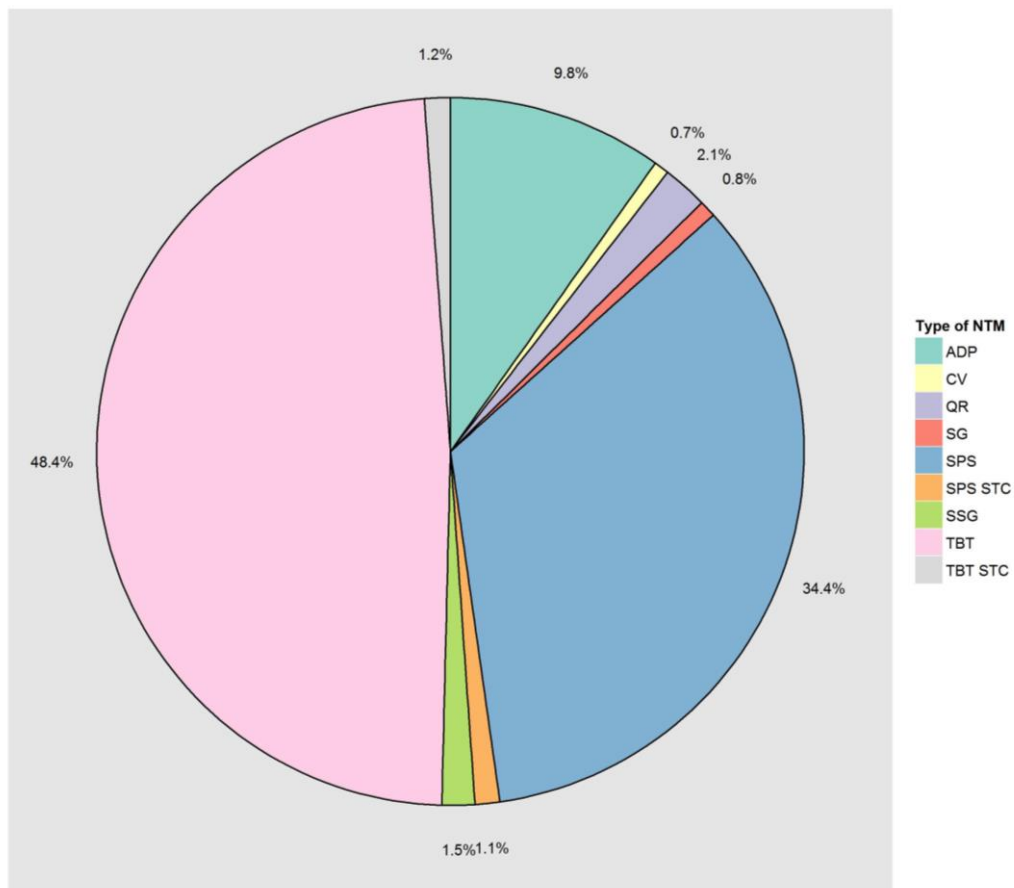
4.1 Overall number of measures

Considering first the overall number of measures (last row in Table 1), Figure 1 depicts the overall number of imposed measures, separated by the type of non-tariff measure. TBT covers approximately half of all NTM, followed by SPS with 35%. Anti-dumping measures are the third largest group with about 10% of all measures, while the remaining non-tariff measure types play negligible roles.

Figure 2 shows the number of non-tariff measures that are in force in a given year (or initiated where in force date is not available), separated by different types of NTMs. We see a steady increase in the number of imposed non-tariff measures. TBT and SPS increase heavily over the years, whereas ADP grows until 2002 and remains almost unchanged afterwards. QR played a minor role until 2011 and then jumped from 169 to over 600 notifications in 2012 and remained on that level afterwards. SSG was only a temporary phenomenon: It increased from 0 in 1994 to 520 in 2005, and remained unchanged afterwards. After 2012, there were no more SSG imposed.

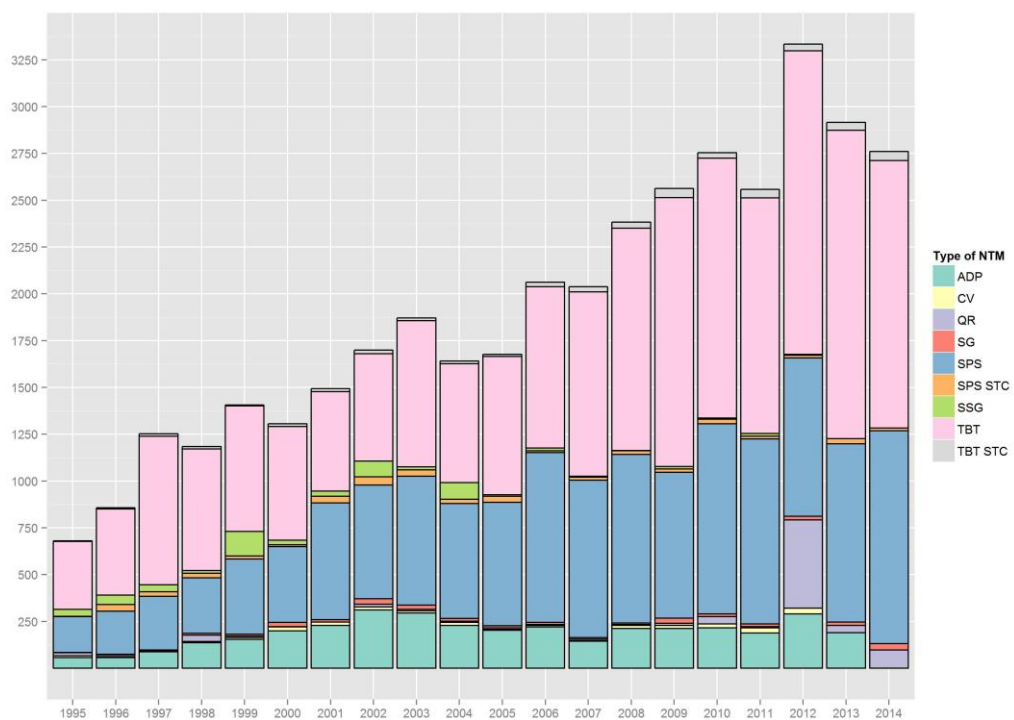
The interesting issues in Figure 2 are the sudden increases in the number of NTMs in some specific years. As the World Trade Report (2012) states, during recent crisis there has been an intensive use of TBT and SPS measures to control the market frictions, which is observed here as the share of these two NTMs among all NTMs increased in 2007. Another jump is a sudden increase in the number of QRs in force in 2012. 471 QRs went in force from January 2012 to October 2012. Australia, Hong Kong, and New Zealand with respectively 118, 102, and 82 QRs are the main countries imposing largest number of QRs in 2012.

Figure 1- Number of notified NTMs by the end of 2014



Source: WTO I-TIP; wiiw calculations.

Figure 2- Evolution of NTMs: Number of NTMs over time, by types of NTM



Source: WTO I-TIP; wiiw calculations.

Table 2- NTM Coverage by classification (frequencies)

HSEOrigin	ADP	CV	QR	SG	SPS	SPS STC	SSG	TBT	TBT STC	Sum
HS Original	3,8	0,3	1,6	0,6	19,3	0,9	1,5	13,8	0,1	41,9
HS missing before	6,0	0,4	0,5	0,2	15,1	0,3	0,0	34,6	1,0	58,1
Step 1: WTO	0,0	0,0	0,4	0,0	1,5	0,0	0,0	10,4	0,0	12,3
Step 2: ICS/CAS	0,0	0,0	0,0	0,0	0,8	0,0	0,0	1,4	0,0	2,2
Step 3: Match	2,1	0,1	0,0	0,1	4,5	0,0	0,0	4,6	0,3	11,7
Step 4: all	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,1
Step 5: TTBD	2,6	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	2,7
Step 6: Approx Match	0,5	0,1	0,0	0,0	1,9	0,0	0,0	3,1	0,2	5,9
HS missing after	0,8	0,1	0,1	0,1	6,4	0,3	0,0	15,0	0,5	23,2
Sum	9,8	0,7	2,1	0,8	34,4	1,1	1,5	48,4	1,2	100,0

