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NTMs: Data concepts and sources*

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Abstract

In the context of trade agreements, non-tariff measures (NTMs) have been analysed in many studies that apply different methods and different data. Being hardly comparable and inconclusive, the results crucially depend on the NTM data. In this paper, we systematically examine the NTM data available and commonly used in trade policy analysis. While taking stock, we first elaborate on the kind of NTM information actually provided, the advantages and disadvantage of the data and their interpretation.

Second, we contact an explorative analysis in order to identify gaps in the data and explore how the data could be reconciled by finding corresponding, complementary and/or additional NTM information. More specifically, we will combine the different information contents of the NTM data and other data, like GDP and trade, in order to draw some stylised facts about the products affected and countries imposing the measures and of course the measures. The source of NTMs available is extremely rich, covering countries worldwide, all products and considerable detail of specific measures. In some, unfortunately limited, cases time series will allow us to also explore trends.

For example, plotting the NTM TRAINS data and the WTO notifications for unique measures, there are more technical measures i.e. both sanitary and phytosanitary (SPS) measures as well as measures of technical barriers to trade (TBT) than WTO notifications. This makes sense, given that notifications are voluntary rather than obligatory for WTO members. The data also shows that countries that have many technical measures in place and that can hence be considered as more active in regulating tend to notify measures more often to the WTO. Moreover, the number of measures tends to be relatively lower for countries with low values of GDP, but these countries still have more measures in place

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than measures notified to the WTO. We will further explore whether the number of measures and notification differ per product. For example, it would be interesting to clarify if agri-food products are subject to more measures, as often stated. Are certain products more regulated in some countries or regions? At the same token, is there a correlation between the structure of the industry or the net trade position of a country and the number of measures imposed and/or notified? In the paper, we will present (visualise) these and other relations of interest in the trade context.

Overall, our paper provides better knowledge about NTM data and thus helps to paint a more complete and real picture about NTM matters in trade analyses. The results will be interesting for academic researchers that apply the available NTM data but also for applied and policy-orientated trade economist.

Keywords: Non-tariff measures, NTM inventory NTM analysis, data sources, data collection

Contents

1 Introduction

Non-tariff measures (NTMs) have become increasingly important in the context of trade liberalisation. With declining tariffs, they have been widely discussed at the international level. Plurilateral and bilateral trade agreements have covered them in order to tackle these behind the border measures, while acknowledging public policy goals in the interest of individual countries. Given the proliferation of such trade agreements, the analysis of trade policies in particular aims to determine the effect of NTMs by applying different types of information about NTMs. Results of such analysis is hardly comparable and tend to be inconclusive not only due to the different methodologies applied but also due to the different data employed.

NTMs take various forms ranging from requirements for market access, e.g. food safety requirements or certification requirements, custom procedures, safeguard measures, including antidumping, rules of origin and public procurement (UNCTAD, 2009). defines NTMs as policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both. NTMs have been defined by concerted effort of the Multi-Agency Support Team (MAST) group that consists of international organisations and experts. [1] Applying the MAST classification, UNCTAD and ITC, both part of the MAST group, and other institutions have been engaged in the collection of NTM data. While the MAST definition is widely accepted, information about NTMs collected is not comparable and cannot be easily matched across databases. Of course, NTMs that are very complex can be described in many different ways and at different levels of detail, which either paint a very broad picture or a very detailed picture about the respective measures. Furthermore, different information contents on measures is provided by different data sources, for example complaints about measures, notification of regulations or the information provided in regulations.

In this paper, we systematically examine NTM data commonly applied in trade policy analysis and present main characteristics that should be considered in their application. As stated, the results of the analysis of NTMs crucially depend on the data applied. Hence knowing details about the data will help to interpret and compare results. Most importantly, the data best suited can be chosen in order to meet the purpose of the respective analysis. We take stock of the key NTM data for trade policy analysis by putting the data into the context of conceptually thinking about NTM and assess which NTM information is actually available for a meaningful analysis. The ultimate goal of our endeavour would be to reconcile the NTM data available so as to provide comprehensive and compatible datasets about NTMs. This would facilitate the assessment of the impact of NTMs and provide new insights about the measures under review.

The paper is structured as follows: First, we briefly introduce classification

[1] United Nations Committee of Trade and Development (UNCTAD), the Food and Agriculture Organization of the United Nations (FAO), the International Monetary Fund (IMF), the International Trade Centre (ITC), the Organisation for Economic Co-operation and Development (OECD), the United Nations Industrial Development Organization (UNIDO), the World Bank and the World Trade Organization (WTO)

of NTMs and databases for NTMs for goods and NTMs for services. Note that it is generally distinguished between NTMs for goods and NTMs for services. While NTMs for goods have been well captured by applying a common classification, respective work on NTMs for services is currently under way. With this background, we present the different types of NTMs, data sources as well as the implications of the data collection. Second, we present a comparative analysis in which we identify the differences and communalities of the key NTM data. Third, we elaborate on the challenges when applying the data in trade policy analysis. The paper ends with concluding remarks that point out the possibilities to proceed with NTM data work.

2 Classification of NTMs

NTMs have been classified by differentiating between the very different types of measures. Indeed, NTMs are all measures that can have an impact on trade but that are not import tariffs. This is a negative concept of the broad term covering all trade-related regulations. The trade relation should be interpreted in a wide sense: The measures being imposed by one country could affect the activities of firms of other countries, irrespective of whether the measures are applied at the border, in the imposing country or even in the exporting countries. In the latter cases, NTMs are often referred to as "behind the boarder measures" that have a bearing on the production of foreign firms in other countries. Furthermore, the effect of measure can be manifold, interlinked and different for different types of firms, different firm sizes and so on. UNCTAD, 2012 defines NTMs as ?policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both?.

NTMs refer to policy measures and are thus directly linked to the legislation of a country. They are official governmental regulations with reference to legal texts. The emphasis on governmental regulation is particular relevant for technical measures because some technical measures, like for example standards for products safety, product compatibly or labels, are also set by the private sector. Private standards developed by the respective sector are not described in legal texts, while possibly referring to legal provisions and/or being endorsed by governments. Initially, private standards have been considered as being voluntary but de facto they have become mandatory since compliance with them is prerequisite for products being sold (e.g. due to consumer demands or market power of retailers). The differentiation between governmental (public) and private standards has caused confusion and debates, especially at the international floor where governmental measures are subject to the WTO agreements but private standards are not.

Furthermore, the focus is on the measures, no matter whether they are barriers to trade or not. In fact, NTMs have often been referred to as non-tariff barriers (NTBs). Using the term NTBs points out the negative trade-hampering effect of measures that would need to be determined in an analysis. The term NTMs is neutral in the sense that both the potential costs and benefits of these

measures are taken into account. The benefits of measures would clearly need to be considered if measures are imposed for public policy goals and if they are not only identified as disguised protectionist measures. This is why it makes sense to look at NTMs in a wider cost-benefit framework, see for example, van Tongeren et al., 2009 that distinguishes between effects of NTMs on the quantity, the prices and the quality of products. Furthermore, it can also be argued that some types of NTMs, especially those that convey information related to the respective product or those that impact the product quality, would facilitate international trade across partner countries, in addition to causing trade costs. NTMs could indeed open up markets, thereby functioning as ?trade catalysts? even for producers in developing countries where the trade-restricting effect of NTMs has typically been emphasized.

