Methods of analyzing SPS and TBT measures

William Meyers

PID_00157677

Universitat Oberta de Catalunya
www.uoc.edu

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Introduction

As NTMs have been gaining more relevance in international trade policy, policy makers have increasingly asked the economists to *quantify* NTMs. Quantitative analyses help to inform governments about the costs of their SPS (and TBT) policies, and provide the determinants necessary for defining more efficient regulations.

Bibliographical reference

(Antle, 1995)

A better estimation of the damage caused to a country by foreign regulations may help solving disputes, and serve as a basis for calculating compensation claims.

Bibliographical reference

(Beghin and Bureau, 2001)

Quantifications on NTMs based on quantity restrictions such as quotas were relatively straightforward. The effects of a quota are restricted trade volumes and quota rents.

Analysing *regulatory* NTMs, such as SPS and TBT measures, is more complex for at least two reasons:

- Quality of data.
- Choice of analytical approaches.

Traditionally economists only looked at the trade effects of SPS and TBT measures (that is, restricting trade flows). Some studies also added health benefits, such as the number of lives saved under specific regulations.

Recently, the trends have been to look at an economic assessment of a broad evaluation of costs and benefits looking beyond trade effects. In this module, we look at the sources and quality of data on NTMs, analytical tools and conclude with some case studies.

1. Sources and quality of data on NTMs

In this part we look at the sources and quality of data on NTMs. Of course, proper economic analysis calls for other data as well, such as those discussed earlier under the cost and benefits of food safety regulations.

To model the effects of the non-tariff barriers, detailed information on the actual NTMs is needed. Usually the information comes from:

- Business surveys sponsored by various organizations (such as the OECD).
- Complaints filed by exporters facing problems in particular markets.
- Governments self-reporting on their policies.

Data are important for a variety of reasons: exporters, policy makers negotiating in trade agreements, academics and researchers are interested. However, although the data on NTMs have improved, often classification (taxonomy) of NTMs is not standardized; country coverage differs across sources, and data are often updated with a significant lag.

Trade databases –and trade monitoring and customs administration in general– often refer to *HS Codes*. Before proceeding to the actual data sources, a short explanation is needed on the harmonized system. **The Harmonized Commodity Description and Coding Systems** (or **Harmonized System–HS**) is an international product nomenclature developed by the World Customs Organization.

On the international level, HS codes are harmonized up to level 6 and cover about 5,000 commodity groups. Countries are free to add additional levels of differentiation beyond HS6. The Harmonized System is used by more than 200 countries as a basis for their customs tariffs and for collection of international trade statistics where over 98% of the international trade is classified in terms of HS. HS itself presents a *harmonization* discussed several times in the course. It contributes to the harmonization of customs and trade procedures. It is updated on a regular basis, although basics remain the same.

Let's look at an example of *gingerbread*. The HS consists of 22 *sections*. Each section includes at least one chapter. There are 99 *Chapters*, of which the first 24 are relevant for food and agriculture. For example, in Section IV *Prepared foodstuffs; beverages, spirits, and vinegar; tobacco and manufactured tobacco substitutes* there are 9 chapters (so-called HS 2):

- Chapter 16 Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates.
- Chapter 17 Sugars and sugar confectionery.

- Chapter 18 Cocoa and cocoa preparations.
- Chapter 19 Preparations of cereals, flour, starch or milk; bakers' wares.
- Chapter 20 Preparations of vegetables, fruit, nuts or other parts of plants.
- Chapter 21 Miscellaneous edible preparations.
- Chapter 22 Beverages, spirits and vinegar.
- Chapter 23 Residues and waste from the food industries; prepared animal feed.
- Chapter 24 Tobacco and manufactured tobacco substitutes.

Going further down in the nomenclature, HS 4 (four digits) are called headings. In Chapter 19, for example, there is a heading 19.05:

> "Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion wafers, empty capsules of a kind suitable for pharmaceutical use, sealing wafers, rice paper and similar products".
>
> The Harmonized Commodity Description and Coding Systems. Chapter 19.