HSEOrigin	ADP	CV	QR	SG	SPS	SPS STC	SSG	TBT	TBT STC	Sum
HS Original	39,1	42,5	77,2	74,7	56,1	76,3	100,0	28,5	11,3	41,9
HS missing before	60,9	57,5	22,8	25,3	43,9	23,7	0,0	71,5	88,7	58,1
Step 1: WTO	0,0	0,0	19,9	0,0	4,2	0,0	0,0	21,4	0,0	12,3
Step 2: ICS/CAS	0,0	0,0	0,0	0,0	2,3	0,0	0,0	2,9	0,0	2,2
Step 3: Match	21,3	12,7	0,0	11,1	13,1	0,0	0,0	9,5	29,6	11,7
Step 4: all	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,2	0,0	0,1
Step 5: TTBD	26,7	9,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	2,7
Step 6: Approx Match	5,3	20,9	0,0	6,1	5,4	0,0	0,0	6,4	15,9	5,9
HS missing after	7,7	14,6	3,0	8,1	18,7	23,7	0,0	31,0	43,3	23,2
Sum	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

HSEOrigin	ADP	CV	QR	SG	SPS	SPS STC	SSG	TBT	TBT STC	Sum
HS Original	9,2	0,7	3,8	1,4	46,1	2,1	3,6	32,9	0,3	100,0
HS missing before	10,3	0,7	0,8	0,3	26,0	0,5	0,0	59,6	1,8	100,0
Step 1: WTO	0,0	0,0	3,3	0,0	11,9	0,0	0,0	84,8	0,0	100,0
Step 2: ICS/CAS	0,0	0,0	0,0	0,0	36,1	0,0	0,0	63,9	0,0	100,0
Step 3: Match	17,8	0,7	0,0	0,7	38,4	0,0	0,0	39,4	3,0	100,0
Step 4: all	0,0	0,0	0,0	0,0	33,3	0,0	0,0	66,7	0,0	100,0
Step 5: TTBD	97,6	2,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	100,0
Step 6: Approx Match	8,9	2,4	0,0	0,8	31,8	0,0	0,0	52,9	3,2	100,0
HS missing after	3,3	0,4	0,3	0,3	27,7	1,2	0,0	64,7	2,2	100,0
Sum	9,8	0,7	2,1	0,8	34,4	1,1	1,5	48,4	1,2	100,0

Source: WTO I-TIP; wiiw calculations.

4.2 Measures with HS codes

4.2.1 Structure of HS imputation

As already mentioned, many measures with missing HS codes in the raw I-TIP data are matched with their respective HS codes. Table 2 provides some frequency statistics. Before filling in HS codes, TBTs had the largest number of missing HS codes with 71.5%, ADP with 60.9%, CV with 57.5%, and SPS with 43.9% of all their notifications in the raw data. After the imputation steps, these numbers dropped to 31% for TBTs, 7.7% for ADP, 14.6% for CV, and 18.7% for SPS. Thus, the procedure reduced the number of missing HS codes for ADP considerably. For other measures the share of missing HS codes has been halved.

Figures 3 through 5 give a graphical overview of the origins of the HS codes in the database. 23.2% of all NTMs still have missing HS codes. Interpreted HS codes by the WTO members (i.e. usually trade partners facing the NTMs) covers the largest share of filled HS codes with 12.3% of all NTMs, which might be quite reasonable as the first step of imputation. However, the accuracy of WTO interpreted HS codes is not completely accredited by the WTO ERSD¹⁵.

The second step of imputation, which includes finding the corresponding HS codes for the notified ICS codes does not improve the data. The main reason is that the correspondence table between the ICS and HS codes does not include many of the codes in both classifications. This correspondence table is provided by the ERSD that can be improved significantly. However, another part of this step is to find the HS codes for the written ICS and CAS codes within the product description. The data improvement found HS codes for 2.2% of all NTMs, mainly based on the ICS codes written in the product descriptions. These cases are essentially in the recent years (2012-2014). It is important to note that very few HS codes are found based on the CAS codes within the product description.

The third step of the imputation is the second largest improvement in the data, covering 11.7% of NTMs with newly filled HS codes. Another negligible improvement in the data is where the product description refers to all products. 0.1% of all NTMs have filled HS codes from the fifth step of imputation. NTMs with filled HS codes after matching the data with TTBD – step six – cover 2.7% of all NTMs. This, in fact, seems to be a large improvement as TTBD only covers bilateral quantitative NTMs on specific detailed products. Finally, the last step of imputation – which is a string set comparison – is the third largest improvement in the data. String set matching of the product description between NTMs with missing and NTMs with non-missing HS codes, renders newly filled HS codes for 5.9% of all NTMs.

¹⁵ During the discussions in the second PRONTO workshop in Amsterdam, 27-28 May 2015, WTO ERSD emphasized that the I-TIP is as it is notified and the WTO-interpreted HS codes are mainly the ones reported by the WTO members and not by ERSD. Moreover, it was stated that in spite of indicated date of withdrawal for some NTMs, there is no solid information whether or not the NTM is out of force.

Figure 3: Number of NTMs in %, by origin of HS code

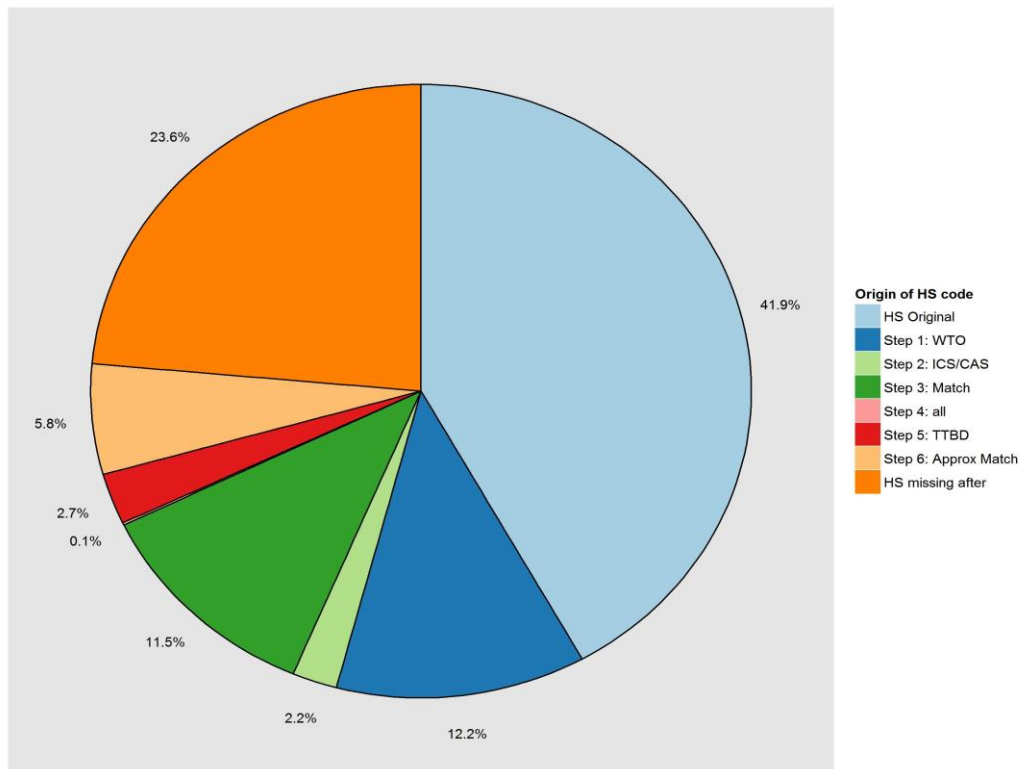
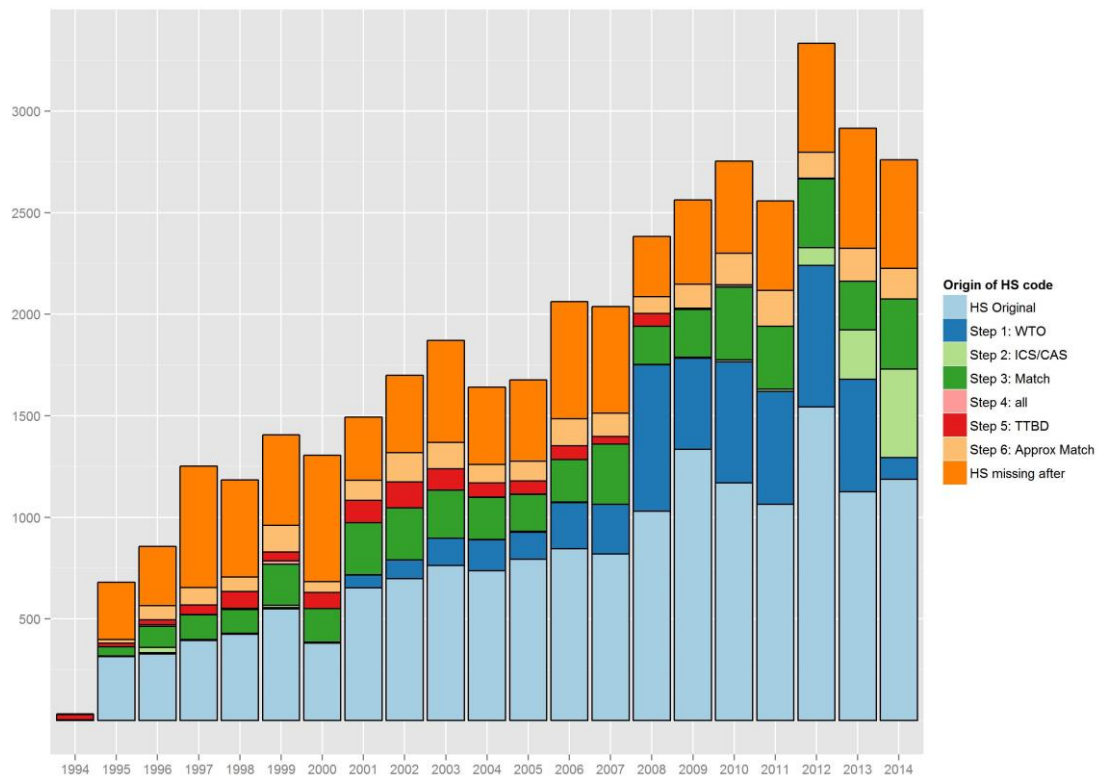