For classifying NTMs, services and goods are dealt with separately. Most effort has been made to define NTMs and streamline classification and data collection for goods NTMs. For NTMs relevant for trade in services, activities of other data collection efforts have made available rich databases using different categories of services sectors and measures. This disintegrated data makes it difficult to compare the information provided by the various data collection methods and different underlying concepts. Experts involved in the topic have been working on merging the available information to a common classification that would help to conduct comparative analysis in order to assess the impact of NTMs in services trade. For example, the World Bank and the OECD have been engaged in large-scale data collections for NTMs for services. Their classifications could be the basis for a common classification that could then be linked to the structure of the General Agreement on Trade in Services (GATS).

Concerning NTMs for goods, the MAST that constitutes a working group of international organisations [2], researchers and users has developed a classification, henceforth referred to as the MAST classification. The MAST classification of NTMs is the outcome of intensive discussions, agreement by MAST members as well as testing in the field through data collection. For the specific goals of the MAST classification see UNCTAD, 2009. The MAST classification has become the standard taxonomy for NTMs by the international trade community, including regional and international organizations. It is important to note that the MAST classification does not contain any judgement on legitimacy of measures, adequacy or necessity as well as does not provide information on the goals that the measures are supposed to achieve.

The current and latest MAST classification is version 2012; see UNCTAD, 2012. In addition, UNCTAD, 2016 describes main measures in detail in order to guide data collectors in applying the classification. There is a continuous effort to update measure descriptions and further classify measures, thereby adopting to the realities of trade and meeting information needs. Hence, the MAST classification should be seen as evolving with updates of more detailed

[2]In addition to United Nations Conference on Trade and Development (UNCTAD), the following organizations are part of MAST: the Food and Agriculture Organization of the United Nations (FAO), the International Monetary Fund (IMF), International Trade Centre (ITC), the Organization for Economic Co-operation and Development (OECD), the United Nations Industrial Development Organization (UNIDO), the World Bank and the World Trade Organization (WTO).

classifications, amendments and additions to the existing structure.

Table 1 presents the MAST classification at the most aggregated of measures. For the detailed description about which measures are included in the different chapters, see appendix A.1. First of all, it is differentiated between import and export measures. Import measures target foreign products or foreign firms, as opposed to export measures that target domestic products or domestic firms, while having a bearing on international trade. Import measures are further classified as being either technical measures or non-technical measures. In contrast, export measures comprise only one chapter, which is currently not further detailed.

Table 1: MAST 2012 NTM Classification

Category	Classification Chapter
Technical	**A** Sanitary And Phytosanitary (SPS)
	B Technical Barriers To Trade (TBT)
	C Pre-Shipment Inspection (PSI)
Non-technical	**D** Contingent Trade-Protective Measures
	E Non-Automatic Licensing, Quotas, Prohibitions
	F Price-Control Measures, incl. Additional Taxes/Charges
	G Finance Measures
	H Measures Affecting Competition
	I Trade-Related Investment Measures
	J Distribution Restrictions
	K Restrictions on Post-Sales Services
	L Subsidies
	M Government Procurement Restrictions
	N Intellectual Property
	O Rules of Origin
	P Export-Related Measures

Each chapter of the MAST classification is given a capital letter, presenting the broad category of measures. The chapters are then further divided into subcategories by numbering. The subcategories mainly contain details at the three digit level. In the definition of the subcategories, the same structure of further specifying measures is applied in order to add logic and to facilitate the comparison across the potentially very different measures. The parallel structure of the subcategories is most visible for SPS measures and TBT measures that are described in chapter A and chapter B, respectively.

Issues of NTMs are not necessarily due to measures per se but can be caused by the implementation and the application of measures. In this case, NTMs are referred to as procedural obstacles. When analysing NTMs, it should be made explicit whether the measure (according to the MAST classification) under review or the implementation of the measure causes the NTM issues. In the context of NTMs and developing countries, ITC aims at identifying procedural obstacles in addition to measures that are relevant for developing countries. They have been conducting surveys in order to directly ask firms about NTMs and the related issues they face when exporting and developed a separate classification of NTM obstacles that distinguishes between regulatory obstacles due to measures and procedural obstacles due the implementation of measures. In

appendix A.2 provides the ITC classification; for details see ITC, 2014.

3 NTM data: sources, information contents and databases

3.1 Data sources

The information about NTMs comes from different sources that are used in the data collection. Table 2 provides an overview of different sources of NTM information that are respectively mapped to the databases for NTMs for goods and NTMs for services. In the following, we elaborate on the sources by ordering them according to their completeness and the details they provide about the measures identified.

Table 2: Overview NTM Data Sources

Collection Framework	Goods	Services
Inventories of legislation	- NTM TRAINS - OECD PMR Database - WB Investing Across Borders - World Bank TTBD - OECD Export Restrictions - Global Trade Alert	- World Bank STRI Database - OECD STRI Database - OECD PMR Database - WB Investing Across Borders - Global Trade Alert
International agreements	- DESTA - UNCTAD BIT Database	- DESTA - GATS commitment schedule - WTO Services RTA Database - UNCTAD BIT Database
Review of legislation	- WTO Trade Policy Review - WTO DG Monitoring Reports - UNCTAD Investment Policy	- WTO Trade Policy Review - WTO DG Monitoring Reports - UNCTAD Investment Policy
Notifications	- WTO Notifications	- GATS Notifications
Surveys and complaint portals	- ITC NTM Surveys - ITC Trade Obstacle Alert - WTO STC - EU Market Access Database - tradebarriers.org	
Import refusals	- EU RASFF - US FDA OASIS	
Other sources	- USITC CoRe NTM Database	

3.1.1 Inventories of legislation

NTM TRAINS: The most direct source of NTM data are regulatory inventories in which national legislation is meticulously reviewed in order to identify which measures are specified in the legal body of a country and thus imposed by the country. Regulatory inventories require considerable knowledge on the rules and regulation that contain NTMs but also the governmental bodies/ministries

making the legislation. For the regulatory inventories, collection methods range from the scanning the entire legislation documents to approaching policy-makers or industry for their expert knowledge on specific regulations of specific products. The latter of course may result in the inventory reflecting expert opinions and judgement to a certain extent. For example the data on NTMs in the World Bank Investing Across Borders, OECD PMR/STRI database, World Bank STRI Database are collected by surveys of legal and industry experts as well as officials in the national ministries/administrations. In contrast, the NTM TRAINS database by UNCTAD and ITC involves desk research to identify and classify all legal texts that are published by governments. For the collection, UNCTAD and ITC have been engaging independent and especially trained data collection teams, preferably local people who are familiar with the legal structure of their country.

Mapping the existing body of regulations to the MAST classification, NTM TRAINS is the most comprehensive and rigorous regulatory inventory. The regulations covered have a clear relation to trade by mentioning imports, foreign firms or the respective partner countries; information about regulations for domestic products and production is not collected.

In addition, international bilateral or plurilateral agreements have been scanned for information about NTMs as they increasingly contain provisions on NTMs and how they are dealt with by the respective partner countries. International agreements provide important information about NTMs, especially when considering that national legislations tend to equally refer to all foreign countries according to the most-favoured nation (MFN) principle of the WTO. Thus, the provisions specified between countries are likely to give more insights into what type of measures are actually applied, including preferential access. Databases on international agreements are for example the DESTA database or WTO Services RTA database.

