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The Rising Importance of Non-tariff Measures and their use in Free Trade Agreements Impact Assessments

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Abstract

This research examines non-tariff measures (NTMs) and their use in impact assessments of free trade agreements (FTAs) based on computable general equilibrium models (CGE) as well as its implications. We show that projected gains related to FTAs tend to rely on removing 'actionable' NTMs and that, usually, impact assessments and empirical studies that provide this recommendation lack case-specific explanations behind actionability as well as of the channels and the way NTM elimination is supposed to improve welfare. We also find that the estimated economic gains from FTAs based on CGE models tend to be small and based on a high percentage of NTM elimination, which underestimates the social significance of these measures. Since NTMs comprise measures that target not only economic aspects but also social and environmental ones, indiscriminate NTM elimination suggests that small gains may come at a high cost.

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1. Introduction

In recent decades, there has been an increase in the use of non-tariff measures (NTMs) while tariff barriers have declined significantly (de Melo & Nicita, 2018). As a result, NTMs have been placed at the center of the debate on trade policy. NTMs' importance is also evident in the evaluation and assessment of free trade agreements (FTAs), where Computable General Equilibrium (CGE) models are used. These models, however, rely in assumptions that do not necessarily reflect the way economies work and the actual purposes of NTMs. As discussed below, positive effects of FTAs estimated with CGE models are based on a considerable reduction or elimination of NTMs. This underlies trade liberalization's positive projected impact on international trade, productivity and economic growth. NTM elimination is then, from the perspective of these models, a precondition for the success of trade and investment agreements. Table 1 shows instances of the proportion of NTM reduction that is required to obtain, usually small, gains in the form of GDP from FTAs.

Table 1. NTM reduction in CGE models

NTM reduction	Estimated gains in GDP per year
FTA: EU-Japan* 50% overall reduction of Japanese NTMs; 16.5% reduction of EU goods NTMs; 50% reduction of EU services NTMs; 65% of bilateral reduction in goods and services NTMs to third countries	EU = Between 0.34% to 0.79%, Japan = Between 0.27% to 0.67% (lower and upper bound estimates)
TPP and alternative regional trade agreements◆ 50% overall NTM removal	All Trans-Pacific Partnership countries: Average gains in real GDP due to NTM removal = 1.73% Average gains in real GDP due to tariff removal = 0.15%
FTA: EU-Japan✣ NTM reduction equivalent to an average FTA effect (about 20%)	EU = 0.21%, Japan = 0.86%

*Based on European Commission (2012, 2016) in UK Department for International Trade (2018). See note 40.

◆Based on Kawasaki, K. (2017). The calculation includes the United States of America.

✣Based on Benz and Yalzin (2015). The authors use an alternative model that also relies on NTM elimination.

The purpose of this paper is to analyze the assumption that NTMs are mainly bearers of costs whose elimination inevitably stimulates trade and improves 'welfare' as it is assumed in the CGE models used for the assessment of the impacts of FTAs. Here it is argued that these conclusions are wrong because they are the result of CGE models' one-sided perspective. First of all, we find that gains related to FTAs in impact assessments based on these models tend to be achieved by the 'guillotine' approach (Cadot, et al., 2018) of cutting 'actionable' NTMs. Normally, however, impact assessments and empirical studies that provide this recommendation do not provide sufficient details about the way actionability is determined. While advising NTM cuts as the main way to increase welfare, these assessments not only miss case-specific explanations behind actionability but also the channels and the way NTM elimination is supposed to improve welfare.

Second, we find that estimated gains from FTAs based on CGE models tend to be small and based on a high percentage of NTM elimination. However, since NTMs comprise measures that target not only economic aspects but also social and environmental ones, indiscriminate NTM elimination suggests that small gains may come at a high cost. Third, impact assessments of FTAs based on CGE models rely on the inclusion of Ad Valorem Equivalents (AVEs) of NTMs, which allow to account for NTMs' potential costs. Yet, there is no equivalent way to account for NTMs' potential social benefits in these models (e.g., in terms of health and the environment), which underestimates the social significance of NTMs. This suggests that CGEs models are too limited for an effective evaluation of FTAs. A consistent evaluation of the impacts of trade liberalization that implies NTMs reduction would have to account not only for the economic gains of trade liberalization but also for the loss of social welfare when NTMs are eliminated too.

The paper is structured in the following way: Section 2 presents a brief review of NTMs' definition, classification, and stylized facts. Section 3 shows how the misinterpretation of NTMs as being mainly costs, particularly in 'free-trade' economics,[2] has led to the idea that it is necessary to eliminate them in order to achieve productivity and economic growth. This section also includes a discussion on NTMs and their use in impact assessments where CGE models are employed. The section ends with a reminder of the reasons NTMs should be assessed not only in terms of their effect on economic but also social welfare. Section 4 concludes.

2. NTMs Definition, Classification, and Stylized Facts

Non-Tariff Measures (NTMs) are policy measures that target the international trade of goods and services. Potential ways of affecting trade include changes in prices, in quantities traded, or in both (UNCTAD, 2010; see also UNCTAD, 2018b). It is important to consider that NTMs are diverse and cover different purposes. NTMs applied to imports include, for instance, sanitary and phytosanitary measures (SPSs), standards on technical specifications, quality requirements, licensing, quantity and price control measures, public procurement, and so forth.

The rise in the demand of products with high quality standards, particularly those that may be harmful to the environment and health, has also led to the need for regulating the imports of a variety of goods (see de Melo & Nicita, 2018; UNCTAD & World Bank 2017). This need is being fulfilled mainly through NTMs. As seen below, however, NTMs are not only standards. They are varied and cover a variety of purposes.

A. Definition

Since NTMs are diverse and target different objectives, their definition tends to be broad in scope. As mentioned, NTMs are commonly defined as policy instruments with the capacity of affecting foreign trade. In another definition, de Melo and Nicita (2018) describe NTMs as policies that have the purpose of regulating market access as well as of guarantying safety regarding imported products. These authors acknowledge an evolving role for NTMs. They explain how during the 1990s, NTMs were mainly perceived as measures with a protectionist intent.[3] However, amid the

[2] Neoclassical economics or 'free-trade theory.'

[3] The reason they were mainly known, and still referred to, as non-tariff barriers (NTBs) (see Beghin, 2008).

establishment of the WTO and its rejection of obstacles to trade -as expressed in its Agreement on Technical Barriers to Trade (WTO, 2014)- as well as the positive evolution of the economies around the world, with knowledgeable and more demanding consumers, NTMs started being acknowledged also as policies capable of tackling social concerns related, for instance, to the environment and health.

NTMs are also commonly defined as what they are not, i.e., as measures that are not tariffs, but which can have an impact on foreign trade flows (Ederington & Ruta, 2016). Berden & Francois (2015) also define NTMs as regulatory differences. In a 2013 report from the United Nations Conference on Trade and Development (UNCTAD), NTMs were defined as all the measures that alter the conditions of international trade either by restricting it or facilitating it. In the same report, it is clarified that in practice NTMs are "measures that have the potential to substantially distort international trade, whether their trade effects are protectionist or not" (UNCTAD, 2013). In 2010, UNCTAD also provided a broad definition of 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" (UNCTAD, 2010).

According to these definitions, NTMs can be characterized by the following aspects. First of all, NTMs are policies established by governments.[4] Second, they are rules or regulations with no specific quantitative dimension (UNCTAD, 2013).[5] Another characteristic is related to NTMs' potential to affect foreign trade as mentioned before -by changing prices and quantities together or separately- (UNCTAD, 2010; see also de Melo & Nicita, 2018). Finally, NTM diversity and complexity make their quantification and that of their impacts particularly difficult (Dee & Ferrantino, 2005; Carrère & de Melo, 2011; Fugazza, 2013).

It is also important to consider that even though some NTMs may be used with protectionist intents, others are created to safeguard socially relevant aspects that may be affected within the context of foreign trade; that they may also help facilitate trade (see de Melo & Nicita, 2018); and that they have the capacity of influencing countries' development as will be discussed in Section C. Finally, as seen below, being many and of different kinds, suggests that their proper classification is an indispensable step for the analysis of their socioeconomic implications.

B. Classification

Given NTMs' diversity and increasing importance in trade policy relative to two decades ago, it is important to consider a classification that facilitate their systematization for the analysis of their implications. As explained by Beghin & Xiong (2018), a better classification of NTMs that allows for their meaningful aggregation is not only a crucial but also difficult task that if accomplished, will have major repercussions on trade policy.