Figure 4: Number of NTMs, by origin of HS code and year imposed

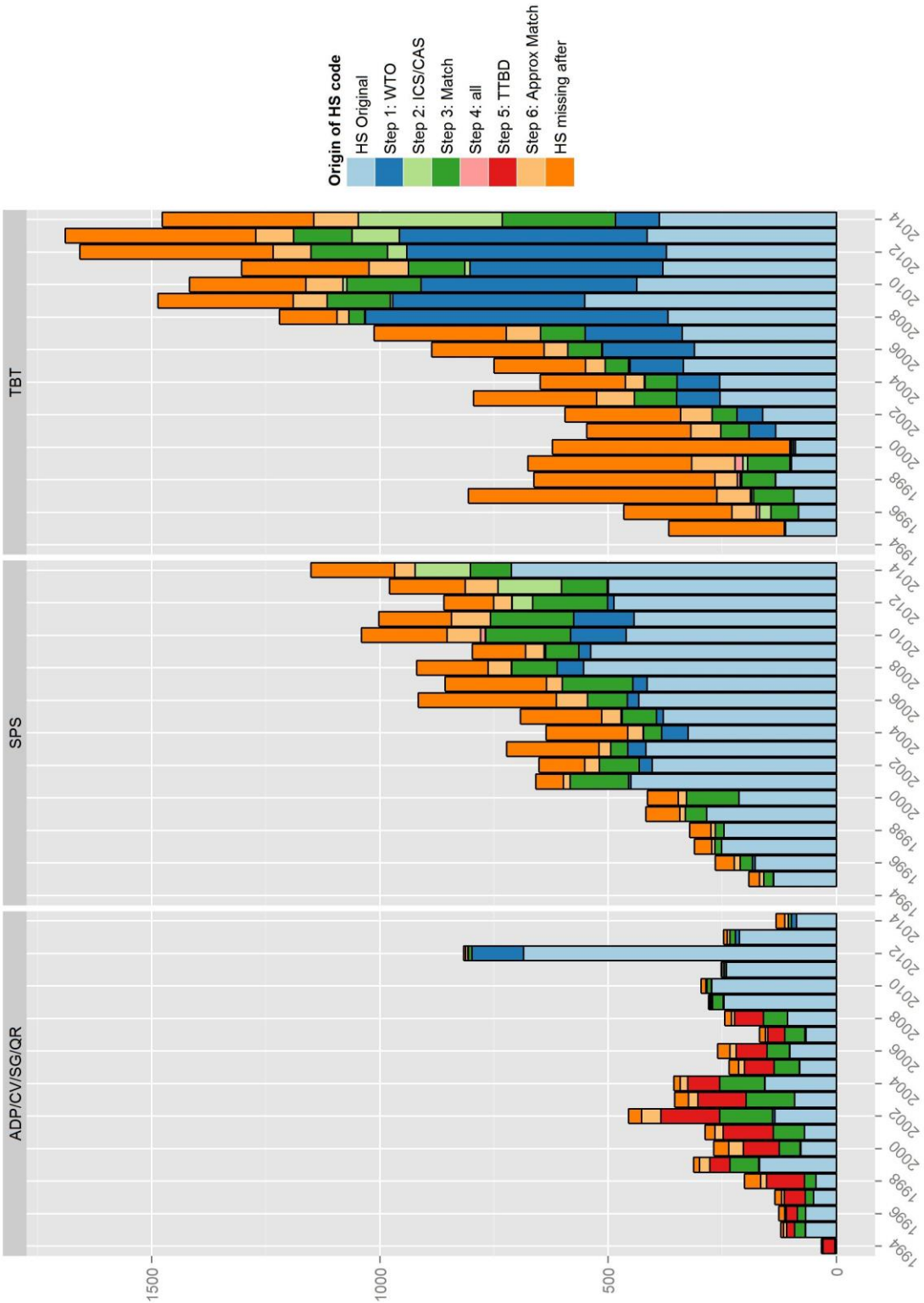


Source: WTO I-TIP; wiiw calculations.

As observed in Figure 4, the share of NTMs with missing HS codes is larger in the earlier years of the sample. WTO agreements went in force in 1995 and notifications to the WTO started afterwards. Although there are NTMs in the data initiated since 1979, we cannot completely guarantee the completeness and accuracy of the data for the period before 1995. Moreover, large share of missing HS codes in the first years of WTO establishment shows that product description, and in general information provided within the early notifications are imprecise as members had been less experienced with technicalities.

HS codes found from the TTBD could essentially improve the data up to 2008. The reason behind is that the quantitative NTMs after 2008 were better notified to the WTO with more detailed information, and there were fewer missing HS codes within the notifications. Figure 5 supports the idea of good notification procedure on quantitative NTMs (left panel), as the share of HS codes from the original source of data is very large after 2008. However, in 2012, a large share of HS codes is not coming from the original source but from the HS codes interpreted by the WTO members. After 2007 financial crisis, usage of NTMs, especially quantitative restrictions have increased. In order to increase the transparency of trade policies, WTO motivated member states to notify their NTMs, which would potentially improve market efficiencies.

Figure 5: Number of NTMs, by origin of HS code and type of NTM



Source: WTO I-TIP; wiiw calculations.

4.2.2 The structure of NTMs by product group

In Figure 6, we group each non-tariff measure into broad product chapters within HS. Contrary to the other graphs in this section, Figure 6 does not include measures with missing HS codes.

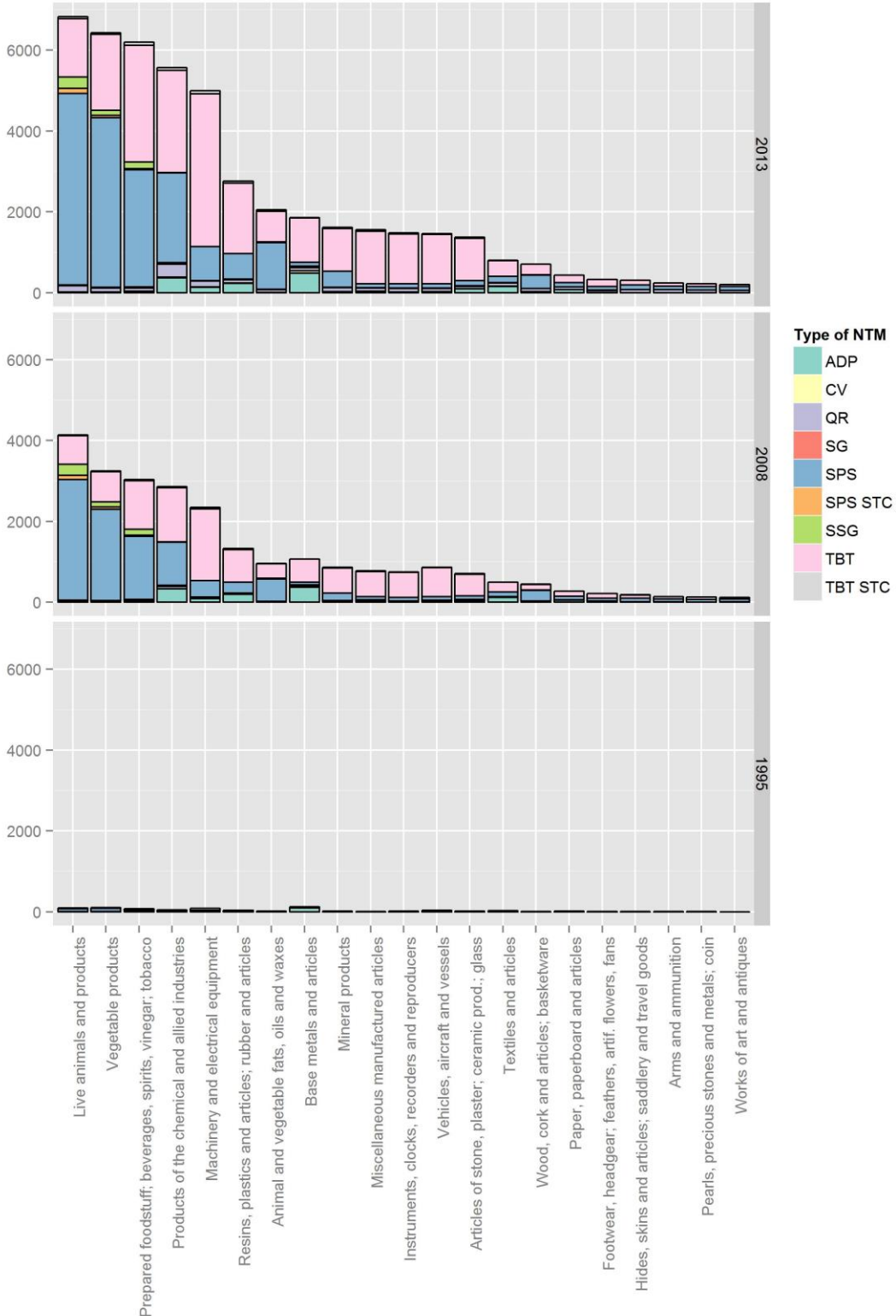
As it is observed, most measures fall under the categories agricultural and processed agricultural products (live animals, vegetables, fats, oils and waxes, prepared foodstuff and beverages). A large number of NTMs on food products indicates the sensitivity and importance of trade on these products. Most of the measures found in food categories are SPS. This is quite reasonable as SPS are mainly imposed on food and agricultural products concerning health, safety, plant, animal and environmental issues.