OECD Product Market Regulation database: The OECD collects data on regulations in order to conduct cross-country comparative analyses. The focus is on economic regulations that target product markets, thereby affecting domestic and foreign firms alike (Nicoletti et al., 2000). The regulatory environment of countries, i.e. the de jure policy settings, is of main interest and hence the regulatory body of the countries under review is not entirely covered. The core of the data collection is a regulatory database that consists information of the OECD Regulatory Indicators Questionnaires about economy-wide or industry-specific regulatory provisions as well as administrative procedures. In surveys, these questionnaires are completed by country governments. Questions are of closed form leaving space to either answer with a numerical value or select a response from a pre-defined list. In contrast to open question, the burden of interpretation thus lies with the respondent rather than with the OECD. (Koske et al., 2015) By applying the information collected in combination with other data (e.g. tariffs, World Bank Doing Business indicators, FDI), the OECD constructs the following indices; for details see Conway et al., 2005; Koske et al., 2015:

- Economy-wide regulations (PMR) that capture cross-sector horizontal reg-

ulation and indicators relevant for services and manufacturing sectors;

- Non-manufacturing sector regulations (NMR) that comprise sector specific regulations affecting entry and operations of professional services, retail distribution and network sectors;
- Internet regulation that cover a subset of regulations particularly relevant for the assessment of a country's approaches to the internet economy;
- Sector regulators that focus on the governance performance of regulatory bodies: design, implementation and enforcement of regulations.

OECD Services Trade Restrictiveness Index (STRI): The OECD provides information of policies in eighteen broad services sectors. Next to sector-specific measures, there is also a broad group of general measures, which apply horizontally. The following broad categories of measures are covered: restrictions on foreign entry, restrictions on the movement of people, other discriminatory measures, barriers to competition and regulatory transparency. For each measure, information is provided about which mode of supply of the service, as defined by GATS, is affected, and whether a measure applies to foreign services suppliers only or whether it applies to all operator in the market. In the latter case, the measure is considered as being non-discriminatory. In addition, it is identified whether a particular measure affects the establishment or operations of business.

Like the PRM database, the data for services is collected by surveys for officials in governments or national administration and used for the construction of an index. With the index, the qualitative answers about the respective measures are translated into quantitative information. For details about the construction of the index see Geloso Grosso et al., 2015.

World Bank Services Trade Restrictiveness Index (STRI): The World Bank STRI database contains information on services policies that apply to both domestic and foreign firms in five broad sectors, namely telecommunications, finance, transportation, retail, and professional services. Similar to the OECD databases, the World Bank does not include information about the implementation measures, the status or the performance of measures. For each of the sectors, measures are structured along their most dominant mode(s) of supply. The supply of services through commercial presence (mode 3) is most prominent and we thus summarise the corresponding categories of measures collected as an example:

- Legal form of entry and restrictions on foreign equity (GATS Article XVI): Measures that affect the establishment of services activities of foreigners. For professional services these are further supplemented by measures that stipulate local licensing requirements linked to the establishment and ownership of businesses;
- Licensing limits and transparency of licensing requirements (GATS Article XVI, Article XVII (partly) and Article VI): Measures that limit the

number of licenses issued leading to de facto quotas on the number of providers;

- Restrictions on operations (GATS Article XVII): Measures that affect the operations of a firm, e.g. national requirements for the board of directors and/or employees, restrictions on the repatriation of earnings. Other measures are sector-specific, e.g. restrictions of the number of ATMs;
- Relevant aspects of the regulatory environment (GATS Article VI and XVIII): Measures indicating the independence of the sector regulator, transparency of regulatory changes and how firms can appeal decisions.

For non-OECD countries, the World Bank collects the respective data via questionnaires that local law firms specialized in or familiar with the policy issues and/or sector at hand are asked to complete. For OECD countries, the data is retrieved from publicly available sources including for example WTO Trade Policy Reviews. Finally, the government or WTO representatives/delegates of the countries under review are asked to validate the information collected.

After the data collection, the information is used to calculate a restrictiveness index. Since only the information about measures for foreign firms is used, the index clearly focuses on the discriminatory effect of the measures under review. In the calculation, the World Bank ranks the measures according to their relevance for the sector as well as according to their effect on firms. Borchert et al., 2012 provide the details of the index calculation.

World Bank Investing Across Border: The data on investment across borders come from surveys of experts such as law professors, professional service providers, export promotion authorities, or chambers of commerce that are asked about the laws affecting FDI. The information encompasses five themes as follows; for details see World Bank, 2010:

- Investing Across Sectors: Limits of foreign equity ownership;
- Starting a Foreign Investment: Procedural burden of a company to establish a new business. This concerns questions on the administrational burden but also questions whether, for example, there are special incentive schemes for foreign investors, aspects of land acquisition and administration, or laws governing special economic zones (SEZs);
- Arbitrating and Mediating Disputes: Domestic and international arbitration regimes. The information provided is suitable to assess the quality of the legal environment in a given country. Information about the performance as well as cost estimates are also provided;
- Converting and Transferring Currency: Measures related to foreign exchange inflows, outflows, payments and accounts. This includes possible limits to repatriation, requirements with respect to the importing service payments or restrictions on capital gains outflows;

- Employing Skilled Expatriates: Measures that restrict the issuing of sponsored temporary work permits and that determine the procedural ease/obstacle to receive it.

UNCTAD Investment Policy Hub: The database is a repository of the investment policies that contains information about FDI policies affecting entry/establishment as well as treatment and protection. Furthermore, information about the general business environment and sectoral regulations is provided. The information is retrieved from bilateral investment treaties and other investment-related agreements, in addition to the WTO Investment Policy reviews conducted mainly for developing countries.

World Bank Temporary Barriers of Trade Database (TBTD): The database in fact comprises five individual databases, namely the Global Antidumping Database, the Global Countervailing Duties Database (GCVD), the China-Specific Safeguards Database (CSGD), the WTO Disputes Database (DSUD) and the Global Safeguards Database (GSGD). The information is extracted from national government legal texts and other communications dealing with the respective measures and mapped to the HS product codes. Combing national information with WTO information sources, in particular notifications, clearly links to reporting to the WTO.

In comparison to other NTM data sources, the time dimension is of course crucial for TTBD since the measures under review are temporary, i.e. implying a start and an end date of measures being applicable. Indeed, the TTBD contains time series of the respective measures that allow for incorporating time in the analyses of the measures.

The TTBD is the result of a data collection project for more than 30 countries. It was initiated by Brandeis University and that expanded further via funding by the Development Research Group of the World Bank, and the Global Trade and Financial Architecture (GTFA) project (sponsored by the UK Department for International Development, DIFID). Bown, 2007 presents the detailed development of the TTBD.

Global trade alert (GTA): The GTA initiative (coordinated by the Centre for Economic Policy Research, CEPR)) brings together experts from different research institutes in seven regions worldwide that examine potentially hampering trade measures, as found in newspapers, journals and other news items. The GTA experts assess the measures identified according to their trade-related and economic effects and those that are actually found as being trade hampering are recorded in the GTA. In addition to the information about the measure and the product affected, the country imposing the measure is also reported as well as the country affected. Note that the countries affected are made specific and hence the GTA provides country-specific NTM information rather than being bound to the most favourite nation principle.

Overall, the GTA aims to increase the transparency about NTMs that matter. Identifying measures that are trade-hampering is also the first step of helping to reduce their impact by bring forward policy options, like mutual

recognition for example.