[4] Private standards also exist, but they are not considered in this paper (see Beghin, et al., 2015; Vandemoortele & Deconinck, 2014). See also Henson & Humphrey (2010) and Schuster & Maertens (2015) for examples of private standards specific to the agri-food sector.

[5] This is normally explained by the counterfactual if NTMs 'are not tariffs;' thus, there is not a specific number (a percentage of price or amount per unit) that can be in principle linked to them.

Like their definition, NTM classification has evolved over time. According to Dee & Ferrantino (2005), the first taxonomy of NTMs was developed by Baldwin (1970),[6] who divided NTMs into twelve categories that included, among others, quotas, different types of subsidies, restrictive immigration policies, and selective monetary controls. Laird and Vossenaar (1991) also developed a classification of NTMs according to intent and immediate impact (e.g., measures for the control of price or quantity of imports; monitoring measures; production and exports; technical barriers). Deardorff and Stern (1997) also proposed a classification that focused mainly on price and quantity measures as well as on what they considered as technical barriers (in Dee & Ferrantino, 2005). Dee & Ferrantino (2005) also explains that the main difference between the UNCTAD's classification during the nineties[7] and that of Deardorff and Stern (1997) is the inclusion of measures that affect foreign investment and trade's atmosphere as well as the inclusion of quantitative measures and other duties, charges, and defense measures under the same group.

More recently, UNCTAD (2013) categorized NTMs by their scope and or design. Import measures are classified in technical measures and non-technical measures and then catalogued as hard measures (which include price and quantity control measures); threat measures (such as antidumping); sanitary and phytosanitary (SPS) measures, and other measures (e.g., exports measures). It is important to consider that each of these groups encompasses different types of measures too. Technical measures are categorized into three chapters: SPSs, technical barriers to trade (TBT), and pre-shipment inspections and other formalities.[8]

Non-technical measures are classified in twelve chapters,[9] which include contingent trade protective measures; quantity control measures (other than for SPS or TBT reasons); prices control measures; finance measures; measures affecting competition; trade-related investment measures; distribution of imports measures; restrictions of after-sales services; subsidies; government procurement policies; intellectual property measures; and rules of origin (de Melo & Nicita, 2018; UNCTAD, 2013). The export category is comprised by only one chapter[10] that includes all export-related measures according to the UNCTAD's classification (the 2012 version).

According to Ederington & Ruta (2016), however, the classification developed by UNCTAD and similar organizations[11] differ from those that are used in the theoretical literature. They explain that the latter employs a classification that is based on the following three categories: i. a subset of NTMs that are directed to imports; ii. Those which target exports; and iii. NTMs that includes standards and domestic taxation regarding health, the environment, products, etc., (also called behind-the-border measures). The first and second categories are referred to as *customs regulations*

[6] By 1968, the WTO had developed an inventory, based on notifications, of what was considered mainly as NTBs. The inventory was kept up to date by different working groups in 1982 and 1986, and it was terminated in 1995 when the new inventory based on reverse notification was created (see Dee & Ferrantino, 2005).

[7] This refers to the Trade Analysis and Information System (TRAINS) Database, which concentrates the information on NTMs collected and classified by UNCTAD since 1994 (UNCTAD, 2018a).

[8] These are known as chapter A, B, and C respectively -in the taxonomy developed by UNCTAD.

[9] Chapter D, E, F, G, H, I, J, K, L, M, N, O.

[10] Chapter P.

[11] In 2006, UNCTAD established the Multi-Agency Support Team (MAST) in order to develop a taxonomy of NTMs. The MAST is comprised by eight international organizations: Food and Agriculture Organization of the United Nations (FAO); International Monetary Fund (IMF); International Trade Centre (ITC); Organization for Economic Cooperation and Development (OCDE); United Nations Conference on Trade and Development (UNCTAD); United Nations Industrial Development Organization (UNIDO); World Bank; and the World Trade Organization (WTO).

or *discriminatory*[12] (because they distinguish between foreign and domestic products; between the market of destination of local products, and so forth) and the third as *non-discriminatory*[13] (for this group of NTMs tackle both production and consumption regardless of the products' origin or destination).[14]

More recently, de Melo & Nicita (2018), offered a classification of NTMs based on their different dimensions. For instance, they can be categorized as border measures -further divided into import and export measures (if applied at customs) or as behind-the-border (when applied domestically). The same authors explain that NTMs can also be categorized according to the agreements or clauses they refer to (e.g., clauses in the General Agreement on Tariffs and Trade, GATT, and WTO agreements), according to the way they impact prices (i.e., through customs, process, product, or consumer regulations), or even according to the costs NTMs impose[15] (e.g., enforcement and process adaptation costs).

C. Stylized Facts

In 1997, Deardorff and Stern introduced a theoretical representation of the expected changes generated in an economy when NTMs are applied. For instance, NTMs were described as having the following features: the potential of reducing the quantity of imports; of increasing the price of imports; and of changing the elasticity of the demand for imports. They were also expected to vary according to their effectiveness; to generate uncertainty; as well as to produce welfare and administrative costs.

Empirical studies have pointed out some stylized facts in relation to the *use* of NTMs. One of the most recent studies is the one by UNCTAD and the World Bank (2018), which is based on data from the most updated version of the TRAINS Database[16] and the calculation of different indicators associated to NTMs (i.e., *inventory* measures such as the Frequency Index[17]; the Coverage Ratio[18]; the Prevalence Score[19]; and Regulatory Intensity[20]).

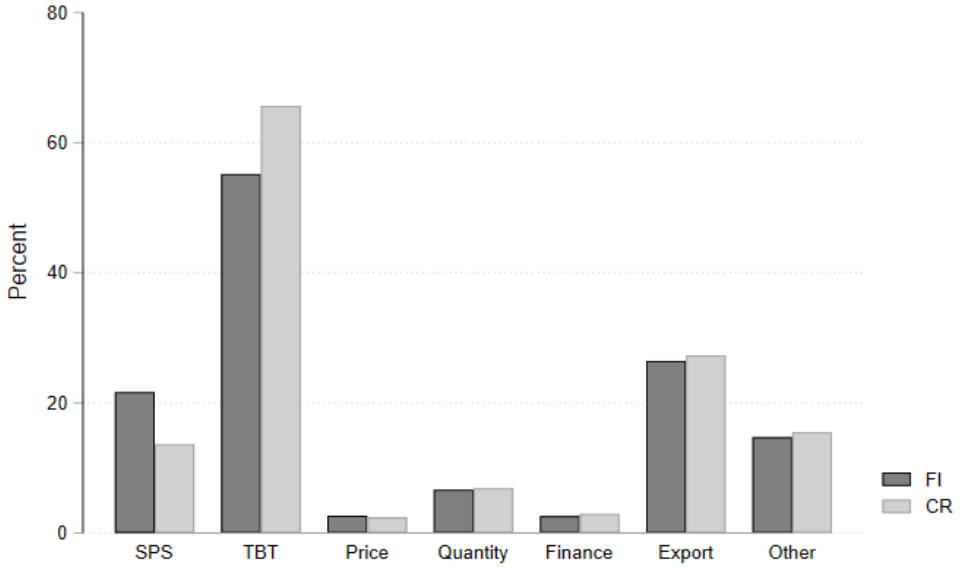
The same study identifies the following stylized facts regarding the use of NTMs: First, high-income countries tend to regulate a higher proportion of their imports as well as to apply more regulations to each imported product relative to low-income countries. Notably, the study also finds that, least developed countries (LDCs) regulate their own exports more when compared to

[12] Discriminatory measures generate a gap or wedge between the local and the foreign price.
[13] According to UNCTAD, the taxonomy developed by the MAST, in contrast to the theory-based classification, "does not judge on legitimacy, adequacy, necessity or discrimination of any form of policy intervention used in international trade. It acknowledges existence and is designed to organize information in a database format" (UNCTAD, 2012).
[14] The same authors offer a correspondence between UNCTAD's classification and the theory-based one (see Ederington & Ruta, 2016).
[15] The authors acknowledge this option as analytically useful but difficult to implement.
[16] Which comprises data for 109 economies.
[17] The Frequency Index expresses the percentage of products to which an NTMs is applied.
[18] The Coverage ratio provides the percentage of foreign trade that is affected by NTMs.
[19] The Prevalence score provides the average number of NTMs that affect regulated products.
[20] Regulatory intensity is an indicator that serves to account for differences in regulatory intensity and trade importance across products (UNCTAD & World Bank, 2018).

other groups of countries and that they regulate their exports more strategically[21] than their imports -by requiring export licenses, registrations, and technical measures- in order to guarantee quality (UNCTAD & World Bank, 2018). The second stylized fact regarding the use of NTMs is that the agri-food sector shows the highest number of NTMs (eight on average) per regulated import product across countries.[22] According to the same source, agri-food is the most regulated sector across all development statuses.