Products of chemical industries are also a common target for non-tariff measures. This is also the category where the most of QR and ADP measures fall in. ADP can also be found in the category of base metals.

Machinery and electronic equipment are the third big group of products that are affected by non-tariff measures. Technical regulations and standards that are originally covered within TBTs account for the largest share in this category.

Generally, one can see from Figure 5 that SPS measures are more commonly used for agricultural and food products, whereas TBTs can be found in manufacturing product categories, such as machinery, vehicles and instruments.

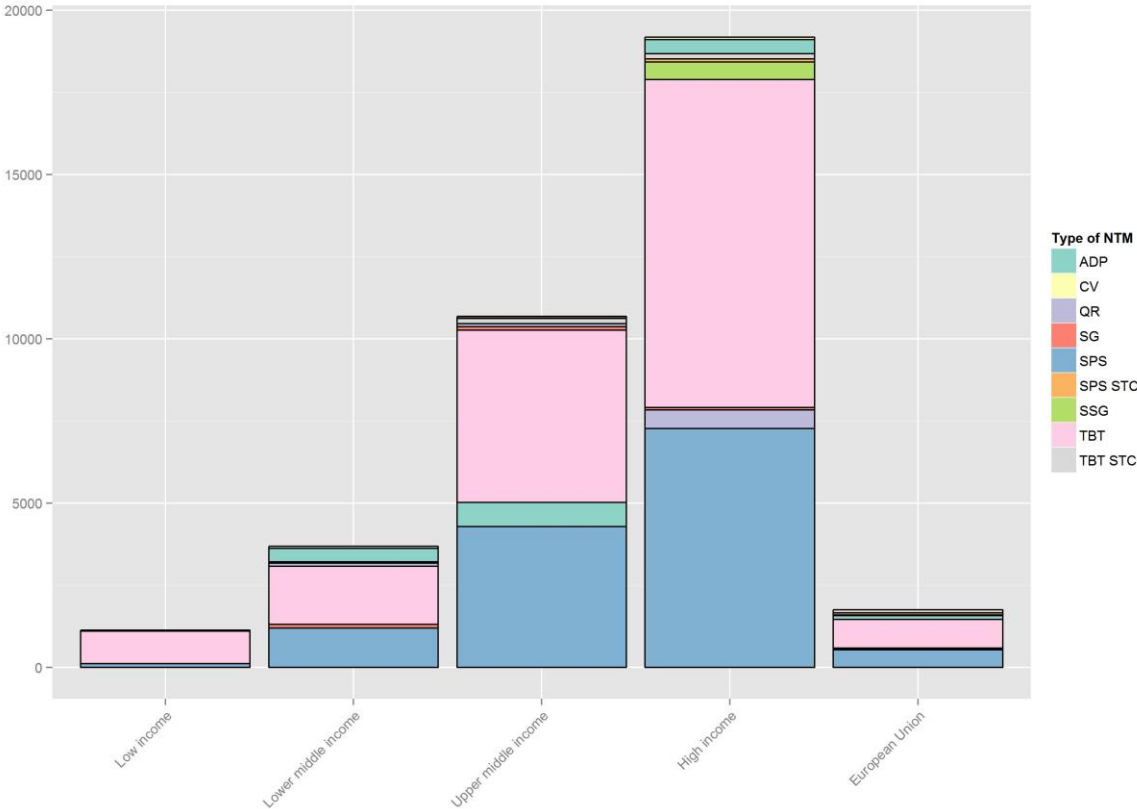
Figure 6- Number of NTMs by product category



Source: WTO I-TIP; wiiw calculations.

Figure 7 shows the number of non-tariff measures that were in force in 2014 separated by economic development of the imposing countries. We use the classification of the World Bank, published in January 2015 which groups the countries into low, lower middle, upper middle and high income countries. We include the European Union separately as the NTMs legislated by the EU commission is common for all 28 EU member states. The bar for the European Union counts all NTMs that were imposed by the European Union as a whole. However if an individual country (e.g., Belgium) imposed an NTM independently, we would find it under the high income countries.

Figure 7- Number of NTMs, by the imposing country groups in 2014

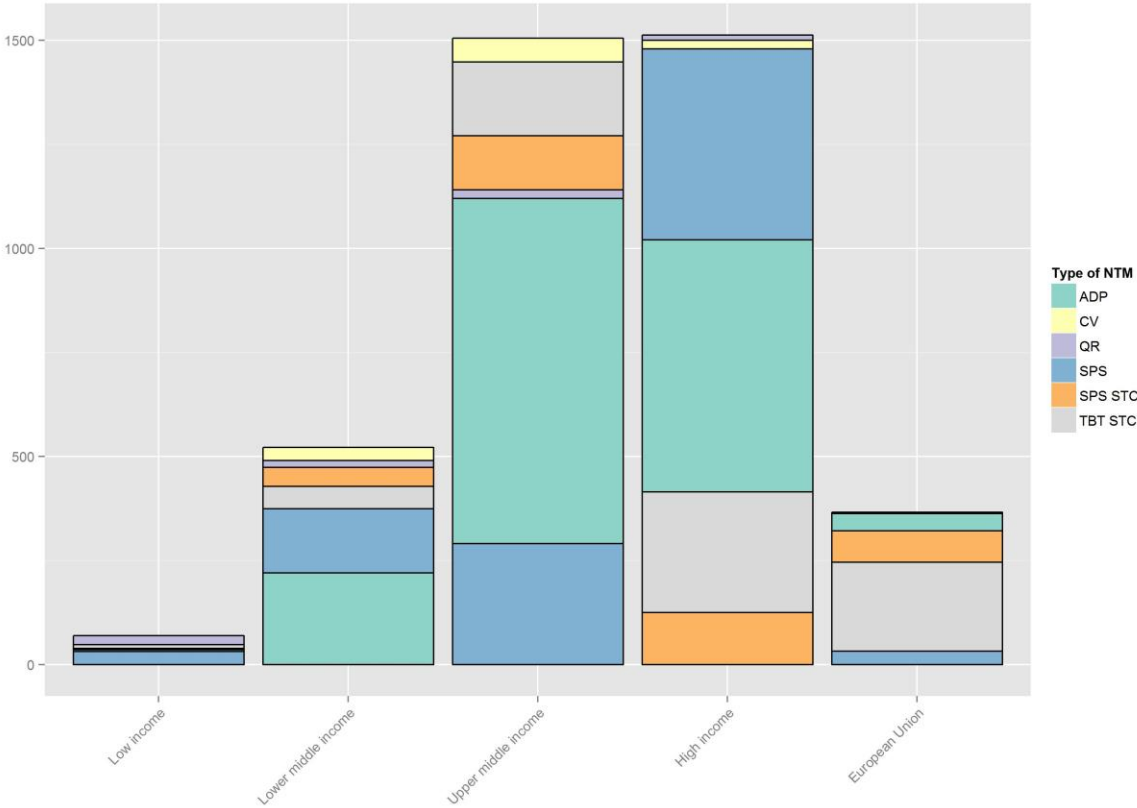


Source: WTO I-TIP; wiiw calculations.