3.1.2 International agreements

[ADD TEXT ON TRADE AGREEMENT DATABASES]

3.1.3 Review of legislation

Information on NTMs can also be found in policy reviews of a country's trade policy and procedures. While WTO's trade policy reviews are embedded in the Trade Policy Review Mechanism (TPRM), UNCTAD?s Investment Policy Reviews are conducted upon request of a country?s government. In general, for each of the reviews a screening of relevant policies is undertaken. These are by and large one-off activities, or with relatively large time intervals between reviews. In contrast, news, publications, and countries? policy initiatives are continuously screened in the Global Trade Alert that is described further below, thereby painting the "just-in-time" picture on policies that could have an effect on trade. WTO Trade Policy Reviews: The reviews are a rich source of information about NTMs. The information is provided in text format with the MAST classification of measures or product codes not applied. Furthermore, country-specific information is usually not reported about, applying the most favourite nation principle of trade policies under the WTO agreements. This makes the application of the information in the trade policy reviews tedious and time-consuming. However, some information may directly clarify WTO notifications, help to understand concerns and/or to simply provide background information about NTMs. Note that the frequency of each WTO member being reviewed varies according to its worldwide trade positon. For example, the four largest trade countries are under scrutiny once every two years, whereas other countries are reviewed less often. The reviews report on trade of goods as well as services and intellectual property. The latter expanding the scope of the initial reviews as agreed under the WTO Uruguay agreements in 1995.

3.1.4 Notifications

WTO notifications: The notification to the WTO constitute an important source of NTM data. WTO members are asked to notify their regulations as an important means of transparency and predictability of policies. The obligation of WTO members to notify measures is formulated and compliance has been encouraged throughout the years.[3] Baccetta et al., 2012 provides details on the development of WTO notification. The notification obligations are formu-

[3]WTO members could also notify measures of other WTO members. These notifications are called reverse notifications as the reporting country does not implement the measures. With the establishment of committees for Special Trade Concerns (STCs), WTO members have increasingly made use to raise their concerns in these committees rather than notify the measures of others to the WTO as reverse notifications.

lated individually per topic, and the procedures of the notification, including information required, differ per topic.

The notifications are about changes of laws and regulations as well as their administration. The measures affected are described as text. However, details on which NTM code of the MAST classification are provided, albeit not at the level of detail as in NTM TRAINS. The codes of the products affected are only reported in some cases, while in other cases products are only described. Some kind of mapping and text mining could be used to assign the NTM codes as well as HS codes (Ghodsi et al., 2015). The changes of the measures are supposed to be reported before their implementation by the reporting WTO member. Other WTO member could react, perhaps even influence the respective measure being proposed and notified, such that measures reported as WTO notifications may be implemented differently or may even be withdrawn. This information is not recorded, thereby leaving the question of implementation open. Overall, countries seem to notify more measures than asked for. Notifications reflect the due diligence of countries? activities of policy-making as well as regulatory traditions. For those countries that are struggling to correctly notify, support measures and assistance have been made available by the WTO.

3.1.5 Surveys and complaint portals

Surveys or complaint portals gather the perceptions about the impact of NTMs from a business point of view. Such information is complementary to the inventory or listings of regulations or changes of regulations, that are generated by other collection initiatives. In surveys or complaint portals, the private sector can indicate if a certain measure poses challenges to trading activities and to what degree. Due to the complex nature of NTMs and the many combinations of measures and products affected, the data collections are large-scale resource intensive initiatives, usually embedded in other activities (e.g. workshops) supporting the data collection.

In surveys, business, sector representatives that are actually or potentially affected by the respective measures are asked about the measures and the impact of the measures on them. Such surveys are obviously crucial for understanding the effect of measures but also for identifying which measures actually matter. While surveys provide first-hand information about measures, survey results must carefully be dealt with due to potential biases and inconsistent replies. Surveys must be developed and conducted in a scientifically sounds manner, otherwise they may become mere ad-hoc opinion polls. The data collection by surveys should entail some kind of quality control in order to assure the data represent the measures and the corresponding issues correctly. This, for example, involves an appropriate selection of experts to conduct the reviews, the identification of suitable persons to complete the questionnaires as well as the provision of training of those conducting the surveys, if necessary. Furthermore, testing a country?s responses for internal consistency (e.g. whether responses to questions in a country survey contradict each other, or not), and cross-checking with results of other countries increase the likelihood to build a dataset enabling cross-country analyses.

Unlike NTM inventories or notifications, surveys about NTMs provide information about which particular measures cause difficulties for businesses or an entire sector and thus matter and have an economic impact. Note that surveys about NTMs shed light on perceptions about measures, and are not necessarily complete since focusing on the measure that businesses actually report difficulties with. There are several initiatives of conducting NTM surveys in severable countries organised by several organisations and institutions. However, NTM surveys often remain limited since they focus on one specific product/sector, one specific country/region, and results generate insights in a specific case study only.

ITC NTM Surveys: On a large scale, ITC has conducted (telephone and face-to-face) business surveys about exporters ?and importers? experiences with trade-related regulations and procedures. They provide comparable information across twenty-three countries, where the survey has been conducted, mainly developing countries. Sectors are covered in a representative sample, whereby products are sometimes only described and thus appear without product code. NTMs are referred to by the MAST classification, while the difficulties reported are categories by the classification of trade obstacles (see appendix 2). Note that obstacles of measures can be caused by the individual measure itself, by its implementation and procedures related to the implementation as well as by the prevailing situation in the country that determines the capability and (technical) facilities necessary for meeting regulations and prove compliance with NTMs, as requested.

ITC, 2015 presents an overview of the results of the ITC NTM surveys. The results give the number of export and import businesses affected by NTMs of partner countries, but trade-related domestic regulations are also considered. Given the sampling methods, shares with regard to the entire sector can be calculated in order to point out the impact and possibly costs caused by the respective measures. Furthermore, insights are provided about which measures cause problems and what kind of problems occur most frequently. For example, the lack of access to relevant information is often mentioned, and transparency and knowledge seems to be a crucial bottleneck for NTM compliance.

EU Market Access Database (MADB): The EU MADB of DG Trade of the European Commission contains a complaint register for EU firms that face NTMs when exporting to partner countries outside the EU. The complaints reported are systematically collected, evaluated and made public if considered as being relevant from the perspective of the EU member states. Furthermore, the EC?s efforts of removing the obstacles due to the NTMs complained about are also reported and traced back. Information about the current state of affairs in the NTM matter is provided. Note that other countries or regions have similar complaint registries in place; for example for the Tripartite Free Trade Area of COMESA, EAC and SADC.[4]

WTO Specific Trade Concerns (STC): The STC database comprises the WTO members? concerns about SPS and TBT measures, that are reported for products and the imposing countries as well as the countries affected and hence

[4]http://www.tradebarriers.org

raising the concern. Any WTO member can raise a concern but usually groups of WTO members formulate concerns together. The respective concerns are then recorded by the WTO Secretariat in the minutes of the meetings. The text format of the STCs are thus scattered in WTO documents and for the data to be used, some kind of transfer into the database is necessary. This could also mean that the contents in the database is shortened, while preserving the link to the original documentation of the concern.

The WTO STCs constitute information complementary to the WTO notification as well as NTM inventories like NTM TRAINS. More specifically, STCs provide insights about measures that matter since WTO members would not raise their concerns if they were not relevant for them. As such STCs can be considered to convey information that businesses shared with the government of the respective country that subsequently submits the concern to the WTO.