Going further down in the nomenclature, we get to HS 6 (subheadings). An example of a subheading in the heading 19.05 is 1905.20: *Gingerbread and alike*.

Bibliographical reference

http://www.wcoomd.org/home_wco_topics_hso

1.1. WTO notifications

Notifications to the WTO SPS and TBT committees are important sources of data. Under the SPS Agreement, each Member of the WTO has obligations to fulfil its transparency requirement. Transparency called on countries to publish all sanitary and phytosanitary measures and notify changes to SPS measures. This is done by establishing a notification authority in a country. Notifications are qualitative in nature and can be found on the WTO website.

WTO's Trade Policy Reviews are also an important source of trade policies. The policies of each WTO Member are reviewed with the frequency of reviews depending on the importance of the particular country in the world trade. Countries with the largest share of world trade (the EU, US, Japan and China) are reviewed every two years, the next 16 every four years, and the others every six years.

1.2. WITS

WITS is a software developed by the World Bank which gives access to three major trade and tariff data compilations:

- **Comtrade**.

- **TRAINS**, which stands for Trade Analysis and Information System. It is of interest to NTMs and is maintained by the UNCTAD (United Nations Conference on Trade and Development). It provides information at HS 6 on tariff and non-tariff measures. The data collection started in the 1980s

and contains information for 97 countries. However, since its updating relies on self-reporting by countries, the database itself suffers from *ad hoc* updates; and countries that do update in regular basis look worse than those not providing updates. The nomenclature of NTMs we described in last module is part of UNCTAD's new initiative to set up a new NTMS classification and a data collection portal. The classification currently used by TRAINS contains 6 chapters for NTMs which are divided into two groups:

- Core measures, such as quotas, which intend to protect local producers.
- Non-core measures, such as food safety regulations, which intend to protect local consumers.

- **WTO** databases.

1.3. Business surveys and complaints

The last big group of information about NTMs comes from businesses. Businesses engaging in trade are on the frontline and provide first hand information on obstacles to trade. They can file a complaint by themselves with their respective governments or express their concerns when asked in a business survey. OECD has done several business surveys to identify perceived key problem areas for exporters globally and for developing country exporters. Despite the best efforts, the response rates to business surveys are rather low as potential respondents render them time consuming and not effective.

A better score is achieved with complaints from businesses to their respective governments. **The Office of the United States Trade Representative** published a report on *Foreign Trade Barriers*. The European Commission maintains the **European Union's Market Access Database**. In addition to the Market Access Database, which is based on complaints of European exporters, the European Commission also maintains an **Export Help Desk**. Export Help Desk details requirements to export to the EU market.

Surveys often reveal that the biggest burdens on exporters are not the actual SPS or TBT measures, but the administrative burden and multiple testing requirements, as a large proportion of trade products are still assessed in individual destination markets. Surveys, just as other sources of data, help to identify a problem but not to quantify it.

2. Analytical tools

Measurement (or quantification) maps complex effects into a scalar (such as volume of imports affects, level of welfare) or a matrix.

Bibliographical reference

(Beghin and Bureau, 2001)

The definition of NTMs as a trade or welfare restricting measure has implications on empirical measurement. Some methods only aim at obtaining a count of NTMs, while others analyze their impact on market equilibrium, trade flows, economic efficiency and welfare for the purposes of policy makers, although studies covering economic costs and benefits are still rather rare. Existing studies focus on lost trade as a welfare measure. However, given that NTMs deliver many economic benefits, such as enhanced information and transparency, investigating them through the lenses of economic costs and benefits might be more opportune. In this part we look at three different approaches for analyzing NTMs.

2.1. Inventory approaches

Inventory based approaches create an *inventory* of measures. They identify a problem but do not quantify it. However, they provide an input into more sophisticated approaches and are used both in qualitative and quantitative assessment. Data sources we described in the earlier section. In particular, three sources of information are beneficial:

- Data on regulations, such as the number of regulations affecting a product described by an HS subheading.
- Data on frequency of detentions, and
- Data on complaints from the industry against discriminatory regulatory practices.