We see that high-income countries imposed the largest amount of measures (19179). This number is to a large extent divided into TBT and SPS: 9977 and 7269 respectively. However, the overall picture is that the less advanced the countries are, the fewer measures they impose. However, a general overview shows that the number ADP imposed by upper-mid-income is larger than the ones imposed by high-income countries. Low-middle, upper-middle, and high-income economies are respectively imposing 410, 736, and 430 ADPs. While low-income countries do not impose any APD, there are 125 ADP cases imposed by the EU. Considering the EU as a group of countries, the average NTM imposed by country for the EU is comparably much smaller than the NTMs imposed by other high-income countries such as the US, Japan, or Canada as single countries.

The low income countries had only 1128 measures imposed until 2014, of which 993 were TBTs. In sum, the European Union (as a whole) imposed even more measures (with 1748) than low income countries did in our database together. Considering TBT and SPS as qualitative core NTMs, and the rest as the Quantitative NTMs, share of qualitative NTMs in all imposed measures is around 90% for the whole database. This share is 82% for low-middle income economies. Qualitative regulations mostly follow high levels of standards and high levels of production techniques. In other words, a country can implement restrictive trade regulations based on qualitative criteria if it already enjoys high level of standards on its domestic production; otherwise, it would be easier to restrict trade based on non-qualitative measures. This issue is observed for lower-middle income economies, as they cannot easily compete with higher-income economies which are blessed with higher qualities and standards.

Figure 8- Number of NTMs, by the individual affected country groups



Note: Not including NTMs imposed on “All members”
Source: WTO I-TIP; wiiw calculations.

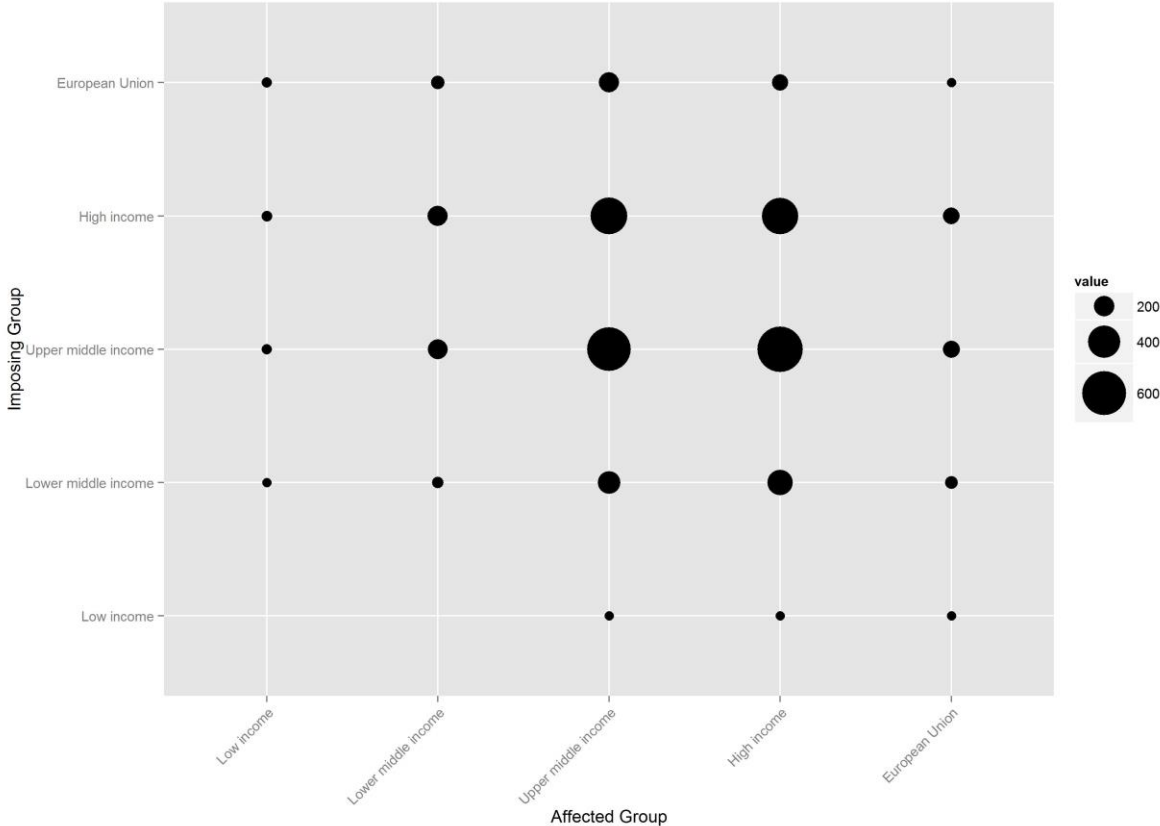
The same grouping is applied with respect to the affected countries which are shown in Figure 8. The by far largest part of measures (33,241) is imposed on “all members”, i.e., all WTO countries. It is important to mention that TBTs and the majority of SPS measures are imposed against all members. However, TBT and SPS STCs are bilateral concerns of specific partners against imposed measures. To keep the graph interpretable, we show only the measures where the country affected was not “all members”. Thus, apart from “all members”, upper middle

income and high income countries are the most affected groups. There are 1505 and 1513 measures imposed against these two country groups.

It is interesting to note what types of non-tariff measures are imposed, when “all members” are excluded, which is depicted in Figure 8. ADPs and SPS are the predominantly imposed types of measures. TBTs, on the contrary, are solely imposed on “all members”. However, considering specific trade concerns (STC) on TBT and SPS, we can always find single affected countries. The reason is quite clear as STCs are reverse notifications by the affected countries. Hence, the affected country notifies to the WTO committee minutes recording regarding a TBT or SPS it is facing and raising concern on.

In Figure 9, we finally plot the imposing income groups versus the affected income groups. The size of the circle indicates the number of non-tariff measures that are in place in 2014. As in Figure 8, we do not consider cases, where the affected group was “all members”. Thus, the imposing groups in Figure 6 do not correspond to the imposing groups in Figure 7. We observe that non-tariff measures are imposed by and affect predominantly upper middle and high income countries. This is in line with the previous two graphs, where we have seen the same pattern.

Figure 9- Imposing groups vs. affected groups by number of NTMs in 2014



Note: Not including NTMs imposed on “All members”
Source: WTO I-TIP; wiiw calculations.

5. NTMs and trade flows

The measures for which HS codes are available (after the imputation steps) resulted in an I-TIP NTM bilateral panel database with a much larger coverage concerning HS-codes as compared to the raw data. This bilateral panel database shows the number of each type of NTMs in force for a 6-digit HS product imposed by a reporter country against the trade partner. Therefore, this data shows the total number of notified measures up to the current year that are not yet withdrawn.

This will be finally merged with detailed HS 6-digit trade data taken from UN COMTRADE. The count data will therefore be merged with bilateral trade data, which will be used in further analysis.

Table 3- Affect bilateral flows by NTMs (2002-2013)

NTM	Aff. Flows	Mean	Imports in \$Bill.	% flows	% WLD Imports
ADP	16386	13808.61	226.2679	0.02%	0.17%
SPS	3611573	4855.953	17537.63	5.20%	13.26%
TBT	8813589	3651.995	32187.18	12.68%	24.33%
QNTM	660591	5328.296	3519.824	0.95%	2.66%
All flows	69502170	1903.465	132294.9	100.00%	100%