The third stylized fact is that the most frequent form of NTMs are technical barriers to trade (TBT); export measures; and SPSs (see Figure 1). Fourth, while SPSs are spread in a similar manner among all countries, high-income ones lead the use of TBTs and export measures. This suggests that low-income countries may be the most affected by the application of NTMs around the world. Since low-income countries are generally in disadvantage when trying to comply with the NTMs imposed by their trading partners, it is not surprising that NTMs can de facto discriminate against them. In other words, low-income countries may end up being negatively affected more than high-income ones by the application of NTMs because of their lack of resources in different dimensions. For instance, besides costs of compliance and information limitations, low-income countries tend to lack the infrastructure and institutional resources to satisfy complex requirements (de Melo & Nicita, 2018). At the same time, low-income countries tend to be discriminated by being asked to fulfill additional requirements, particularly for agricultural products (de Melo & Nicita, 2018; UNCTAD, 2013; UNCTAD & World Bank, 2018). Even when that is the case, however, it is important to consider that NTMs are not supposed to affect deliberately more or less a particular group of countries.

Figure 1: Frequency index and coverage ratio of non-tariff measures



Source: Author's calculation based on WITS. The frequency index (FI) and the coverage ratio (CR) are calculated as the trade-weighted average of national FIs and CRs. "Other" is the aggregation of chapters "C" and "F".

[21] Even though only 30 per cent of LDCs' products are affected by export measures, these products represent around 60 per cent of the export value of these countries (UNCTAD & World Bank, 2018).
[22] Across the 109 countries covered by the TRAINS Database.

The fifth stylized fact identified in the UNCTAD and World Bank's study is that the higher the level of GDP per capita, the larger the portion of a country's foreign trade that is regulated with NTMs and the larger its use of NTMs per product subject to regulations. Finally, the sixth stylized fact refers to the possibility of policy substitution (the lower the tariffs applied by a country, the higher its use of NTMs[23]).

In a different study, de Melo and Nicita (2018) find some of these patterns too while analyzing the same indicators. They also find that while countries may apply very differently the same regulation, they can be grouped into those that apply non-technical regulations frequently and those that apply it occasionally. Another pattern observed by these authors is that even though there is a correlation between GDP per capita and the use of technical measures, the former would not be a good predictor of the latter due to the large variance in the use of NTMs at all income levels.

3. Misinterpretation of NTMs' role

In this section, we show that the gains associated to FTAs based on impact assessments that use CGE models are reached by cutting a significant amount of 'actionable' NTMs, which is based on one of the main misconceptions regarding NTMs (i.e., that they *mainly* generate costs, reduce foreign trade and welfare). We also show that while advising NTMs cuts as the main way to increase welfare, these assessments not only miss case-specific explanations behind 'actionability' but also the channels and the way NTM elimination is supposed to improve welfare. We also show that, since NTMs comprise measures that target not only economic aspects but also social and environmental ones, indiscriminate NTM elimination may bring small economic gains at a high cost.

A. NTM elimination as a panacea for economic growth

Here we consider a theoretical explanation of the potential effects of an NTM. We explore the idea that NTMs only represent costs,[24] which discourage trade, economic growth and 'welfare'. First of all, we illustrate the effect of measures that are similar to a quota.[25] As seen below, 'free-trade' economics view of these type of measure as generators of extra costs is transferred into NTMs without discrimination. This leads to the view of NTMs, generally, as bearers of costs and loss of welfare.[26] At the end of this subsection, we also consider the way NTMs may lead to different outcomes other than only increasing costs or reducing welfare.

[23] Yet, the results based on this observation should be considered with caution due to spurious correlation (see de Melo and Nicita, 2018).

[24] We also consider the way NTMs may lead to different outcomes other than just increasing costs. This is not to say that NTMs do not generate costs but that it is important to consider that their role goes beyond the economic one and that their net effect on welfare does not have to be always negative.

[25] We introduce the effect of a quota as represented in a neoclassical partial equilibrium model. The CGE models that we examine later also make use of the assumptions used in this theory.

[26] As seen in subsection B, this view is also accepted in the impact assessments of FTAs (e.g., those based in CGE models).

a. Theoretical effects

The effect of a quota is similar to that of a tariff, but in contrast to the latter, when a quota is implemented, the government does not receive revenue. We illustrate with the effect of a quota because it is an example of how one type of NTM can be linked to obstacles to trade due to the extra costs that generates for producers and consumers. Beghin and Xiong (2018) have also offered detailed explanations of the effects of other types of NTMs such as SPSs and TBTs, which we also briefly discussed in Section 3 B(b).

The literature on the theoretical effects of NTMs has frequently considered the effects of a quota and similar measures (see, for example, Fugazza 2013). A quota is normally imposed by governments, which for instance, provide licenses to specific companies or individuals. This allow the latter to import a maximum amount of a good per year. The smaller the quota the more restrictive it is on the amount that can be imported and vice versa (see Berg, 2014). Those with a license are the only ones permitted to import the product. Licenses may differ among beneficiaries within the same country since some of them may be able to import higher quantities than others.

The immediate effect of a quota is to reduce the amount of the regulated good in the local market. By limiting the amount of imports in this way, and if an initial price -before the quota- is considered, the demand for the good would be higher than the local supply. This makes the price increase until the demand is reduced to equal the supply level. This is the effect of the quota, to increase the price of the imported good and to reduce consumer's welfare (see Figure 2).[27]

A quota has allocation effects too. When the quota is applied, whatever amount the government would have received as income when a tariff was implemented is, in this case, received as rent by those who hold the quota license, which could be either the government of the importing country, the domestic residents, or a foreign company (Fugazza, 2013).[28] Measures with similar effects as those of a quota are government procurement and voluntary export restraint (VER). In the case of VERs, governments self-impose restrictions on the quantity that can be traded with a specific country while, by favoring domestic production, government procurement may end up limiting the quantity that can be imported from another country.

Figure 2 illustrates the effects of a quota.[29] The upward-slopping curve represents the domestic supply for a good produced by a specific country under 'perfect competition' while the downward-slopping one represents the domestic demand for the same good. If this country did not trade with other countries, the price of the good would be represented by P, which is higher than the prevailing world market price (Pw) for similar goods. On the other hand, if the country has foreign trade partners, and it implements a quota for the imports of similar goods to protect local production, for example, the price in the domestic market will increase from Pw to Pq. At that price, the domestic

[27] A tariff that restraints imports to the same level will have the same effect unless a local monopoly is present (Obstfeld & Krugman, 2017).

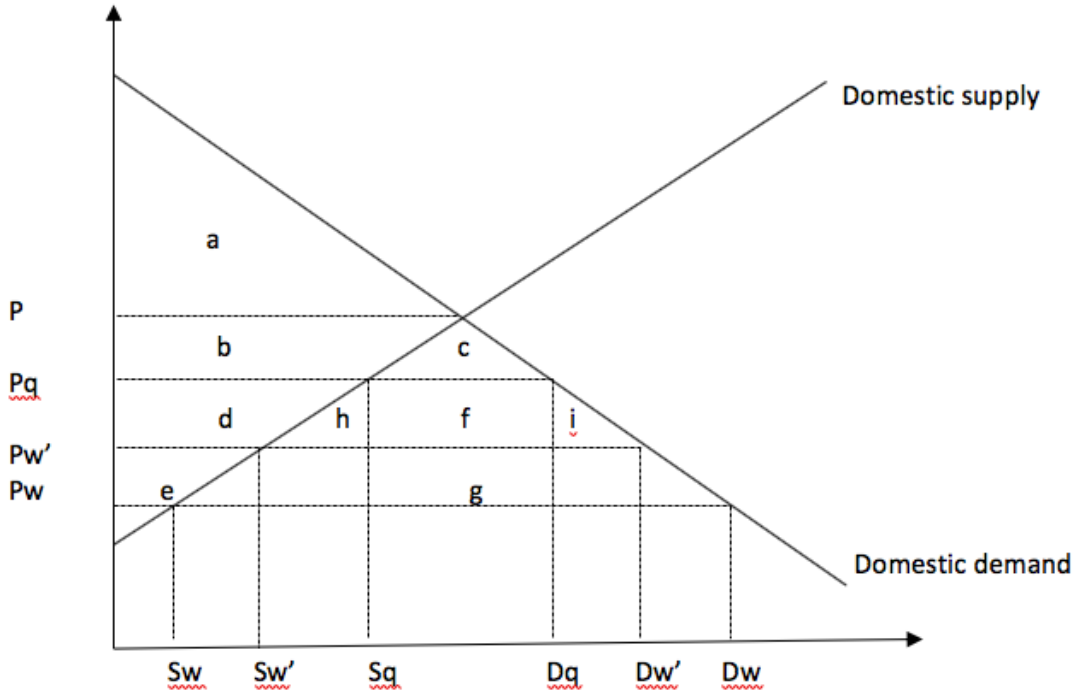
[28] If there are transfers of rent abroad (e.g., to the government of the exporting country who holds a license) the cost of a quota could end up being higher than that of a tariff.