3.1.6 Import refusals

[ADD TEXT]

3.1.7 Other source

[ADD TEXT ON GOVERNMENTAL AND OTHER DATABASES]

3.2 Type of NTM information

The information provided in the database consists of four main elements: the measure of course, the product affected, the country imposing the measure and the country affected by the measure. The details about the measures under review range from noting down their mere presence to information on the actual provisions, as follows:

- *Binary* variables that indicate whether a measure is there or not. These can be simply in the form of 1/0, or yes/no;
- *Numerical* variables reflecting quantitative attributes of an NTM, e.g. percentage of foreign equity ownership, maximum residual limits, or maximum weight;
- *Text* that can be a plain description of a regulation (required info on a label, container clearance procedures, etc.), usually the link to the regulatory text is provided. Sometimes also the date of entry into force is provided, which adds important information in particular for ad hoc emergency or temporary measures.
- *Categorical* variables are used to classify measures, e.g. whether a measure is discriminatory or not;

- *Ordinal* variables indicating a ranking along a chosen dimension, e.g. a five-point scale of openness from "open without restrictions" to "completely closed" or to signal the status of implementation (not/partially/fully implemented), as well as the perceived restrictiveness of a measures in business surveys;
- *Computed indicators* combining different information contents, e.g. restrictiveness indexes, count or frequency ratios.

The information provided per measure varies in the different database. While some databases provide considerable details, e.g. numerical information about maximum residue levels, others state if a measure is present or has changed. For example, a quota on intra-corporate transferees can be a binary piece of information (country A has a quota), a numerical statement (3 transferees per company), or an ordinal variable (10-point scale indicating the degree of restrictiveness of such a quota).

3.3 Trade facilitation and compliance

Since the impact of NTMs on trade is not only determined by the characteristics of the measure itself but also by the importers' and exporters' compliance capacity (or their trade/institutional environment more generally) information about different dimensions of trade facilitation is a useful complement to the available NTM data. Table 3 summarizes the main data sources for such indicators and highlights that these data are by large available for a wide range of countries. Particularly, efforts by the OECD as well as World Bank have led to rich sets of indicators allowing to create a comprehensive picture of a country?s trading environment in this context. The data are mainly generated via desk research (e.g. most of the OECD indicators) or surveys among experts, practitioners and academics in the field of logistics (e.g. World Bank LPI or Global Express Association). Furthermore, the World Bank Doing Business indicators are available in time-series (starting in 2006), while other data sources provide a limited number of years. Sometimes data are only available for one or two years (cross section data). Table 3 actually combines data availability for 2014 and 2015.

In a few cases, trade facilitation indicators could be directly linked to NTMs. For example, the quality of infrastructure section of the World Bank LPI contains a question with regard to the competence of domestic health and SPS authorities, and the UNESCAP asks about the state of implementation of electronic SPS certificate exchange. In addition, UNIDO collects measures (not listed in Table 3) related to the trade standards compliance capacity of 49 countries (mainly developing countries). These indicators reflect the different areas of a modern infrastructure (e.g. metrology, inspection, accreditation, or testing) that support the compliance with standards. Such information would be useful to better understand and explain the NTM impact.

Table 3: Trade facilitation measures

Source	Category	Number of measures	Number of countries (max)
GEA	Customs Efficiency	16	127
	Post-release Processes	9	120
	Transparency	3	122
OECD TFI	Advance rulings	12	152
	Appeal procedure	13	171
	External border agency cooperation	6	152
	Fees and charges	6	152
	Formalities - Automation	6	152
	Formalities - Documents	6	151
	Governance and impartiality	11	165
	Information availability	26	165
	Internal border agency cooperation	4	152
	Involvement of the trade community	6	163
	Formalities - Procedures	17	153
UNESCAP	Trade Facilitation and Paperless Trade	23	117
World Bank LPI (Domestic)	Changes in the logistics env.	8	117
	Competence and quality of services	13	117
	Efficiency of processes	7	117
	Level of fees and charges	10	117
	Quality of infrastructure	7	117
	Sources of major delays	5	117
	Domestic Performance	29	116
World Bank LPI (International)	International LPI	8	160
World Bank Doing Business	Trading Across Borders	17	189

4 Official NTM databases - availability and scope

4.1 Geographic coverage

NTM data have been collected for many countries. Comprehensive cross-country analyses require a sufficiently large number of countries such that the results about measures can be generalised or consistently reported for groups of countries. In such analyses, the question if NTMs affect developing countries more than developed countries, for example, may be of particular interest. In addition, certain countries or groups of countries may impose NTMs more frequently than other countries or may impose specific NTMs that other countries do not apply.

Figure 1 illustrates the country coverage of the main NTM databases. For goods, the largest country coverage is available for the WTO notifications (138 countries) and the NTM TRAINS database (103 countries). For services, the country coverage is largest for the GATS schedules of commitments (160 countries) and the World Bank STRI database (103 countries). Comprising information about NTMs for both goods and services, the Global Trade Alert (164 countries) and the WTO Trade Policy Reviews (120 countries) show a large country coverage. In comparison, other databases cover considerably smaller numbers of countries. For example, the EU Market Access Database (MADB) provides complaints for 43 countries, only. Furthermore, the full regulatory reviews in NTM TRAINS are currently available for 60 countries (counting the EU as one entity), and the results of the ITC NTM surveys can be retrieved for 23 countries. It should be noted that that figure 1 adds the number of countries for which information is reported across the available years. This means that a country is included in the calculation of the country coverage if at least one data point is reported at one point in time.

[UPDATE TEXT TO FIGURE]

As illustrated, data gaps with respect to the country coverage are significant, despite large-scale data collection efforts. This is particularly true for databases with complex, resource-intensive data collection projects such as the ITC surveys or regulatory inventories of the NTM TRAINS database. The country coverage tends to be higher for data collection efforts that have been institutionalized (i.e. WTO) and/or that have been applied in some kind of routine of regular collection mechanisms (e.g. GTA). In addition, some databases have been constrained by whether countries actually have certain policy instruments in place (e.g. RTAs with a services component), by their institutional focus (e.g. OECD databases) or by the participation of the business community (i.e. complaint portal like the EU MADB).

It is usually differentiated between imposing country and countries affected. The databases reviewed show that measures are often imposed on all countries, thereby reflecting the MFN principle of treating all partner countries equally. Information about NTMs between two specific countries or groups of countries is not always provided. By definition, some databases exclusively