Source: I-TIP, UN COMTRADE, TRAINS, calculation by wiiw

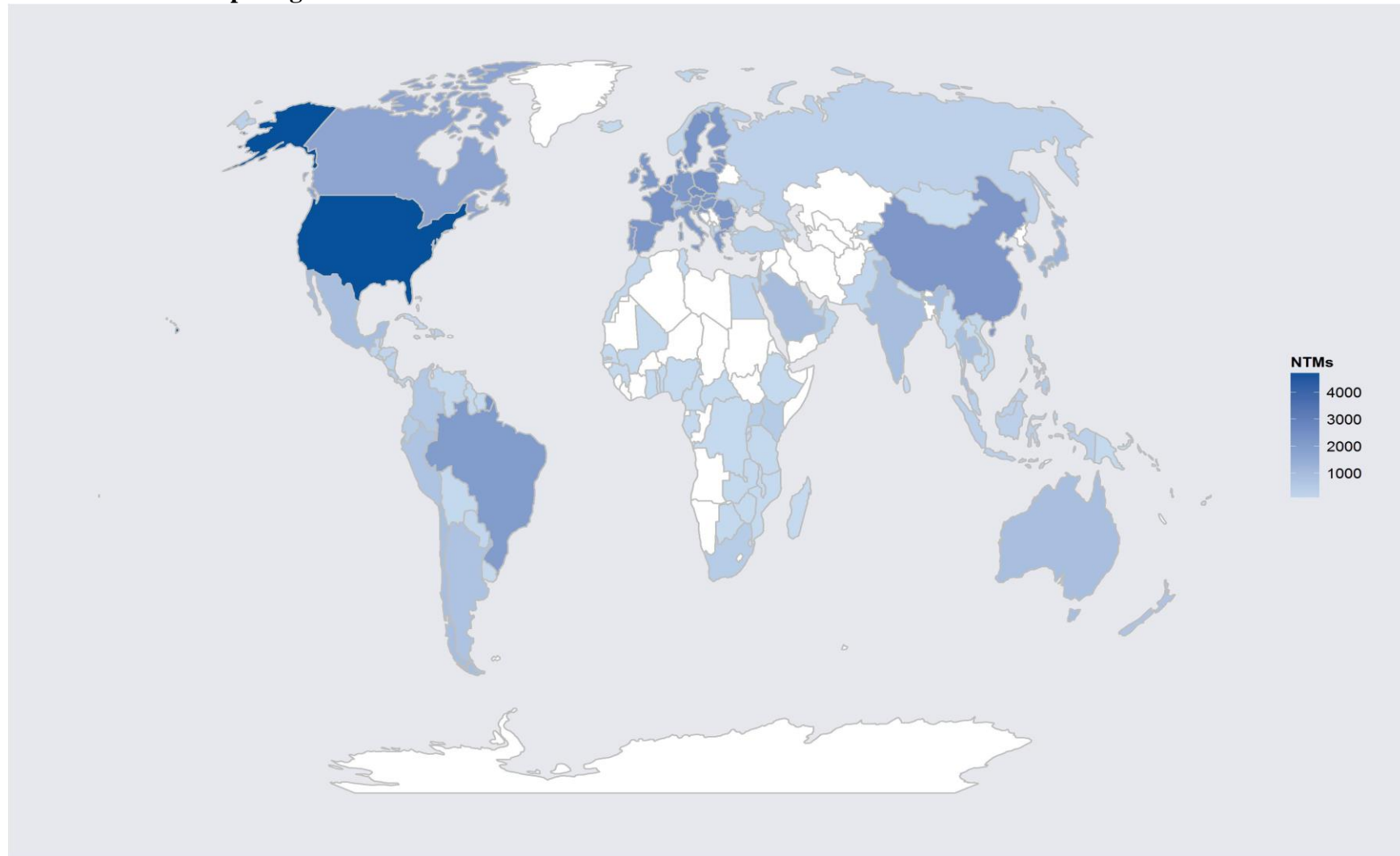
Table 3 presents the affected trade flows by the imposed NTMs (with imputed HS codes) during the period from 2002 to 2013. After merging the count NTM data with the import trade flows in HS revision 2002 at 6-digit level, we observe that TBTs maintained by the WTO members are affecting 12.68% of all bilateral flows in the world. These regulations are affecting almost a quarter of total import values of the world. SPS are the next influential measures affecting 5.2% of all trade flows comprising 13.26% of total world imports values during the period. ADP measures have minor influence on bilateral flows. However, the affected trade flows by ADP are substantially large in the average magnitude of the trade values. In average, the trade flows at the focus of ADPs are over seven times the average import values of all bilateral import values. This shows that in spite of fewer affected bilateral flows by ADP, the affected import values are essentially higher than flows affected by other NTM types. The rest of NTMs are affecting almost 1% of all bilateral flows, which has impact on 2.66% of total world import values.

References

- Bown, C. P. (2007). Global antidumping database version 3.0. World Bank Policy Research Working Paper, (3737).
- Bown, C. P. (2014). Temporary Trade Barriers Database, The World Bank. Available on line at: <http://go.worldbank.org/W5AGKE6DH0>
- Francois, J., M. Manchin, H. Norberg, O. Pindyuk, and P. Tomberger (2013), Reducing Transatlantic Barriers to Trade and Investment - An Economic Assessment, Study for the European Commission, Prepared under implementing Framework Contract TRADE10/A2/A16;
http://trade.ec.europa.eu/doclib/docs/2013/march/tradoc_150737.pdf
- Karatzoglou, Alexandros, and Ingo Feinerer. "Kernel-based machine learning for fast text mining in R." *Computational Statistics & Data Analysis* 54.2 (2010): 290-297.
- Tversky, Amos (1977). "Features of Similarity". *Psychological Reviews* 84 (4): 327–352.

Appendix:

1- Countries imposing NTMs



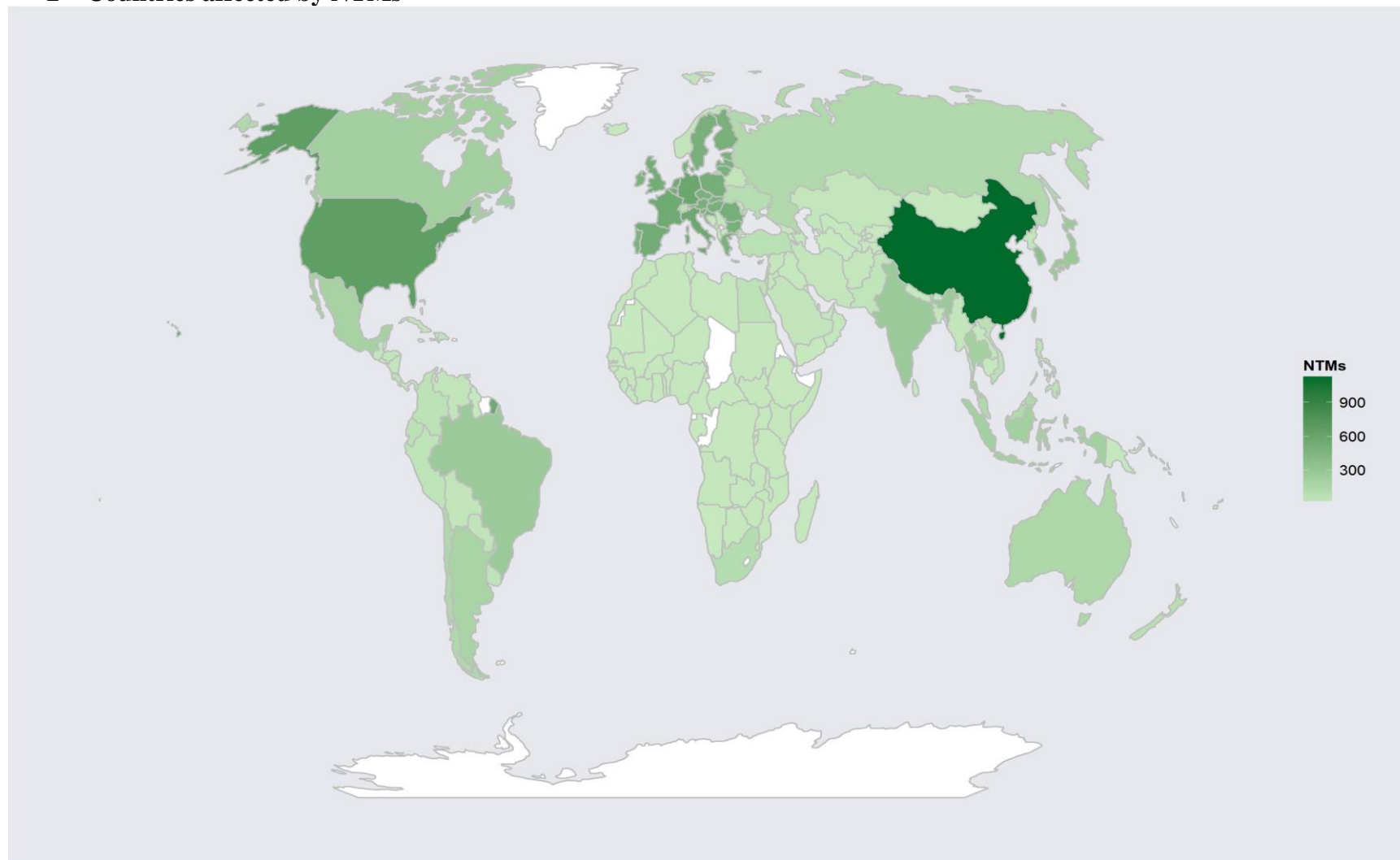
Source: I-TIP; wiiw calculations.