[29] The discussion about Figure 2 is adapted from Kohler and Storm (2016) to consider the case of the implementation and removal of NTMs that are similar to a quota.

demand (Dq) is larger than the domestic supply (Sq) and the excess of demand is compensated with imports.

In this context, consumers' surplus equals the areas (a+b+c) and producers' surplus (d+e). Quota rents are allocated to those who hold import licenses and are represented by (f+g). If the right to hold a license is kept by the local government, (f+g) represents rents for the latter and aggregate welfare equals the sum of the areas that represent consumers' surplus, producers' surplus, and government rents (a+b+c+d+e+f+g). If the right to hold a license is assigned to the government of exporting countries, the transfer of rents to those countries would make the costs of a quota higher than the costs of a tariff and aggregate welfare would be less.

Figure 2. The effect of a quota in international trade



Source: adapted from Kohler and Storm (2016)

Under the same theoretical framework, if trade liberalization is pursued, for example with the elimination of the quota, welfare is expected to increase. When the government eliminates the quota, local consumers face the world price Pw, or alternatively Pw' -if the country is big enough to affect global demand pushing up the price. In the latter scenario, consumer surplus increases by (d+h+f+i) which makes consumers' surplus increase to (a+b+c+d+h+f+i). Producers' surplus is reduced by (d), which reduces producers' surplus to (e). Since rents are eliminated with the elimination of the quota, government revenue declines by (f+g) if the government was holding a license. However, if foreign governments were holding the license, costs for the local economy are reduced further since there are no rents to be transferred to the rest of the world.

Aggregate welfare changes depend on whether the change in the improvement of consumers' surplus is larger than the reduction of welfare for producers and the government [(d+h+f+i)-d-f-g = (h+i) – G > 0]. When the quota is eliminated, (h+i) (the Harberger[30] triangles) represents the net gain in total welfare. With the quota elimination, (g) represents a welfare loss that arises from the increase of price to Pw'. Assuming that the loss (g) is smaller than the gains in welfare (h+i), trade liberalization improves aggregate welfare. As explained by Taylor and Arnim (2006), however, when it comes to calculate these gains, modelers choice of parameters (e.g., elasticities) can make the gains higher.

Beghin & Xiong (2018) have examined in detail the effects of standard-like NTMs such as TBTs and SPSs. These authors explain how the theoretical effects of this type of NTM can be different for the domestic and foreign supplier of a good for their ability to meet the standard may be different. In cases where the cost of meeting the standard is higher for the local supplier, the measure could have an anti-protective effect that may benefit foreign suppliers if they are able to comply with the standard more easily than locals and vice versa. Thus, just as some NTMs can have a protective effect, others may have an anti-protective one. It is also possible that both local and foreign suppliers may end up sharing the burden of the raise in costs (with no rents to be allocated).

In addition, it is important to consider that NTMs do not have to be always welfare reducing. For instance, even though technical measures may generate costs, it is possible that they also generate demand-enhancing effects that could compensate for those costs, and which may also end up generating welfare gains for consumers and producers.[31] For instance, this may happen in the context of imported products that can be dangerous for the environment or health. Under such conditions, it is possible that governments may end up applying an NTM such as SPSs or a similar one in order to protect consumers and the environment. In this way, the application of the NTM may signal quality (see Section 3B (b) below) and increase demand (Beghin & Xiong, 2018).

There are situations where consumers may be aware of the dangers of consuming a particular good, in which case they assume[32] the potential risk of its consumption. If standard-like measures such as SPSs and TBTs are implemented to imports of the dangerous product, this affects directly the supply curve and the production costs of both local and foreign producers.[33] The consequence of the implementation of the NTMs in this case will be an increase of price and a reduction of imports and consumption. Nevertheless, when the effect on demand and supply are considered together, even if a decrease of the quantity consumed takes place, the actual change of prices of the imported good will depend on the stringency of the measure, the probability of contagion and the associated costs from the perspective of the consumer (see Fugazza, 2013). In other words, prices do not have to increase always after an NTM is introduced.

[30] Harberger (1954).
[31] For a review of empirical and theoretical work on NTMs and their effects, see Thilmany & Barrett (1997) as well as Beghin & Xiong (2018).
[32] They 'internalize' or assume the extra cost generated to others or to the environment, for example, due to their consumption of that good.
[33] Unless the dangerous feature only belongs to one of the producers.

Moreover, and perhaps even more important from the point of view of welfare is that if demand-enhancing effects actually take place, the public standard introduced with the NTM, may boost the demand of imports, which can potentially counteract the effects of the internalization of the damage (Section 3B (b) shows how the reduction of asymmetric information[34] between producers and consumers is a main channel through which demand-enhancing effects take place). As explained by Thilmany & Barrett (1997), and as seen below, "the effects on trade volumes and aggregate welfare are analytically ambiguous" (see also Beghin, Maertens, & Swinnen, 2015). For this reason, the implementation of the NTM may also improve welfare (see Disdier & Marette, 2010). Beghin & Xiong (2018) also explain how gains from trade can be positive with the introduction of an NTM that corrects an externality.[35] These gains can be just lower than in the case where no externality is present and, therefore, an NTM is not necessary welfare reducing. In any case, the final effect of the application of an NTM on welfare cannot be established a priori.

b. Trade liberalization and 'welfare'

According to the economics of trade-liberalization, NTMs should be reduced to avoid potential increases of costs and loss of welfare. In other words, trade should be liberalized so that productivity and economic growth can be stimulated, and welfare enhanced.

To summarize the consequences of regulations on welfare, from this point of view, it can be seen that with tariffs, imports are smaller and welfare is reduced for consumers (consumer's surplus is reduced) while it is increased for local producers; the government gets income while national welfare is reduced. A similar logic follows when NTMs are analyzed from this perspective. Indeed, if the NTM is too restrictive (a quota close to zero for example), welfare will be also penalized.

On the other hand, when tariffs are removed, overall economic welfare is improved. By the same token, if NTMs disappear, consumers will pay lower prices,[36] which will allow them to demand higher quantities. There are, then, gains in consumer surplus when the regulation and 'its costs' are removed, which also benefit producers. Overall, welfare is enhanced because the gains in consumer surplus compensate for any other loss. The net gain is translated into improved aggregate 'welfare.' It is important to note, however, that this conclusion only makes sense under the assumption that NTMs only generate costs. Yet, these regulations may also bring positive outcomes for consumers and society. If this is considered, the NTMs elimination requirement to improve welfare does not necessarily hold.

[34] Asymmetric information takes place when one party (e.g., consumer) has less information than the other (e.g., producers).

[35] If an externality such as asymmetric information cannot completely be eliminated, which means an 'optimal' solution is not attainable, the introduction of an NTM can contribute to counteract it, leading at least to a 'second best' solution. NTM implementation is not the 'best' solution from the perspective of an idealized view of the economy, but it may provide a sensible alternative to real economic problems such as asymmetric information.

[36] In the case of a small country, they would pay the world price (a small country cannot influence the world prices). A larger country could increase the world price, but if it is still below of the price generated with the regulation, welfare is still improved when the NTM is removed.

B. NTMs quantification and its use on FTAs impact assessments

In this section, we explain how the use of NTMs in CGE models that assess free trade agreements reinforces the misconception that in order to increase trade and welfare, NTMs should be reduced and how this is the result of the one-sided assumption of NTMs as merely costs.

a. Quantification

The assessment of free trade agreements is interrelated with the way NTMs and their effects are quantified. The quality of the assessments is also related to the quality of the measures used for that quantification. Below, we present a brief survey of NTM quantification measures considering their function as well as main limitations.