Among possible statistics are:

- **Simple counts of restrictions**
- **Frequency ratios**
- **Import coverage ratios**

Frequency ratios are defined as the number of product categories subject to a NTM or as a percentage of the total number of product category in a classification subject to a NTM. The coverage index combines the count with trade flows and calculates the portion of imports or exports that is potentially affected by the existence of measures. However, causality is often hard to assign: is there low trade because of NTMs or is it for other reasons, such as lack of demand?

Among other shortcomings of the inventory approach is the qualitative nature of most of the regulations. Simple statistics, such as frequency type measures, provide information on frequency but not the impact and on an importance of a measure. Different standards and regulations cannot be expected to have similar effects on trade.

For example, a labelling requirement would be less detrimental and more easily fixable than a pesticide residue.

A correlation between the number of measures and trade restrictiveness might be misleading, especially when bans are considered. Comparisons across countries also suffer from reporting issues.

Despite its many shortcomings, the inventory based method serves as a problem identifier which can later be analyzed using more detailed and comprehensive methods. Inventory based approaches do not make it possible to identify regulations that have a major trade restriction effect from those that do not.

2.2. Price wedges

Price wedge methods focus on trade impacts. They rely on the idea that NTMs can be assessed in terms of their impact on the domestic price (or price of goods which comply with a NTM on a certain market) in comparison to some reference price, as NTMs are likely to increase domestic prices, for example, due to higher compliance costs. The method aims to provide a tariff equivalent of a NTM which is then used in modelling.

A conceptually correct measure of a price wedge would be to compare the price that would prevail in the absence of the NTM to the price that would prevail domestically in the presence of the NTM, if the price paid to suppliers were to remain unchanged.

Bibliographical reference

(Deardorff and Stern, 1998)

However, these prices are usually unobservable, and actual measures of NTMs focus instead on a comparison of the domestic and foreign price in the presence of the NTM.

Since products differ in quality, quality adjustments are often made. Consequently, the application of a price wedge method to the food sector is an increasingly challenging exercise. In addition, the price wedge method reveals that there is a difference in prices but is unable to attribute the difference to specific factors. Also, imported goods must be perfect substitutes for the method to be valid.

Alternatively, quantity impact measures can be calculated. They attempt to estimate the size of trade flows that would exist in the absence of a given measure.

2.3. Econometric and modelling methods

Econometric and modelling methods actually look at the impacts of NTMs and use results of inventory and price wedge approaches as inputs. Econometric methods rely on gravity based approaches. Gravity models, just like Newton's Law of Universal Gravitation formula (think apple), use the gravitational force concept to explain trade volumes. Policy variables, such as NTMs can be added. Quantification of NTMs is often tempted to conclude that the foregone trade that cannot be explained by tariffs is due to NTMs. Gravity approaches capture trade effects of NTMs as opposed to welfare effects.

Rather than estimating the actual impact, cost-benefit approaches provide some indication on what should be included as trade barriers on the basis of the effect of regulations on welfare. Costs and benefits of each regulation have to be taken into account. When SPS or other regulations aim at correcting market failures, one difficulty which arises is often the identification of the protectionist component of the regulation. By decomposing welfare effects, it is possible to assess the welfare loss associated with a measure whose costs exceed benefits. The combination of scientific and cost-benefit assessment is one of the most promising areas of research in the identification and assessment of the effects of NTMs. Challenges are similar to those discussed under cost-benefit analysis of food safety.

Often NTMs are measured in terms of impact on the overall equilibrium in the sector or in the economy. Roberts proposes an analytical framework that summarizes most of what the various authors have adopted.

Bibliographical reference

Roberts et al (1999)

They distinguish three economic effects:

- The *regulatory protection effect*, i.e., the rents to the domestic sector.
- The *supply shift* effect on the domestic supply induced by compliance cost.
- The *demand shift* effects arising from new information that increases consumer demand for the product. The shortcoming of this method –as well as others– is lack of data.