Table 4- Countries maintaining NTMs

No	Country	SPS	TBT	QNTM	Total	No	Country	SPS	TBT	QNTM	Total
1	Albania	181	66	0	247	69	Kyrgyzstan	0	33	4	37
2	Antigua and Barbuda	4	0	0	4	70	Laos	1	1	12	14
3	Argentina	179	341	231	751	71	Latvia	46	31	10	87
4	Armenia	24	72	2	98	72	Lithuania	0	25	1	26
5	Australia	353	198	316	867	73	Macao	15	6	10	31
6	Austria	1	4	0	5	74	Macedonia	4	7	0	11
7	Azerbaijan	2	0	0	2	75	Madagascar	11	0	0	11
8	Bahrain	153	372	0	525	76	Malawi	1	0	0	1
9	Barbados	2	10	23	35	77	Malaysia	33	211	56	300
10	Belgium	10	208	0	218	78	Mali	21	2	20	43
11	Belize	9	5	0	14	79	Mauritius	12	4	0	16
12	Benin	6	2	0	8	80	Mexico	273	459	140	872
13	Bolivia	19	24	0	43	81	Moldova	3	25	2	30
14	Botswana	3	38	0	41	82	Mongolia	2	7	0	9
15	Brazil	1014	729	275	2018	83	Morocco	39	26	13	78
16	Brunei Darussalam	3	2	0	5	84	Mozambique	2	9	0	11
17	Bulgaria	27	0	7	34	85	Myanmar	0	1	0	1
18	Burundi	3	1	0	4	86	Nepal	20	4	0	24
19	Cabo Verde	1	0	0	1	87	Netherlands	68	615	0	683
20	Cambodia	0	3	0	3	88	New Zealand	511	98	123	732
21	Cameroon	0	8	0	8	89	Nicaragua	87	143	13	243
22	Canada	908	573	252	1733	90	Nigeria	0	1	0	1
23	Central African Republic	0	10	0	10	91	Norway	33	79	1	113
24	Chile	491	365	28	884	92	Oman	53	196	0	249
25	China	843	1052	209	2104	93	Pakistan	1	57	79	137
26	Colombia	255	251	66	572	94	Panama	58	85	5	148
27	Congo	0	3	0	3	95	Papua New Guinea	0	1	0	1
28	Costa Rica	152	162	30	344	96	Paraguay	27	80	1	108
29	Croatia	1	39	1	41	97	Peru	583	68	70	721
30	Cuba	16	19	14	49	98	Philippines	266	243	24	533
31	Cyprus	11	1	0	12	99	Poland	25	8	233	266
32	Czech Republic	25	291	17	333	100	Portugal	0	1	0	1
33	Denmark	3	251	0	254	101	Qatar	52	369	0	421
34	Dominican Republic	60	231	6	297	102	Romania	25	90	0	115
35	Ecuador	157	287	11	455	103	Russian Federation	90	41	116	247
36	Egypt	58	75	58	191	104	Rwanda	0	37	0	37
37	El Salvador	117	232	3	352	105	Saint Lucia	0	49	0	49
38	Estonia	0	11	1	12	106	St Vincent & the Grenadines	1	13	0	14
39	Ethiopia	0	0	5	5	107	Saudi Arabia	139	822	0	961
40	European Union	536	867	530	1933	108	Senegal	7	12	0	19
41	Fiji	4	1	0	5	109	Singapore	53	39	28	120
42	Finland	1	70	0	71	110	Slovakia	21	47	5	73
43	France	8	224	0	232	111	Slovenia	21	101	1	123
44	Gabon	0	0	0	0	112	South Africa	37	232	170	439
45	Gambia	2	2	0	4	113	South Korea	488	639	127	1254
46	Georgia	23	89	15	127	114	Spain	4	68	0	72
47	Germany	9	21	0	30	115	Sri Lanka	37	47	0	84
48	Ghana	1	9	0	10	116	Suriname	0	0	0	0
49	Greece	0	0	0	0	117	Swaziland	2	1	0	3
50	Grenada	0	17	0	17	118	Sweden	0	221	0	221
51	Guatemala	60	94	0	154	119	Switzerland	72	255	28	355
52	Guinea	5	1	0	6	120	Taiwan	341	192	65	598
53	Guyana	1	20	0	21	121	Tanzania	1	44	0	45
54	Haiti	0	1	0	1	122	Thailand	224	546	98	868
55	Honduras	52	85	3	140	123	Togo	0	2	0	2
56	Hong Kong	39	76	106	221	124	Trinidad and Tobago	5	111	7	123
57	Hungary	22	30	5	57	125	Tunisia	0	26	4	30
58	Iceland	9	2	0	11	126	Turkey	51	63	217	331
59	India	93	91	700	884	127	Uganda	3	433	0	436
60	Indonesia	99	92	82	273	128	Ukraine	102	98	55	255
61	Ireland	0	1	0	1	129	United Arab Emirates	47	245	0	292
62	Israel	9	865	30	904	130	United Kingdom	4	45	0	49
63	Italy	3	26	0	29	131	United States	2722	1145	826	4693
64	Jamaica	14	74	7	95	132	Uruguay	27	7	24	58
65	Japan	388	706	104	1198	133	Venezuela	12	35	27	74
66	Jordan	30	47	18	95	134	Viet Nam	66	51	2	119
67	Kenya	30	438	0	468	135	Zambia	4	44	0	48
68	Kuwait	3	258	0	261	136	Zimbabwe	4	0	0	4

Source: I-TIP, wiiw calculation; QTNMs are the rest of NTMs

2- Countries affected by NTMs



Source: I-TIP; wiiw calculations.

Table 5- Countries affected by NTMs

No	Country	QNTMs	SPS	STCs	Total	No	Country	QNTMs	SPS	STCs	Total
1	Afghanistan	0	10	0	10	68	Iceland	0	3	4	7
2	Albania	0	1	0	1	69	India	192	34	13	266
3	Algeria	2	6	0	8	70	Indonesia	161	19	19	211
4	All Members	1644		0	1644	71	Iran	19	5	0	24
5	Angola	9	2	0	11	72	Iraq	0	3	0	3
6	Argentina	46	33	106	185	73	Ireland	4	7	0	11
7	Armenia	1	3	0	4	74	Israel	19	33	9	65
8	Australia	20	51	84	155	75	Italy	58	35	0	93
9	Austria	14	9	0	23	76	Jamaica	0	3	2	12
10	Azerbaijan	0	5	0	5	77	Japan	161	40	64	279
11	Bangladesh	3	7	0	10	78	Jordan	1	3	6	11
12	Barbados	0	1	2	3	79	Kazakhstan	21	4	0	25
13	Belarus	24	3	0	27	80	Kenya	2	8	2	15
14	Belgium	27	14	0	41	81	Kiribati	2	0	0	2
15	Belize	0	2	2	4	82	Kuwait	2	0	1	3
16	Benin	0	2	1	3	83	Kyrgyzstan	0	1	0	1
17	Bhutan	0	3	0	3	84	Laos	1	2	0	3
18	Bolivia	0	16	11	27	85	Latvia	3	6	0	15
19	Bosnia and Herzegovina	3	3	0	6	86	Lebanon	0	2	0	2
20	Botswana	0	3	2	5	87	Liberia	1	0	0	1
21	Brazil	120	48	99	267	88	Libya	3	4	0	7
22	Brunei Darussalam	0	1	0	1	89	Liechtenstein	0	1	0	1
23	Bulgaria	11	10	7	28	90	Lithuania	6	9	0	16
24	Burkina Faso	0	4	0	4	91	Luxembourg	3	8	0	11
25	Burundi	0	2	1	3	92	Macao	10	1	0	11
26	Cambodia	0	6	0	6	93	Macedonia	6	3	2	11
27	Cameroon	0	2	1	3	94	Madagascar	0	3	0	3
28	Canada	45	33	143	221	95	Malawi	1	2	7	10
29	Central African Republic	0	1	0	1	96	Malaysia	105	11	15	137
30	Chile	25	50	66	141	97	Mali	0	2	0	2
31	China	963	51	104	1118	98	Marshall Islands	2	0	0	2
32	Colombia	4	21	33	58	99	Mauritania	0	2	0	2
33	Comoros	0	1	0	1	100	Mauritius	0	3	1	4
34	Congo	1	2	0	3	101	Mexico	54	41	67	195
35	Cook Islands	2	0	0	2	102	Moldova	6	4	0	11
36	Costa Rica	0	23	19	42	103	Mongolia	0	3	0	3
37	Cote d'Ivoire	5	3	1	9	104	Montenegro	3	2	0	5
38	Croatia	4	7	7	18	105	Morocco	1	10	0	13
39	Cuba	1	3	25	29	106	Mozambique	0	2	3	5
40	Cyprus	0	4	0	4	107	Myanmar	11	7	0	18
41	Czech Republic	11	5	7	23	108	Namibia	0	2	0	2
42	Denmark	7	14	0	21	109	Nauru	2	0	0	2
43	Dominican Republic	3	9	28	40	110	Nepal	2	4	0	6
44	Ecuador	3	30	27	60	111	Netherlands	21	50	0	71
45	Egypt	18	22	14	54	112	New Zealand	8	23	28	86
46	El Salvador	3	3	8	14	113	Nicaragua	0	4	7	19
47	Estonia	4	5	6	15	114	Niger	0	3	1	4
48	Ethiopia	0	3	0	3	115	Nigeria	1	9	7	17
49	European Union	95	32	344	471	116	Niue	2	0	0	2
50	Faroe Islands	2	0	0	2	117	North Korea	14	0	0	14
51	Fiji	2	6	2	10	118	Norway	8	5	11	28
52	Finland	17	7	0	24	119	Oman	10	1	0	11
53	France	51	23	0	74	120	Pakistan	20	8	2	35
54	Gabon	0	1	0	1	121	Palau	2	0	0	2
55	Gambia	0	2	1	3	122	Panama	0	1	1	3
56	Georgia	1	5	0	6	123	Papua New Guinea	2	1	0	5
57	Germany	71	35	0	106	124	Paraguay	3	23	3	37
58	Ghana	0	3	1	4	125	Peru	3	21	8	43
59	Greece	9	11	0	20	126	Philippines	18	16	8	62
60	Guatemala	4	7	15	26	127	Poland	24	11	1	44
61	Guinea	2	1	0	3	128	Portugal	5	8	0	13
62	Guinea-Bissau	0	1	0	1	129	Qatar	1	0	1	2
63	Guyana	0	1	0	1	130	Romania	32	4	0	42
64	Haiti	0	1	0	1	131	Russian Federation	112	14	5	133
65	Honduras	0	11	10	21	132	Rwanda	0	2	0	2
66	Hong Kong	29	4	7	40	133	St Vincent & the Grenadines	0	1	0	2
67	Hungary	11	7	8	26	134	Samoa	2	2	0	4