In section 2C, *inventory* measures were introduced. These measures account for the prevalence and use of NTMs. The frequency index and the coverage ratio are two examples of inventory measures. The Frequency Index expresses the percentage of products to which NTMs are applied. It is an indication of the existence of these regulations. In the case of the Coverage ratio, it expresses the percentage of imports that is affected by NTMs with respect to total imports. The main limitation of these measures is that they only account for the incidence of NTMs and for the share of products to which they are applied. These measures do not account for the price or quantity effects of NTMs either. They can be used, however, to construct other indicators that allow to estimate such effects (see Fugazza, 2013).

There are other measures that capture *heterogeneity* as well as the *stringency* of NTMs. The heterogeneity index, for example, compares NTMs between trading partners or the dissimilarity of their requirements.[37] A different version of this index allows to consider differences on the stringency of the requirements. Stringency measures are useful to analyze the regulatory restrictiveness at the product and country level (see Beghin & Xiong, 2018). Even though useful for comparison, there are limitations associated to heterogeneity and stringency measures, which are mainly related to omitting regulations when they are only considered by one country. There are also technical limitations related to the way the indexes are defined. For example, equal weights have been assigned when considering features of certain regulated products, which should have a differentiated treatment (e.g., see Beghin & Xiong (2018) for an example regarding maximum residue limits for chemicals).

Other tools used for the quantification of NTMs are *business surveys*, which are structured interviews, that allow to obtain information on the pervasiveness of NTMs. If well designed, this type of instrument may reveal details regarding the impact of one or more NTMs that are of particular interest. However, business surveys can be costly in terms of time and financial resources, which likely plays a role in limiting the scope of the studies (Fugazza, 2010). Also, they

[37] This index can take a value between 0 and 1. The closer the value is to 1, the more heterogeneity between partners' sets of NTMs. The values provided by the index allow as well to analyze the potential of harmonization between economies (see Beghin & Xiong, 2018). Specific *integration* measures that deal with NTM transparency and harmonization have been developed in recent years. Beghin & Xiong (2018) offer a literature review on this indicators up to 2016 while discussing their strenth and weaknesses.

capture the economic aspects of NTMs that are relevant for businesses, not necessarily including those that are important from the point of view of society in general.

Another instrument in the quantification of NTMs are gravity models. Gravity models of international trade are commonly used to estimate trade flows. The analysis is based on the size and distance of the economies involved. Gravity equations can be used for partial and general equilibrium analysis to estimate the value impact of NTMs (see also Beghin & Xiong, 2018). This method is limited to the analysis of specific products and countries at both the product and the industry level (see Fugazza, 2010). In other words, analysis of NTMs effects using gravity models are not ideal for a large group of countries or long periods.

Other approaches used for the quantification of the impacts of NTMs are the price-based and the quantity-based approaches (for example, see Berden & Francois, 2015). The price-based is considered one of the most direct ways to attempt for the quantification of the price impact of NTMs. It allows to calculate ad valorem -or tariff- equivalents (AVEs), which are used to compare prices (*price wedge*) (see also de Melo & Nicita (2018). Obtaining suitable price information is one of the main challenges related to this method even if it is used only for one country. Fugazza (2010) identifies three major flaws associated to this method: the assumption of perfect substitution between local and imported goods; the lack of information regarding the way NTMs acts in practice; and the distortion that is present when the price comparison is made.

Similar to the price-based approach, the quantity-based one is challenging due to data requirements that may prove difficult to fulfill. One advantage related to this method is that it allows for the consideration of the way both tariff and NTMs may restrict trade. This approach permits the inclusion of different NTMs categories while isolating their individual impact. Another advantage is that it offers a way to obtain demand elasticities, to estimate price-effects and AVEs, as well as to obtain levels of protection at the product and country level. Yet, another limitation is that elasticities estimates may be biased due to endogeneity.[38]

Cost-benefit analysis are another way to assess the impact of NTMs. It allows to consider the effect on different groups such as consumers, producers and the government. Willingness to pay is used to estimate the cost aspect of the evaluation, but it is difficult to measure. Cost-benefit analysis are used mainly for case studies where detailed data is available. Notably, this method not only offers a way to account for NTMs' impacts when they are introduced in an economy but also when they are removed (see also Beghin & Xiong, 2018).

Finally, computable general equilibrium (CGE) models allow to estimate the effects of changes in policy in an economy. For instance, CGE models are used to estimate the economic impact of FTAs using AVEs of NTMs (e.g., considering the impact of NTM elimination on GDP).[39] The following section presents a discussion on the advantages and limitations of using CGE models and AVEs of NTMs to quantify the impact of FTAs.

[38] See more details in Fugazza (2010).

[39] Andriamananjara et al., (2004) as well as Fugazza & Maur (2008) also used a CGE model to provide a *global* assessment of NTMs.

b. NTMs in FTAs impact assessments: common flaws

Given the increase in the number of NTMs in the last decades (Carrère & De Melo, 2011; J. D. de Melo & Nicita, 2018; Fugazza, 2013; UNCTAD, 2013; UNCTAD & World Bank, 2018), their consideration in the measurement of the economic effects of FTAs is also relevant. Several empirical studies make use of CGE models, where different levels of AVEs of NTMs -as well as other information- are incorporated to simulate different scenarios of the impact of FTAs.

There are advantages related to the use of CGE models. For instance, they allow to account for the effect of changes in an entire economy. They also offer a way to quantify the results from the interactions between all sectors after policy changes have taken place. These features make CGE models more attractive than partial equilibrium models for the analysis of large FTAs. Yet, large and expensive data requirements also impose limitations over these models. As seen below, there are other serious limitations related to the use of CGE models for the evaluation of the impact of FTAs.

Recent studies that employ CGE or other models that also rely on NTM elimination are shown in Table 1. For example, Benz & Yalcin (2015) developed an impact assessment of the bilateral free trade agreement between the EU and Japan. This study employs a model that considers heterogeneous firms as well as intra-industry trade in both economies. Besides the impact on trade and economic growth, this study considers the effect of the FTA on unemployment. It is important to note that according to the authors the "success of the liberalization process hinges on the elimination of non-tariff barriers" (2013). They simulate two liberalization scenarios (NTM reduction takes place in an 'ambitious' and in a 'comprehensive' scenario). Other studies that account for the impact of the same FTA using CGE models are: European Commission's Directorate-General for Trade (2018); Felbermayr et al., (2017); the European Commission (2012; 2016) as well as Copenhagen Economics (2009[40]).

A specific study of the impact of the same FTA on the United Kingdom is the one developed by its Department for International Trade (2018). Similarly, Porto (2018) simulates different scenarios for the FTA between South Korea and the EU as well as for the FTA between Japan and the EU in order to account for the possibility of a country benefiting from the FTA against competitors that already have an FTA with the same partner. The author employs a CGE model that accounts for the impact of Armington elasticities[41] as well as for the 'actionability'[42] of NTMs. The analysis makes use of the Global Trade Analysis Project (GTAP[43]) in different steps, where

[40] This impact assessments as well as those by the European Commission have been analyzed in a study by the United Kingdom Department for International Trade (2018). This study acknowledges the difficulties of disentangling the NTM reduction modelled in the other impact assessments.

[41] Armington elasticities refer to the degree of substitution between similar goods produced in different countries. CGE models in general make use of the 'Armington assumption' of imperfect substitution between the products exchanged by trading partners. For further discussion on the limitations of this assumption, see Taylor & Arnim (2007).

[42] Generally, actionable measures are subject to being challenged in the WTO. Actionable NTMs are also described as those measures that reduce 'welfare' (See Carrère & De Melo, 2011) and that, therefore, can be subject to elimination.

[43] See Fugazza & Maur (2008) to consider the limitations related to the GTAP.

AVEs of bilateral NTMs as well as tariff measures are considered, but where the former plays a critical role for the results.

Notably, and in contrast to other studies, Porto (2018) acknowledges the different roles played by NTMs. "When the analysis includes the effects of NTMs, a key decision concerns how much an AVE of NTMs should be reduced. In fact, it is not realistic to assume a full elimination of AVEs of NTMs because not all the NTMs in force are adopted for protectionist purposes or to create unnecessary trade costs. In fact, NTMs can be adopted to pursue public policy objectives, such as the health and safety of consumers, which can indirectly affect trade (World Trade Organization, 2012)," (Porto, 2018). Nevertheless, it is not uncommon to find that impact assessments include an indiscriminate reduction of NTMs as a main policy prescription to improve welfare. Once it is established that the criteria to increase welfare is to reduce 'actionable' NTMs, as discussed below, it is not clear how actionability is determined.