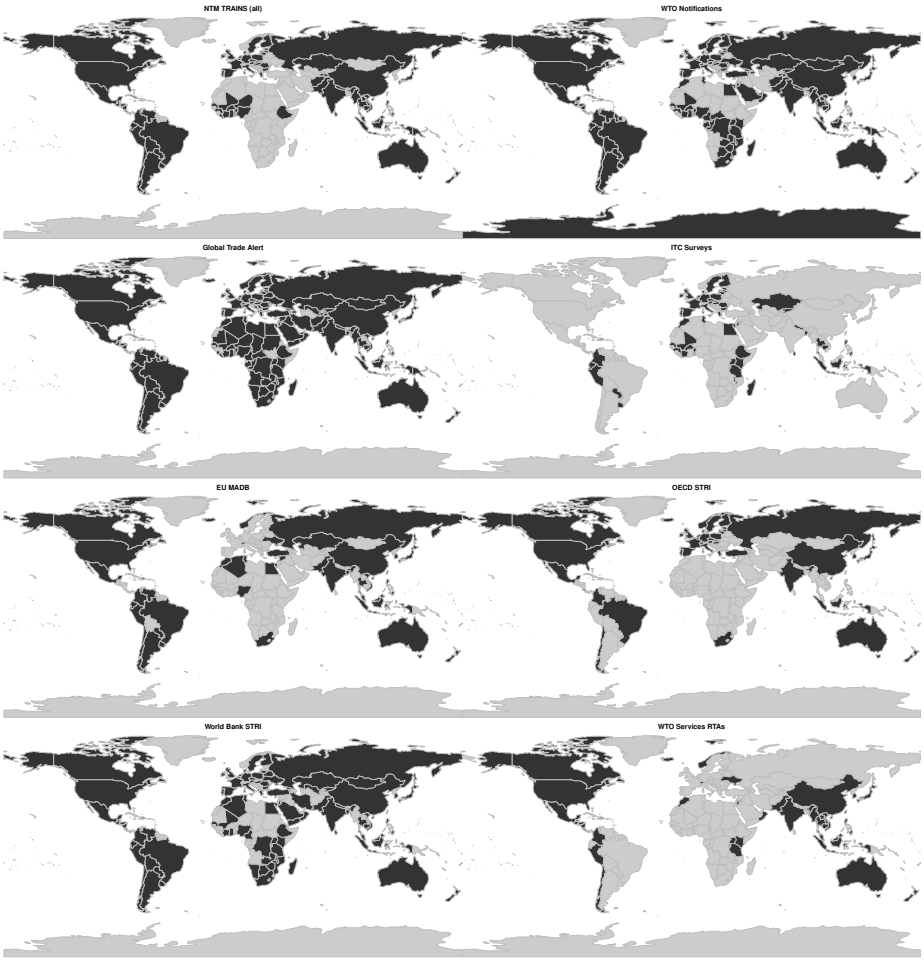

Figure 1: Geographic coverage

contain information about one country imposing NTMs on one or several specific partner countries. They, for example, include the measures reported under the MFN exemptions of the GATS, regional trade agreements as well as the complaints about NTMs affecting specific countries. In addition, the Global Trade Alert the WTO notifications and NTM TRAINS identify the countries affected, where possible. However, the total share of country-specific bilateral or country-specific plurilateral information appears to be relatively small in the WTO notifications (about 15% of the measures). In NTM TRAINS, about 69% of the measures are reported for specific partner countries, while 66% of the measures apply to all partner countries (MFN). NTM data are usually collected on a country level.

4.2 Time coverage

Table 4 presents the availability of NTM data over time. The WTO notifications provide information for many years, covering the longest time period for that NTM data are available. While the first fifteen years exclusively contain temporary trade barriers (antidumping and countervailing measures), the number of measures has significantly increased since 1995, partly due to the notification requirements under the WTO SPS and TBT Agreement. A similar pattern can be observed for NTM TRAINS. While the data initially comprise temporary trade barriers, information about many more measures has been collected in the full regulatory inventories since 2009. Information for a relatively large number of years can also be found in the WTO Trade Policy Reviews (TPRs) and Services RTA databases as well as the EU MADB. However, it should be noted that the information on all measures and all countries is not necessarily available for each year. The time coverage seems to depend on reporting cycles and/or the conclusion of agreements that include reporting commitments, provisions for NTM inventories and maybe even solutions to overcome NTM issues.

The OECD and World Bank STRI databases cover a limited number of years only. They can hence be considered as providing a snap shot of the NTMs in services in a certain year. Since 1998, the OECD PMR database has been updated every five year. While the most recent data may not be readily available, a comprehensive account of the regulations is available for the specific years (namely, 1997, 2003, 2008 and 2013) in which the NTM data was updated. Lacking information of consecutive years, the data remains a cross section but trends of changes in regulations can be identified. More specifically, changes in regulations between years can be assessed by comparing the respective regulations under review in the respective years. In addition, the WTO notifications directly contain the changes as reported by the respective WTO members.

Table 4: Time coverage of main NTM databases

Collection framework	Database	Time coverage	Comment
Inventories of legislation	- NTM TRAINS	1960 - 2016	Date of measure into force
	- OECD PMR Database	1998 - 2013	Policy inventory for 1998, 2003, 2008, 2013
	- World Bank Investing Across Borders	2011 - 2012	Policy inventory as of data collection
	- World Bank TTBD	1980 - 2015	Date of measure into force
	- OECD Export Restrictions Database	1996 - 2014	Year of policy inventory
	- Global Trade Alert	2008 - 2016	Date of measure into force
	- World Bank STRI Database	2008 - 2012	Policy inventory as of data collection (majority 2008)
	- OECD STRI Database	2014 - 2016	Year of policy inventory
International agreements	- DESTA	1949 - 2016	Year of agreement
	- UNCTAD BIT Database	1957 - 2016	Year of agreement
	- GATS schedule	1995	Year of agreement
	- WTO Services RTA Database	1994 - 2016	Year of agreement
Review of legislation	- WTO Trade Policy Review	1996 - 2016	Year of policy review
	- WTO DG Monitoring Reports	2008 - 2016	Date of implementation
	- UNCTAD Investment Policy Review	1999 - 2016	Year of report
Notifications	- WTO Notifications	1960 - 2016	Date of measure into force
	- GATS Notifications	2001 - 2016	Date of notification
Surveys and complaint portals	- ITC NTM Surveys	2010 - 2016	Year of survey data collection
	- ITC Trade Obstacle Alert	2014 - 2016	Date of complaint
	- WTO STC	1995 - 2016	Date of STC raised
	- EU Market Access Database	1996 - 2016	Date of complaint
	- tradebarriers.org	2004 - 2016	Date of complaint
Import refusals	- EU RASFF	1979 - 2016	Date of border refusal
	- US FDA OASIS	2002 - 2016	Date of border refusal
Other sources	- USITC CoRe NTM Database	2009 - 2012	Year of measure into force

[ADJUST TEXT TO NEW TABLE]

4.3 Coverage of type of measure per MAST chapter

Table 5 summarizes the data availability of measures classified by the respective MAST chapter for three databases: NTM TRAINS, WTO notifications and ITC NTM surveys. In NTM TRAINS and the ITC NTM surveys, the information is provided per year. In contrast, WTO notifications of changes in regulations are reported for specific dates and hence need to be summed up to achieve the aggregate number of WTO notifications per year.

As presented, the number of measures in the MAST chapters considerably differ in the NTM TRAINS and WTO notifications. According to the NTM TRAINS data, the 60 countries under review have predominantly imposed SPS (chapter A) and TBT (chapter B) measure. Measures falling in other MAST chapters have been found far less frequently. For example, nine measures related to distribution restrictions (chapter J) are found in only six countries. WTO notifications are currently limited to SPS (chapter A) and TBT (chapter B) measures as well as temporary trade barriers falling under chapter D. These types of measures have been found in more than hundred countries. In comparison to the limited availability of information about measures, the ITC NTM surveys are limited by their country coverage. The ITC NTM surveys cover the business perspective of export and import markets? restrictiveness for only 23 countries, mainly developing countries.

Considering the NTM TRAINS, WTO notifications and the ITC NTM surveys, only ten countries are available in all three databases. For those ten countries, the respective information provided by the three databases could be integrated in one dataset that would provide the combined details about the prevailing regulatory situation (via NTM TRAINS), the changes in the regulations (WTO notifications) as well as about which NTMs are actually perceived as burdensome by businesses.