3. Comparison of studies and results

The inventory approaches discussed earlier reveal which product –country– NTM combinations would be interesting for further study. Inventory approaches together with the *clustering of products* reveal that some sectors are notorious for the high incidence of NTMs and concerns (such as those brought to the WTO Committees or complaints brought up by the exporters), such as fruit and vegetable sectors or meat. Fish, on the other hand, despite a high count of NTMs applied to it, has a low number of concerns, hinting that some sectors –especially the ones dealing with a highly perishable product and subject to a number of regulations– could be more apt in dealing with them. *Commodity type* products, such as cereals, usually do not have a large number of regulations attached to them and concerns are reported relatively sparingly.

Some sectors, such as fruit and vegetables can have a variety of NTMs applied to them differing across products. Other sectors, such as already mentioned commodity types, can be less affected, but some of the NTMs applied to commodities can be made more visible by the media.

> For example, approval of GM varieties, hormone treated meat, or bans prohibiting imports of cheeses made from raw milk.

Despite many exciting topics, data availability is often the limiting factor for more detailed analysis. Many studies and papers discuss the economic and trade effects of food-related regulations in a qualitative manner. Empirical studies quantifying the effects of the SPS and TBT measures (as well as other NTMs) usually focus only on their trade effects, thus, leaving behind a potentially large group of economic costs and benefits. Analysis usually relies on estimating gravity equations or running simulations. Many parameters have to be estimated.

In this part, we discuss a sample of studies investigating TBT and SPS issued quantitatively for two reasons:

- the first one is to give you a flavour of the empirical work in the area,
- the second is to point out the potential shortcomings and the weight assumptions carried in modelling.

Nevertheless, despite the shortcomings, empirical studies remain important to inform the policy makers and potential dispute settlement processes. The review of studies presented in this part is not, of course, exhaustive.

3.1. Tighter residue levels

A popular series of studies from the World Bank looked at the trade effects of tightening aflatoxin regulations in the EU (which, at the time the study was prepared in 2001, had only 15 Members) using a gravity model to estimate bilateral trade flows and the effects of regulations on these trade flows. Their analysis found that the per capita GDP of the importing country (in this case, EU countries) has a positive effect on exports, meaning an increase in per capita GDP increases imports. Tightening the aflatoxin regulations on ground nuts in the EU would restrict African exports from Chad, Egypt, Gambia, Mali, Nigeria, Senegal, South Africa, Sudan and Zimbabwe to the EU. At the time the studies were prepared, the Codex Alimentarius recommended standard was 9 ppb (particles per billion). If all EU Member States accepted 9 ppb as a limit, the increase in trade value would be 72% compared to the 1998 value. If, however, the EU regulation of 2 ppb was accepted, then the loss to African exports would be 36% of the 1998 value. Alternatively, if the EU regulation were made even more stringent, then the loss would amount to 72% of the 1998 value.

A different version of the study (under a media-friendly title of *Saving Two in a Billion: Quantifying the Trade Effects of European Food Safety Standards on African Exports*) looked at the impact on the value of trade flows of EU regulation standardized on levels tighter than the Codex recommended standard, and a Codex recommended standard in two groups:

- Cereals and their preparations.
- Dried fruits, nuts, and vegetables.

The country coverage remained the same as in the earlier described study. The results were linked to changes in estimated health benefits captured by the number of liver cancer deaths. As in the earlier study, stricter regulations were found to have a negative impact on trade. Linking the estimated results to health benefits, authors claim that a stricter aflatoxin standard would cause a significant damage to African exports while saving 2.3 lives per one billion persons.

Other studies on tighter residue levels or other standards are also available. Their general conclusion is that tighter standards restrict trade, although they often fail to take into account other costs and benefits tighter regulations could deliver.