NTM Actionability

Actionability, or the extent to which NTMs can be reduced, is the criterion used for their elimination. However, while drawing on this solution impact assessments tend to omit details regarding 'actionable' NTMs (e.g., Benz & Yalcin, 2015; Porto, 2018). Specific information regarding their type and characteristics is overlooked and, while referring to the increase of costs as the main justification for actionability, NTMs' social role is usually omitted. In other words, 'actionability' is not soundly justified.[44]

Normally, impact assessments and empirical studies using CGE models tend to follow the 'guillotine' approach (see Cadot, et al., 2018) of eliminating a high percentage of NTMs without justification of the reasons to pursue this elimination. The study by Porto (2018) mentioned before, for instance, is based on percentages of NTM reduction developed in other studies, so that the ambitious and comprehensive scenarios lead to a 25 per cent and to a more that 60 per cent reduction of NTMs in different sectors. Then, even though many studies recognize that NTMs are of different kinds and that not all should be eliminated, as in the case of the author just mentioned, they do not satisfactorily justify the reduction of a considerable number of 'actionable' NTMs.

In fact, there are studies that acknowledge the difficulties involved on detecting when NTMs, and in particular SPSs are 'actionable' because their intent[45] is not always easy to detect (see Carrère & De Melo, 2011),[46] but this is usually omitted in impact assessments that use CGE models. It is important, then, that these assessments include case-specific explanations of 'actionability' and of the channels and ways the reduction or elimination of NTM is supposed to improve welfare.

[44] Scenarios of NTM reduction in impact assessments also tend to be informed by NTMs reductions that have been achieved in past FTAs, leaving unjustified the degree of reduction used in the assessment (for example, see European Commission, 2015) .

[45] NTMs can be used with protectionist purposes, which restrain trade by discriminating against imports. Discriminatory or protectionist intents can be used as justification for actionability. From the point of view of policy, then, a major challenge for NTMs is to ensure that they meet legitimate policy goals (WTO, 2012).

[46] According to these authors, it is easier to detect protectionist intents in the case of Rules of Origin than in the case of SPSs because in practice the former have been captured by protectionists interest groups.

In practice, NTM elimination has been accomplished following different approaches. Carrère and de Melo (2011), for instance, identify the horizontal and the vertical approaches. The horizontal approach identifies priority sectors and then eliminates NTMs that are 'plaging' that sector.[47] The vertical approach follows NTM elimination by defining which are the most welfare-reducing ones. According to the same authors, independently of the chosen approach, it is necessary to have a systematic way to determine actionability, but this is not done because determining which NTMs are welfare reducing is not a simple task.

Given that the policy advice from impact assessments can lead to substantive changes regarding the use of NTMs, it is important that the recommendations of NTM elimination are founded on a clear understanding of the nature of those measures. A proper understanding should permit a transparent strategy on the determination of which NTMs should be adjusted and how.

Small gains

Notably, all of the impact assessments mentioned before as well as others that employ a CGE or similar simulations that require NTM elimination report a gain-gain situation for the partners involved (see Table 1). Even though positive, it is important to note that gains in trade flows, productivity and GDP, tend to be small (see Taylor & Arnim, 2007) and contingent on excessive NTM elimination (i.e., that is, on the method used for evaluation). For instance, in the study of the EU-Japan FTA (Benz & Yalcin, 2015), gains on GDP for the EU are of 0.21 per cent while for Japan 0.86 (based on NTM reduction of about 20 per cent). In the study by the European Commission (2012 & 2016[48]) gains on GDP range from 0.34 to 0.79 per cent in the EU while from 0.27 to 0.67 per cent in Japan (after NTM reduction of up to 50 per cent by each country).[49]

It is important to note that other relatively recent free trade agreements, whose impacts have been evaluated using CGE models are the Comprehensive Economic and Trade Agreement (CETA) between the EU and Canada and the Transatlantic Trade and Investment Partnership (TTIP) between the United States and the European Union (EU) (see Francois, et al., 2013, for example). There have been comprehensive examinations of their impact assessments that reveal the drawbacks behind the methodologies used and the results obtained from those assessments, including their small gains in GDP (see, for instance, Kohler & Storm, 2016; as well as Capaldo, 2015).

Independently of the magnitude of the impact, nevertheless, it is important to consider that it would take a significant amount of time for changes to take place -i.e., the model only reports long term effects. Moreover, the fact that the results depend on the elimination of 'actionable' NTMs, which are generally weakly or not justified, suggests that if the proportion of NTMs that is eliminated is not as high as the one considered in these assessments, the actual gains from the implementation of the agreements could be even smaller. Finally, since NTMs comprise measures that target not

[47] Countries that comprise the ASEAN have followed the horizontal approach, for example. See Carrère and de Melo (2011).
[48] Details are from the United Kingdom Department for International Trade (2018).
[49] Japanese NTMs are reduced by 50 per cent overall while European goods NTMs by 16.5 and services NTMs by 50 per cent.

only economic aspects but also social and environmental ones, their indiscriminate elimination also suggests that small gains may come at a high cost.

On CGE assumptions and other limitations

A related aspect linked to the limitations of impact assessments of FTAs based on CGE models is related to the lack of sensible and realistic assumptions in these models. Some of these assumptions reveal flaws in relation to the understanding of NTMs, which raises questions regarding the strength of the conclusions reached in these studies.

First of all, NTMs are not merely *costs*, but they are treated as such in most impact assessments. The quantification of NTMs with ad valorem equivalents that give account of the potential differences in prices when NTMs are present has certainly practical advantages. As seen above, in contrast to tariffs, NTMs are not represented by a specific number (a percentage of price or amount per unit). Also, given that they represent a complex group of measures, they are normally difficult to quantify. Having an alternative that allows to estimate by how much demand would be affected by the NTM is then helpful for intuition because it helps to derive knowledge from what is already known from tariffs.

However, this transformation into numerical equivalents have also allowed to treat all NTMs *uniformly*, which is not warranted considering the real nature of these measures as a diverse group. As seen above, NTMs have not only increased in number in the last decades but also in diversity. Furthermore, even when they belong to the same category or are qualitatively similar, they *may be applied differently* by different countries, which is also overlooked when they are only considered as costs. This can lead to treat an important proportion of NTMs as 'actionable' as seen above.

In other words, if 'being bearers of costs' is a main assumption regarding NTMs, the possibility of loose policy advice is imminent since the potential increases of costs brought with NTMs - without consideration of their potential positive effects- is used as a justification to eliminate them indiscriminately. Given that the only association that is considered is the one of NTMs as tariffs, the quality of NTMs as costs is the only characteristic that is retained in the analysis. However, as explained by Cadot et al., (2017), "dealing with NTMs as if dealing with a trade tool like tariffs is an unproper approach, as NTMs could play a role of check and balance for quality goods." If the methods used for the evaluation of the impacts of FTAs treat NTMs only as tariffs that generate costs, then, they are unsuitable to inform policy beyond NTM elimination. [50]

In the impact assessments of FTAs in Table 1, for example, one of the major policy conclusions is the elimination or reduction of 'actionable' NTMs. This indicates that when AVEs of NTMs are imputed into CGE models, the real nature and purpose of the measures *vanishes* because once included in the model, NTMs' quality as 'cost' is the only one that subsists. In other words, the model facilitates the inclusion of NTMs as costs while there is no equivalent option to include their potential social benefits (e.g., protection of health and the environment) leading to the conclusion that trade liberalization can only be welfare improving. However, the idea of NTMs as merely

[50] In other words, when it comes to consider NTMs, CGE models do not lend themselves for a 'delicate balancing act' (Cadot, Malouche, & Saez, 2012).

generating a 'protection effect' that generate costs has an explicit negative connotation that is not justified "when the NTM responsible for the effect had no protection objective" (Fugazza 2013).

It is also important to consider that, just as in the case of externalities (see Ackerman & Nadal, 2004), it is possible that not all issues surrounding NTMs can be monetized and internalized. In other words, costs may appear from the application of NTMs, but the problems that they may help to contain -which may be valued for consumers and which may also increase welfare- may not be monetizable. Therefore, if such monetization is indispensable for the assessment, there is an underestimation of the social significance of NTMs.

While establishing the theoretical effects of NTMs above, we saw that even though they tend to increase costs, results on overall welfare may be ambiguous. It is also important to understand, then, that NTMs may have positive welfare effects. As noted above, one of the main channels through which this effect may take place is the reduction of information asymmetries. If NTMs contribute to reduce the asymmetry of information between producers and consumers, for example, it is possible that this may have demand-enhancing effects (J. Beghin & Xiong, 2018).