[INSERT UPDATED TABLE]

4.4 Coverage of sectors

NTMs are reported for sectors or rather products according to product codes. The information about NTMs for goods is collected on the product level (HS codes). Figure 2 presents the number of NTMs reported on the product level for all available years. The number of NTMs reported are denoted as observations, as measures are reported more than once and thus appear several times as observations in the respective databases. Note that only those observations that contain a product code are consider. This means that only about 40% of the notifications to the WTO are counted in the number of observations presented. About 60% of the WTO notifications do not have a HS code (Ghodsi et al., 2015). In contrast, NTM TRAINS reports measures with the corresponding HS (6-digit or even more detailed) HS code and the GTA reports most (90%) of the measure identified with the 4-digit HS code.

Figure 2: NTM composition per sector and database

[ADJUST TEXT TO FIGURE]

As shown, most incidences of NTMs are found in animal and vegetables products (I and II), plastics and rubber (VI), textiles (XI) as well as vehicles, aircrafts and vessels (XVI). It is interesting to note that a relatively low number of countries are reported for the relatively large number of observations of WTO notifications in plastics and rubber, and textiles. Overall, the pattern of the number of country and the number of observations seems to be rather balanced across sector. However, one or two sectors show a disproportionately high number of observations. In the GTA, the number of alerts are comparatively high for vehicles, aircrafts and vessels, making up for about 21% of all observations. In NTM TRAINS, about 19% of all regulations are reported for rubber and plastics and most WTO notifications are made in animal and vegetable products.

Table 5[5] presents the number of observations for services by mapping the available data to the first level of the Services Sectoral Classification List (SSCL/W/120) covered under the GATS. As mentioned, the information provided in the different databases differs and thus the figures presented are hardly comparable across databases. Furthermore, the number of subsectors that differ according to classification influences the number of observations per SSCL sector. For example, the relatively high number of commitments and reservations as well as GTA measures in business and transport services could be partly explained

[5]The World Bank and OECD STRI, and GTA database do not use the SSCL sectoral classification. The sector mapping has been approximated.

by the various subchapters that are defined in the sectoral classification. The more subchapters, the more observation are expected at the aggregated level.

Overall, most observations are reported for business, communication, distribution, financial and transport services. These sectors are relatively comprehensively covered by the GATS commitments, by the applied MFN policy (reported by the World Bank and OECD STRIs respectively) as well as by bilateral preferences (reported by the WTO Services RTA). In combination, these databases provide important insights on NTMs for services.

Table 5: Services NTMs per sector as defined in GATS

	WTO Services RTAs		World Bank STRI		OECD STRI		GTA
GATS sector	Countries	Com/Res	Countries	Indicators	Countries	Indicators	Measures
1 Business	45	4124	103	67-70	40	46-63	517
2 Communication	41	1901	103	51-53	40	1-61	106
3 Construction	31	600			40	59	241
4 Distribution	38	1001	103	53	40	4-68	143
5 Education	38	486					33
6 Environmental	34	577					42
7 Financial	43	1344	103	56-62	40	3-91	408
8 Health	28	241					53
9 Tourism	45	706					40
10 Recreation	36	916					102
11 Transport	43	3322	103	46-58	40	0-20	404
12 Other	29	224					45

5 Analysis

- Are there different patterns of NTMs for developing and developed countries across different databases? Is there a different pattern of NTMs between developing and developed countries? (i.e. type of NTMs vs. development status);
- If yes, can we observe an upward trend of NTMs with increasing development?;
- Trade position: presence vs. export/import intensity... number of NTMs vs. import and export position at the product level (if possible);
- Presence vs. NTM specific (compliance) institutional infrastructure... for implementing and affected countries (i.e. the latter via border rejections in the EU and US;

6 Challenges when applying the NTM databases

Analysing NTMs is not straightforward due to the complexity of measures. Usually, gravity estimations are used to gauge the impact of measures on trade by generating estimates of NTMs in terms of ad-valorem equivalents. These estimates for NTMs can subsequently be used in simulation models in order to derive the economic and welfare effects of NTMs. In most studies, all NTMs

are investigated in such a standard analysis. All sectors or broad categories of sectors and all countries or broad categories of regions are considered. There are also more detailed studies focusing on certain measures, sectors and countries, e.g. the effect of SPS measures on the agri-food sector in developing countries.

In addition to limits of the analytical methodology, the studies in the literature show that the data constitute a common challenge for the analysis of NTMs. First of all, the data provided may be not complete or may not be coded according to the agreed categories and classifications, e.g. product and country codes as well as the NTM codes according to the MAST classification. Text mining in the regulatory documents can help to retrieve and complete the missing information. However, in some case challenges remain. From a conceptual point of view, main challenges in the NTM analysis are identified as follows:

Regulatory systems of NTMs: The relation between measures are often not appropriately reflected in the data. In most cases, many measures are imposed on one product or service, and measures imposed on this product/service could mean that another product may be less regulated. The set of measures imposed in a regulatory system are linked and interdependent, such that one measure can influence the outcome of another measure and the other way round. In conclusion, measures cannot be evaluated in isolation and the regulatory system should somewhat be taken into account when analysing NTMs. The OECD and the World Bank, for example, have taken the ?hierarchy of measures? into account for deriving their respective indices measuring the trade restrictiveness of NTMs for services.

Following the idea of regulatory systems of NTMs raises the question about how they are governed at the international, national and local. National authorities, for example, seem to regulate most NTMs, but some NTMs may be governed on the regional or local level. While some indication may be drawn from the OECD PMR data, data on the governance of NTMs is not systematically collected but would be relevant for understanding NTMs and their impact.

Implementation and enforcement: Information about the implementation and enforcement of measures is not readily available. In addition to details about the measures, it is equally important to collect information about if measures are applied and how they are applied. The NTM impact crucially depends on if the measures under review are actually implemented and enforced. Besides, the implementation and not the measure per se could cause the NTM impact. Some clue about implementation and enforcement is provided by those databases that report the beginning date and end date of a measure, or the date of enforcement of the regulation that describes the measure. Sometimes surveys provide information about procedural obstacles relating to the implementation of measures rather than the measures themselves.

In the context of procedural obstacles, institutions are often mentioned as being unsatisfactorily equipped or lacking the capacity to deal with NTMs. For example, it can be argued that the impact of NTMs on exporter and importers of a country is to a large degree influenced by the country?s institutions related to the official national quality infrastructure engaged in technical regulations

(both SPS and TBT), e.g. standard setting, conformity assessment and custom authorities of a country. The World Bank reports on domestic LPI and the UNIDO reports on compliance with standards shed some light on these institutional matters. However, information is neither systematically collected nor reported for specific measures.

Determining the restrictiveness of measures can be considered a main issue in the analysis of the impact of NTMs. Restrictiveness is essentially a relative concept, and thus regulations are somehow compared when determining their restrictiveness and impact. The impact of measures imposed by one partner countries depends on whether they are more restrictive than domestic regulations. In addition, are they more restrictive than the measures imposed by other countries? Comparable information in details is needed for measuring the restrictiveness across countries, e.g. numerical values of maximum residue levels, fees, tax rates or service charges as well as the size of quotas imposed. This goes far beyond the commonly provided information about whether a measure is in place or not. Note that it could be argued that the NTM impact is caused by the mere differences of measures rather than by how much they actually differ (Rau et al, 2012). Following this line of thought, regulatory differences (rather than the restrictiveness of measures) could be investigated by comparing qualitative information on regulatory system.