3.2. Introduction of invasive species

A big group of studies deals with the introduction of invasive species that, when spread, can cause damage to agricultural production or even to a broader biodiversity. Some countries deal with the threat of introducing an invasive species (or weeds or an animal disease or other events influencing ecosystems) by imposing bans, long quarantines or detailed inspection procedures, although their potential trading partners often suspect these policies can be in place to protect domestic producers at the expense of domestic consumers, who are denied variety (and often also quality) and are likely to pay higher prices. Quarantines and inspections that delay entry of a product are particularly harmful in the case of perishable products, such as fruits, vegetables and flowers. Empirical results (such as that of James and Anderson) imply that removal of the ban on banana imports would benefit consumers via higher consumption of bananas, lower the mean price of bananas as well as price variance, because Australian consumption would no longer be constrained to the volume of domestic production which is subject to fluctuations both within and between seasons.

Bibliographical reference

James and Anderson, 1998

Even if the banana industry in Australia was eliminated and producers would have to be compensated, the consumer gains would be large enough to compensate the growers. Although (some) banana imports are considered, the position of the Australian banana industry is clearly against banana imports.

Bibliographical reference

http://www.abgc.org.au/?industry/imports

Another of many examples is avocados from Mexico on the US market. A quarantine in place from 1914 banned entry of Mexican avocados into the US market on the grounds of the risk of pest infestation. Since the early 1970s, this quarantine has been a cause of dispute between the Mexican and US governments, resulting in elaborate evaluations of possible pest risks and risk mitigation procedures that might be carried out.

Bibliographical reference

Bakshi, Nishita (2003). "Sanitary and Phytosanitary Measures: The Case of Mexican Avocados" (Thesis). Virginia Polytechnic Institute and State University.

The dispute has been largely resolved since 1997, by replacing an import ban with trade accompanied by mitigation measures designed to reduce fruit fly and avocado-specific risks.

Bibliographical reference

(Peterson and Orden, 2007)

Orden and Romano evaluated the economic effects of the full or partial easing under alternative assumptions about the probability of a pest infestation. In their analysis, consumers benefit from lower prices but elimination of higher domestic prices sustained by the import ban results in decreased domestic output which has a negative effect on the industry.

Bibliographical reference

Orden and Romano

Peterson and Orden evaluated the effects of a November 2004 rule that removed seasonal and geographic restrictions in the importation of fresh avocados from approved (emphasis added) orchards in Mexico to the United States.

Bibliographical reference

Peterson and Orden (2007)

With the remaining compliance measures in place, pest risks do not substantially increase, but US net welfare increases. If other measures were removed, the net welfare gains could be lower.

3.3. Implementation of HACCP

Our last example deals with an application of HACCP, an example of a process standard. We already discussed a study by Andrers and Caswell on the HACCP in the US seafood trade with developing countries. After HACCP was mandated by the US in 1997, results suggest that HACCP had a negative and significant impact on overall imports. However, while the effect for developed countries was positive, for developing countries the effect was negative. Larger firms experienced positive effects, while smaller firms faced a negative effect. The result held regardless the development status.

Thus, successful adoption of process standards, such as HACCP, or a certification can be challenging for developing countries, and in particular for small producers. However, producers that succeed in adopting a HACCP standard upgrade can find broader and steadier exporting opportunities. The costs of complying with hygiene standards can be substantial. Sometimes firms and industries upgrade following a ban on imports of their products. A case of the Bangladeshi shrimp industry is often cited, but similar examples can be found elsewhere. Between August and December 1997, the European Commission banned imports of frozen shrimp from Bangladesh because of concerns about hygiene standards in processing facilities and the efficiency of controls by Bangladesh government inspectors.

Bibliographical reference

(Spencer at al,)

Cato and Lima dos Santas estimate that, as a result of the ban, shrimp processors lost $14.6 million. Upgrading sanitary conditions in the Bangladesh frozen shrimp industry to satisfy the EU's hygiene requirements cost $17.6 million over the period 1997-98, with an average expenditure per plant of $239,630.

Bibliographical reference

Cato and Lima dos Santas (1998)

The total industry cost required to maintain HACCP in these plants is estimated to be $2.2 million per annum. Further, the Bangladesh government is estimated to have spent $283,000 over this period and predicts an expenditure of $225,000 per annum to maintain a HACCP monitoring programme.