An example of this situation is provided by Thilmany & Barrett (1997) for agricultural products. According to these authors, product quality and safety information may contribute not only to solve "low-quality market equilibria or socially superoptimal risk bearing" but also to increase demand "by relieving consumers' concerns about product quality […] [which may increase] not only domestic producers' welfare but also consumers' welfare." In this way, even when prices may increase due to the presence of NTMs, it is possible that trade volume and aggregate welfare may end up being greater than under unregulated trade (see Thilmany & Barrett 1997).

The latter does not mean, however, that all NTMs would have an improving welfare effect, but rather that since not all of them have the same intents, it is important to consider different criteria of evaluation for different types of NTMs. As established by Beghin & Xiong (2018), each NTM has "its own welfare effects." One criterion is to distinguish between NTMs that resolve information-based market failures and those that only help to protect domestic producers (see Thilmany & Barrett 1997).

We conclude this section by considering other flaws regarding the use of CGE models that, even though pointed out already in the literature (see Ackerman & Nadal, 2004; Ackerman & Gallagher, 2008), it makes sense to remember while considering the validity of the policy conclusions that result from the use of these models. After all, as mentioned above, the amount of FTAs impact assessments based on this method are plenty.

One of the major problems related to this method is that it presupposes that only free markets can lead to general equilibrium -the optimal state. For that reason, it is to be expected that any type of regulation that prevents full trade liberalization is considered a priori as welfare reducing (see Ackerman & Nadal, 2004; Kohler & Storm, 2016). This is related also to CGE models reliance on unreal 'perfect' competition, which leads to an 'ideal' or optimum situation.

The prerequisite for the 'ideal' situation, then, is liberalization (e.g., elimination of NTMs) or the elimination of government intervention. In other words, given the assumptions in which CGE

models rely, the more unregulated an economy is, the more likely it is to reach the ideal state. Thus, regulations such as NTMs are automatically ruled out as vehicles of welfare. For this reason, it is important to develop and make use of methodologies that consider real aspects of the economy instead of ideal ones.[51]

Finally, another issue with the use of CGE models while considering the effects of FTA is their reliance on a comparative static framework. Once the schock or the change of policy has taken place, it is not possible to know what happens between one scenario and the other. Given that CGE models are not completely suitable for dynamic analysis, they may not be the most suitable method for the analysis of the impacts of policies that have long term implications as in the case of FTAs. Given that the policy changes normally assessed with these models have implications over people's welbeign, it is also important to consider alternatives that may give an account of the length of time between changes (e.g., when workers could expect to change from one job to the other,[52] for instance).

C. Remembering NTMs' role for social welfare

We conclude this section by reminding the reader that NTMs may have a relevant role for social welfare. First, as explained above, NTMs comprise a wide range of heterogeneous measures that can have an impact on trade. They also, intendedly or unintendedly, may act as a protection for specific sectors in the economy where they are implemented. However, as also seen above, even though NTMs may lead to the increase of costs and prices, the net effect on welfare does not have to be negative. Therefore the importance of ensuring that NTMs meet legitimate policy goals.[53]

Second, and in relation to the last point, unlike other type of policy measures, NTMs may also have purposes other than merely economic ones (Cadot, et al., 2018; Beghin & Xiong, 2018). As their definition points out, NTMs may have an effect on trade, but that is not neccessarily their ultimate goal. There is also a group of statandard-like NTMs, which aim specifically at protecting the environment and the health of consumers. Their role for social welfare should not be understimated. Besides, it is also important to remember that even when only economic effects are considered, it is possible that the net effect of an NTM end up being positive.

Third, it is also important to consider that NTMs may also have unintended consequences. They may have implications not only for the economic but also for the social aspects related to development. Research in this area has considered, for example, the links of the costs associated to NTMs and the Sustainable Development Goals (SDGs)[54] (see Helble & Shepherd, 2017). Another related study is the one by Hoekman & Nicita (2018), where the authors examine WTO agreements and their implications on governments' autonomy for the application of domestic policies that can contribute to economic and social development.[55]

[51] See Shaikh (1980 & 2016). See also Capaldo (2015) for an alternative methodology, based on the United Nations Global Policy Model, using more realistic assumptions.
[52] See Ackerman & Nadal (2004).
[53] Streamlining, not eliminating NTMs (see Cadot, et al., 2018). Ensuring 'regulatory-improvement' (see Augier, et al., 2012).
[54] For the list of SDGs, see https://www.un.org/development/desa/disabilities/envision2030.html
[55] This study includes as well as a map that relates NTMs to WTO provisions and the SDGs.

These authors find that there is suffienct space for governments to implement the measures they deem necessary towards development. They also discuss how the interaction between trade facilitation and NTMs is critical for it. NTMs can be opaque and complex, then, trade facilitation may contribute easing trade processes, making them more transparent and less expensive. The combination of NTMs and trade facilitation,[56] then, may be one way of supporting the realization of the SDGs. This is particularly important considering that compliance with NTMs can be more difficult for low-income countries. It is also important from the point of view of avoiding the 'guillotine' approach to NTMs that was mentioned above.[57]

4. Conclusion

The purpose of this paper was to examine the assumptions and related implications behind the CGE models used for the assessment of FTAs. We focused particularly in their treatment of NTMs as bearers of costs, which as such need to be eliminated in order to stimulate trade and achieve 'welfare.' We showed that these conclusions are wrong because they are the result of CGE models' one-sided perspective expressed in the interpretation of NTMs as merely costs.

We found that gains related to FTAs in impact assessments based on these models tend to be achieved by cutting 'actionable' NTMs and that the impact assessments and empirical studies that provide this recommendation do not provide sufficient details about the way actionability is determined. While advising NTMs' cuts as the main way to increase welfare, these assessments not only miss case-specific explanations behind actionability but also the channels and the way NTM elimination is supposed to improve welfare.

When establishing the theoretical effects of NTMs, we also saw that they tend to increase costs, but that their effect on overall welfare is ambiguous and that it may even be positive. We showed that one of the main channels through which this positive effect may take place is via the reduction of information asymmetries, which may have demand-enhancing effects.

We found, in addition, that estimated gains from FTAs based on CGE models tend to be small (e.g., between less than one or two per cent gains in GDP) and based on a high percentage of NTM elimination (e.g., 50 per cent or more). However, it was also established that since NTMs comprise measures that target not only economic aspects but also social and environmental ones, indiscriminate and unjustified NTM elimination suggests that small economic gains may be at the expense of high costs for society.

[56] A trade facilitation approach that considers not only the gains but also the costs of its implementation, as well as complementary social policies (see Capaldo, 2014).

[57] Research in these lines could also consider whether NTMs may contribute directly or indirectly to one or more of the SDGs at the same time. For example, via NTMs potential for demand-enhancing effects on products with specific characteristics (e..g, produced under certain standards and by specific groups such as Small and Medium-sized Enterprises (SMEs), women, or LDCs) potentially contributing to the accomplishment of different goals (e.g., Goal 1. End poverty in all its forms everywhere; 5. Achieve gender equality and empower all women and girls; 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; 10. Reduce inequality within and among countries; 12. Ensure sustainable consumption and production patterns; and 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development).

We saw that impact assessments of FTAs based on CGE models rely on the inclusion of Ad Valorem Equivalents (AVEs) of NTMs, which allows to account for NTMs' potential costs, but that there is no equivalent way to account for NTMs' potential social benefits in these models. The potential loss of social benefit, then, is not considered in the quantification of the impact of the implementation of FTAs, which would require a high level of NTM elimination in order to stimulate economic growth. This underestimates the social significance of NTMs and suggests that CGEs models are too limited for an effective evaluation of FTAs.

Finally, we also showed that just as NTMs can lead to improvements in net social welfare, some have the potential to encourage development too. For this reason, it is important to avoide solutions like the 'guillotine' approach to NTMs suggested by impact assessments based on CGE models. Even though methods for the quantification of NTMs and of their effects in the economy have evolved, it is important to develop methodologies that asses trade liberalization accounting for NTMs in a balanced way. A reliable evaluation of the economic impacts of trade liberalization that implies NTMs reduction would have to account for the loss of welfare when NTMs are eliminated too.

References

Ackerman, F., & Gallagher, K. P. (2008). The Shrinking Gains from Global Trade Liberalization in Computable General Equilibrium Models: A Critical Assessment. *International Journal of Political Economy*, *37*(1), 50–77.