Table 2. Cont. Countries affected by NTMs

No	Country	QNTMs	SPS	STCs	Total
135	Saudi Arabia	23	4	3	30
136	Senegal	0	3	5	8
137	Serbia	6	5	0	11
138	Sierra Leone	0	6	0	6
139	Singapore	47	5	3	55
140	Slovakia	7	3	6	16
141	Slovenia	1	2	8	11
142	Solomon Islands	2	0	0	2
143	Somalia	10	0	0	10
144	South Africa	57	25	24	106
145	South Korea	281	21	58	360
146	South Sudan	9	0	0	9
147	Spain	33	30	0	63
148	Sri Lanka	7	4	3	14
149	Sudan	1	9	0	10
150	Swaziland	0	1	0	1
151	Sweden	16	8	0	24
152	Switzerland	6	14	65	85
153	Syrian Arab Republic	9	0	0	9
154	Taiwan	228	30	8	266
155	Tajikistan	1	3	0	4
156	Tanzania	0	2	3	5
157	Thailand	167	17	28	212
158	Togo	0	2	0	2
159	Tonga	2	2	0	4
160	Trinidad and Tobago	3	0	2	5
161	Tunisia	1	6	0	7
162	Turkey	57	12	8	77
163	Turkmenistan	1	0	0	1
164	Tuvalu	2	0	0	2
165	Uganda	0	2	1	3
166	Ukraine	72	13	15	100
167	United Arab Emirates	20	2	0	22
168	United Kingdom	29	26	0	55
169	United States	227	99	327	653
170	Unspecified	0	0	2	2
171	Uruguay	5	15	23	43
172	Uzbekistan	2	6	0	8
173	Vanuatu	2	2	0	4
174	Venezuela	19	3	8	30
175	Viet Nam	45	18	3	66
176	Yemen	0	1	0	1
177	Yugoslavia	2	0	0	2
178	Zambia	0	1	5	6
179	Zimbabwe	3	3	9	15

Source: I-TIP; wiiw calculation.

Notes: TBTs are imposed against all members; STCs cover both TBT STCs and SPS STCs raised by the affected partners; QNTMs cover all the rest of NTMs

Table 6- Keywords mentioned in TBT – Number of TBTs

No	Keywords	No. TBTs	No	Keywords	No. TBTs
1	Safety	6113	30	Crime protection	77
2	Protection of Human health or safety	5888	31	Packaging	69
3	Food standards	3620	32	Biodiversity and ecosystem	63
4	Human health	2147	33	Cost saving and increasing productivity	62
5	Labelling	1797	34	Air pollution reduction	51
6	Prevention of deceptive practices and consumer protection	1764	35	Electromagnetic compatibility	43
7	Protection of the environment	1434	36	Waste management and recycling	43
8	Quality requirements	1293	37	Climate change mitigation	41
9	Telecommunication/Radiocommunication	766	38	Other	41
10	Consumer information	514	39	National security requirements	39
11	Metrology	507	40	Animal protection	38
12	Lowering or removal of trade barriers	338	41	Plant protection	30
13	Adoption of Domestic Law	291	42	Animal welfare	29
14	Harmonization	278	43	Alternative and renewable energy	27
15	Protection of animal or plant life or health	215	44	Sustainable agriculture management	24
16	Consumer protection	195	45	Soil management	16
17	Trade facilitation	193	46	MEAs implementation and compliance	11
18	Food contact materials	192	47	Ozone layer protection	11
19	Chemical	188	48	General environmental protection	10
20	toxic and hazardous substances management	188	49	Sustainable and environmentally friendly production	6
21	Energy conservation and efficiency	166	50	Other environmental risks mitigation	3
22	Animal feed	162	51	Sustainable fisheries management	3
23	Nutrition information	144	52	Sustainable forestry management	3
24	Plant health	138	53	Biofuels	2
25	Conformity assessment	133	54	Environmentally friendly consumption	2
26	Animal health	115	55	Food additives	2
27	Organic agriculture	96	56	Noise pollution reduction	2
28	Genetically modified organisms	89	57	Natural resources conservation	1
29	Water management	85	58	Pesticides	1

Source: I-TIP; wiiw calculations.

Table 7- Keywords mentioned in SPS – Number of SPS

No	Keywords	Nr. SPSs	No	Keywords	Nr. SPSs
1	Human health	8930	37	Fruit fly	130
2	Food safety	8611	38	Newcastle Disease	110
3	Protect humans from animal/plant pest or disease	4693	39	Mycotoxins	104
4	Pesticides	3701	40	Wood packaging / ISPM15	104
5	Plant health	3633	41	HACCP Plan requirements	88
6	Animal health	3350	42	Salmonella	85
7	Maximum residue limits (MRLs)	2895	43	Dioxins	81
8	Animal diseases	2131	44	Classical Swine Fever	80
9	Plant protection	1918	45	Escherichia coli	69
10	Pests	1625	46	Aflatoxins	65
11	Food additives	1265	47	Irradiation	63
12	Territory protection	968	48	Bluetongue	55
13	Zoonoses	949	49	Traceability	54
14	Regionalization	748	50	Equivalence	50
15	Contaminants	744	51	Fungi	50
16	Labelling	720	52	MEAs implementation and compliance	44
17	Protect territory from other damage from pests	684	53	Nematode	40
18	Packaging	604	54	Scrapie	37
19	Certification	526	55	Polychlorinated biphenyls	29
20	control and inspection	526	56	Animal protection	27
21	Foot and mouth disease	481	57	Pharmaceutical products	25
22	Seeds	477	58	Biological control agents	24
23	Avian Influenza	470	59	Listeria monocytogenes	22
24	Animal feed	460	60	Invasive species	20
25	Veterinary drugs	455	61	Ochratoxin	20
26	Transmissible Spongiform Encephalopathy (TSE)	381	62	Environmental protection from pests and diseases	16
27	Bacteria	348	63	Biodiversity and ecosystem	15
28	Bovine Spongiform Encephalopathy(BSE)	338	64	Allergens	14
29	Tolerance exemption	312	65	Animal welfare	13
30	Genetically modified organisms	235	66	Chemical	12
31	Biotechnology	234	67	toxic and hazardous substances management	12
32	Beverages	209	68	Soil management	11
33	Heavy metals	198	69	Water management	11
34	Plant diseases	184	70	Citrus canker	10
35	Feed additives	163	71	H1N1 influenza	10
36	Toxins	159	72	Sudden Oak death	10

Source: I-TIP; wiiw calculations.