Beyond the economic effects of NTMs: Applying the available NTM data, research has been focusing on the economic effects of NTMs. In few studies, public good aspects have been included by applying a cost-benefit framework. Other studies have looked at welfare effects that are economically defined. From a policy point of view, it would be interesting to know more about the effects of NTMs on aspects broader than the economic impact, e.g. the effects on market structure, different types of business and households as well as health and/or environmental effects. Such kind of analyses require additional data and (outcome) indicators in relation to NTMs and possibly the policy objectives behind them.

7 Conclusion

NTMs have been widely discussed and investigated, but information on NTMs still limits their analysis. A main challenge for the analysis is related to the NTM data available. Often, details about the NTM data applied is not reported although such details are paramount for ensuring the quality and an appropriate interpretation of results. This paper brings together information about NTMs and data sources that are officially available. We assess the available NTM data systematically in order to provide information about their characteristics and the conceptual background that needs to be considered in NTM analyses. Data sources of NTMs usually provide information about the measures, products and the countries imposing the measure as well as the countries being affected by the measure. NTMs for goods and NTMs for services are dealt separately. NTMs for goods have been classified according to the international MAST classification, which was initiated by international organisations and experts working on

the NTM topic. For NTMs for services, the first steps of mapping different classifications have been undertaken and will facilitate the analysis in the near future.

The level of details about the measures considerably differs. The information provided comprises binary variables that indicate whether a measure is in place or not, ordinal variables indicating a ranking along a chosen dimension or numerical variables reflecting quantitative attributes of an NTM, e.g. percentage of foreign equity ownership, maximum residual limits, or maximum weight. In addition, the detailed texts that describe measures and their implementation may be provided in some databases. In the database of NTM for goods, the main focus is on information about whether a measure is in place or not (binary variable), but some detailed descriptions of measures are also provided. For NTMs for services, databases in addition provide information about the ranking sequence and/or indication of restrictiveness of measures. This adds another dimension to the NTM data for services, which is of interest for the analysis of NTMs.

Gaps in the country and product coverage have been identified for both NTMs for goods and for NTMs for services. This means that in some databases the NTM information is missing for certain countries and NTMs may also not be reported for all products. Furthermore, databases as well as studies do not necessarily apply existing definitions of measures. In case of NTMs for goods, some surveys for example do not apply the MAST classification. Similarly, products are not always assigned to the product classification codes. This makes the combined use of databases difficult and often unfeasible, given time and budget constraints. Thus, researchers usually omit those observations for which the full information is not available.

Another main challenge of the NTM data relates to the question whether measures are specific to countries or specific to products. Often countries impose NTMs on all partner countries, and measures could be horizontally applicable on all products or certain groups of products. In addition, information about the implementation and enforcement of measures is by large missing. As the NTM impact crucially depends on if the measures under review are actually implemented and enforced, such information would need to be added or assumptions need to be made.

Since the various NTM databases contain different information contents and details about measures, using different NTM data in combination would bring forward the analysis and interpretation of results. However, integrating the available NTM data is not a straightforward task. It would involve considerable data work, text mining as well as assumptions would need to be made since link between the information contents of the different NTM data is not clear. Furthermore, measure are not always uniquely identified, which could easily lead to the double counting of measures. Special attention and a careful merging by experts that understand the data is prerequisite to ensure consistency.

The combined and integrated NTM data would help provide a more complete picture of which measure is imposed on which product by which country

and for what purpose but would also give an indication about the enforcement of the measure. Furthermore, adding information about complaint registers, for example, could point out which measures actually matter in international trade, in addition to identifying the difficulties that businesses face in the presences of a measure. Information beyond the mere existence of measures would add contents and hence value to the analysis of NTMs, thereby building up knowledge about the many aspects of NTMs.

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A Appendix

A.1 Description of NTMs according to the MAST classification

Chapter A deals with sanitary and phytosanitary measures, which are generally referred to as SPS. It gathers measures such as restriction for substances and ensuring food safety, and those for preventing dissemination of disease or pests. Chapter A also includes all conformity-assessment measures related to food safety, such as certification, testing and inspection, and quarantine.

Chapter B collects technical measures, also called TBT. It refers to measures such as labelling, standards on technical specifications and quality requirements, and other measures protecting the environment. As in the case for SPS, chapter B also includes all conformity-assessment measures related to technical requirements, such as certification, testing and inspection.

Chapter C, which classifies the measures related to pre-shipment inspections and other customs formalities.

Chapter D groups the contingent measures, i.e. those measures implemented to counteract particular adverse effects of imports in the market of the importing country, including measures aimed at unfair foreign trade practices. They include antidumping, countervailing, and safeguard measures.

Chapter E includes licensing, quotas and other quantity control measures, including tariff rate quotas.

Chapter F lists price-control measures implemented to control or affect the prices of imported goods. Among the examples are those to support the domestic price of certain products when the import prices of these goods are lower; to establish the domestic price of certain products because of price fluctuation in domestic markets, or price instability in a foreign market; or to increase or preserve tax revenue. This category also includes measures other than tariffs measures that increase the cost of imports in a similar manner (para-tariff measures).

Chapter G refers to measures restricting the payments of imports, for example when the access and cost of foreign exchange is regulated. It also includes measures imposing restrictions on the terms of payment.

Chapter H includes those measures affecting competition ? those that grant exclusive or special preferences or privileges to one or more limited group of economic operators. They refer mainly to monopolistic measures, such as State trading, sole importing agencies or compulsory national insurance or transport.

Chapter I deals with trade-related investment measures, and groups the measures that restrict investment by requiring local content or requesting that investment be related to export in order to balance imports.

Chapters J and K relate to the way products, or services connected to the products, are marketed after imports. They are considered non-tariff measures because they could affect the decision of being imported.

Chapter J, on distribution restrictions, refers to restrictive measures related to the internal distribution of imported products.

Chapter K deals with restrictions on post-sales services, for example, restrictions on the provision of accessory services.

Chapter L contains measures that relate to the subsidies that affect trade.

Chapter M, on government procurement restriction measures, refers to the restrictions bidders may when trying to sell their products to a foreign government.

Chapter N gathers restrictions related to intellectual property measures and intellectual property rights.

Chapter O, on rules of origin, groups the measures that restrict the origin of products or its inputs.

Chapter P is on export measures. It groups the measures a country applies to its exports. It includes export taxes, export quotas and export prohibitions.

A.2 Trade obstacle classification by ITC

Table 6: Trade obstacle classification by ITC

Category	**Obstacle**
Administrative	Large number of different documents Documentation is difficult to fill out Difficulties with translation of documents from or into other languages Numerous administrative windows/organizations involved
Information or transparency issues	Information on selected regulation is not adequately published and disseminated No due notice for changes in selected regulation and procedures Regulations and procedures change frequently Requirements and processes differ from information published
Discriminating behaviour of officials	Arbitrary behaviour of officials regarding classification and valuation of the reported product Arbitrary behaviour of officials with regards to regulations or procedures
Delays or time constraints	Delay related to the implementation of regulations or procedures Deadlines set for completion of requirements are too short
Problem of payment	Unusually high fees and charges for the implementation of regulations or procedures Informal payment (e.g. bribery)
Limited facilities	Limited or inappropriate facilities for trade procedures (e.g. inspections) Limited or inappropriate facilities for transport and storage (e.g. refrigerated trucks) Other type of problems related to limited or inappropriate facilities
Lack of international recognition	Facilities lacking international accreditation or recognition (e.g. testing laboratory) Lack of international accreditation or recognition of procedures or regulations (e.g. lack of recognition of national certificates)
Other obstacles	Other obstacles