Ackerman, F., & Nadal, A. (2004). *The Flawed Foundations of General Equilibrium Theory: Critical Essays on Economic Theory.* Routledge.

Andriamananjara, S., Dean, J. M., Ferrantino, M. J., Feinberg, R. M., Ludema, R. D., & Tsigas, M. E. (2004). *The Effects of Non-Tariff Measures on Prices, Trade, and Welfare: CGE Implementation of Policy-Based Price Comparisons* (SSRN Scholarly Paper No. ID 539705).

Beghin, J. (2008). Non-Tariff Barriers. In *The New Palgrave Dictionary of Economics* (pp. 1–5). https://doi.org/10.1057/978-1-349-95121-5_2188-1

Beghin, J. C., Maertens, M., & Swinnen, J. (2015). *Non-tariff measures and standards in trade and global value chains*. 48.

Beghin, J., Maertens, M., & Swinnen, J. (2015). Non-Tariff Measures and Standards in Trade and Global Value Chains. *CARD Working Papers*.

Beghin, J., & Xiong, B. (2018). Trade and welfare effects of technical regulations and standards. In *The Unseen Impact of Non-Tariff Measures: Insights from a new database.*

Benz, S., & Yalcin, E. (2013). *Quantifying the Economic Effects of an EU-Japan Free Trade Agreement* (SSRN Scholarly Paper No. ID 2294880).

Benz, S., & Yalcin, E. (2015). Productivity Versus Employment: Quantifying the Economic Effects of an EU–Japan Free Trade Agreement. *The World Economy*, *38*(6), 935–961. https://doi.org/10.1111/twec.12205

Berden, K., & Francois, J. (2015). *Quantifying Non-Tariff Measures for TTIP*. 32.

Berg, H. V. den. (2014). *International Economics: A Heterodox Approach.* Routledge.

Cadot, O., Ferrantino, M. J., Gourdon, J., & Reyes, J.-D. (2018). *Reforming Non-Tariff Measures: From Evidence to Policy Advice*. World Bank Publications.

Cadot, O., Malouche, M., & Saez, S. (2012). *Streamlining Non-Tariff Measures. A Toolkit for Policy Makers*.

Cadot, O., Munadi, E., & Ing, L. Y. (2017). *Streamlining NTMs in ASEAN: The Way Forward*.

Capaldo, J. (2014). Trade Hallucination: Risks of Trade Facilitation and Suggestions for Implementation. *GDAE Working Paper 14-02*.

Capaldo, J. (2015). *The Trans-Atlantic Trade and Investment Partnership: European Disintegration, Unemployment and Instability', Economia e Lavoro (2).*

Carrère, C., & De Melo, J. (2011). Non-Tariff Measures: What Do We Know, What Might Be Done? *Journal of Economic Integration*, *26*(1), 169–196. https://doi.org/10.11130/jei.2011.26.1.169

Carrère, C., & de Melo, J. (2011). Notes on Detecting The Effects of Non Tariff Measures. *Journal of Economic Integration*, *26*(1), 136–168. https://doi.org/10.11130/jei.2011.26.1.136

de Melo, J. D., & Nicita, A. (2018). Non-Tariff Measures: Scope and Overview. In *The Unseen Impact of Non-Tariff Measures: Insights from a new database.*

de Melo, J., & Nicita, A. (2018). Non-Tariff Measures: Data and Quantitative Tools of Analysis. In *The Unseen Impact of Non-Tariff Measures: Insights from a new database.*

Deardorf, A., & Stern, R. (1997). *Measurement of Non-Tariff Barriers* (OECD Economics Department Working Papers No. 179). https://doi.org/10.1787/568705648470

Dee, P., & Ferrantino, M. J. (2005). *Quantitative Methods for Assessing the Effects of Non-Tariff Measures and Trade Facilitation*.

Disdier, A.-C., & Marette, S. (2010). The Combination of Gravity and Welfare Approaches for Evaluating Nontariff Measures. *American Journal of Agricultural Economics*, *92*(3), 713–726.

Ederington, J., & Ruta, M. (2016). *Non-Tariff Measures and the World Trading System*. 92.

European Commission. (2015). *Recommendation for a Council Decision authorising the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy to open negotiations and to negotiate with Mexico a modernised Global Agreement.*

European Commission's Directorate-General for Trade. (2018). *The Economic Impact of the EU-JAPAN Economic Partnership Agreement (EPA)*. 60.

Felbermayr, G., Keio, F. K., Keio, T. O., Steininger, M., & Yalcin, E. (2017). *On the Economics of an EU-Japan Free Trade Agreement*. Ifo Institute on behalf of the Bertelsmann Foundation.

Francois, J., Manchin, M., Norberg, H., Pindyuk, O., & Tomberger, P. (2013). *Reducing Transatlantic Barriers to Trade and Investment: An Economic Assessment* (No. 20130401).

Fugazza, M. (2013). *The Economics behind Non-Tariff Measures: Theoretical Insights and Empirical Evidence*. 33.

Fugazza, M., & Maur, J.-C. (2008). Non-tariff barriers in CGE models: How useful for policy? *Journal of Policy Modeling*, *30*(3), 475–490. https://doi.org/10.1016/j.jpolmod.2007.10.001

Harberger, A. C. (1954). Monopoly and Resource Allocation. *American Economic Review*, *44*(2), 77.

Henson, S., & Humphrey, J. (2010). Understanding the complexities of private standards in global agri-food chains as they impact developing countries. *The Journal of Development Studies*, *46*(9), 1628–1646. https://doi.org/10.1080/00220381003706494

Hoekman, B., & Nicita, A. (2018). Non-tariff measures and trade facilitation: WTO disciplines and policy space for development. In *The Unseen Impact of Non-Tariff Measures: Insights from a new database.*

Kohler, P., & Storm, S. (2016). CETA Without Blinders. How Cutting 'Trade Costs and More' Will Cause Unemployment, Inequality and Welfare Losses. *GDAE Working Paper 16/03*.

Obstfeld, M., & Krugman, M. M. P. R. (2017). *International Economics: Theory and Policy, Global Edition* (11th edition).

Porto, M. (2018). Free Trade Agreements and Import-import Substitution Effect Evidence from a CGE Analysis: The Case of EU-Korea and EU-Japan FTAs. *The Journal of Applied Business and Economics; Thunder Bay*, *20*(7), 126–151.

Schuster, M., & Maertens, M. (2015). The Impact of Private Food Standards on Developing Countries' Export Performance: An Analysis of Asparagus Firms in Peru. *World Development*, *66*(C), 208–221.

Shaikh, A. (1980). Marxian competition versus perfect competition: further comments on the so-called choice of technique. *Cambridge Journal of Economics*, *4*.

Shaikh, A. (2016). *Capitalism: Competition, Conflict, Crises*. Oxford University Press.

Taylor, L., & Arnim, R. V. (2007). *Modelling the Impact of Trade Liberalisation: A Critique of Computable General Equilibrium Models*. Oxfam.

Thilmany, D. D., & Barrett, C. B. (1997). Regulatory Barriers in an Integrating World Food Market. *Review of Agricultural Economics*, *19*(1), 91–107. https://doi.org/10.2307/1349680

UNCTAD. (2010). Non-Tariff Measures: Evidence from Selected Developing Countries and Future Research Agenda.

UNCTAD. (2012). UNCTAD | Classification of Non-Tariff Measures.

UNCTAD. (2013). *Non-Tariff Measures to Trade: Economic and Policy Issues for Developing Countries - Developing Countries in International Trade Studies*. 124.

UNCTAD. (2015). *International Classification of Non-Tariff Measures. 2012 Version.*

UNCTAD. (2018a). *UNCTAD TRAINS: The Global Database on Non-Tariff Measures. 2017 Version 2.*

UNCTAD. (2018b). What are Non-Tariff Measures?

UNCTAD, & World Bank. (2018). The Unseen Impact of Non-Tariff Measures: Insights from a new database.

United Kingdom Department for International Trade. (2018). *Impact assessment of the EU-Japan Economic Partnership Agreement (EPA) on the UK*.

Vandemoortele, T., & Deconinck, K. (2014). When Are Private Standards More Stringent than Public Standards? *American Journal of Agricultural Economics*, *96*(1), 154–171.

World Trade Organization (Ed.). (2014). *Technical barriers to trade* (Revised in 2014). Geneva, Switzerland: World Trade Organization.

WTO. (2012). World Trade Report 2012.