

TECHNICAL MEASURES TO TRADE AND THEIR IMPACTS ON BRAZILIAN AGRICULTURAL IMPORTS

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Abstract

International trade is beneficial to countries due to the diverse benefits conveyed such as being a source of financial resources and promoting a broad variety and availability of products to consumers. Despite this, some nations aim at protecting their producers through tariff and non-tariff measures. Brazil, despite being competitive in the agricultural sector, may be doing as such. To evaluate the effect of technical barriers to trade (TBT) on Brazilian agricultural imports, a gravity equation was estimated. Results showed that measures that alter the products features constituted trade barriers, so they had a negative impact on trade. Although these measures constitute barriers, they also bring benefits: products with higher quality, safety and standardization for consumers. Therefore, the TBT agreement is important to avoid unnecessary constraints to trade, besides providing more transparency.

Keywords: TBT agreement, gravity model, international trade.

1

INTRODUCTION

The importance of international trade is a consensus among countries due to the diverse benefits conveyed, such as being a source of financial resources and promoting a broad variety and availability of products to consumers. In addition, it improves productive processes given that every country wishes to become more competitive.

Countries achieve gains not only as exporters but also as importers. As an example, it is possible to see technological improvement via technology transfers or inflation control via importation.

There is strong theoretical evidence that international trade is a good deal for all countries, a fact elucidated by trade theories such as Ricardo's theory of comparative advantage, Heckscher and Ohlin's (and Stolper and Samuelson's) relative endowments of factors of production, among others (Krugman & Obstfeld, 2010). The authors also claim that one of the most important insights into the international economy is that there are gains from trade, meaning that the exchange of goods and services between countries can be mutually beneficial.

Rodriguez and Rodrik (2001) argue that the prevailing view in political circles in Europe and North America is that countries with fewer barriers to international trade exhibit more rapid economic growth. According to the authors, multilateral institutions, such as the Organization for Economic Cooperation and Development (OECD), the World Bank and the International Monetary Fund (IMF) vehemently preach that trade liberalization generates predictable and positive consequences for economic development.

International trade allows the consumption of several goods in greater abundance for all countries, serves as a source of income, enhances technology transfer, allows certain sectors to have economies of scale and contributes to economic development. This statement does not mean, however, that international trade must necessarily be entirely free of barriers, and that it is good for all agents. Trade protection can still be necessary, for example, to protect an infant industry or provide quality assurance for a consumer. Each country, given its current level of development, lives in a different domestic economic environment, which is affected by foreign economy, and may require a freer or more protected trade.

Thus, protection mechanisms are expected from some economies, having import tariffs as one of the most common and constantly observed instruments across countries. Nevertheless, instruments such as quotas, subsidies, technical and sanitary measures are also broadly used.

For this reason, it is necessary that international trade regulation prevents countries' protection mechanisms from being used indiscriminately, which may hinder foreign transactions.

The authentic liberalization of international trade needs norms to be harmonized across countries. Despite market capacity for automatically generating the normalization of economic activities internationally, it is required the cooperative action of private agents at International Organizations for Standardization, and governmental authorities, when it comes to international agreements (FERRAZ FILHO, 1997).

The elimination of trade barriers was sought through the World Trade Organization (WTO), which is an institution that has as its main objective to regulate and promote free trade among countries. These barriers may be tariff or non-tariff barriers. The non-tariff barriers (NTBs) represent any instrument utilized to avoid or create constraints to products and services trade in the international market (LIMA FILHO, 2005).

Since the first round of the General Agreement on Tariffs and Trade (GATT¹), the participant countries have executed a series of trade agreements aiming at the promotion of free trade. Initially, according to Batista (1992), the negotiations were limited essentially to the liberalization of manufacture trade obtained through tariff reductions. A big wave of tariff cuts was then originated, which has been propagating across nations up to the present date.

Normally, the implementation of NTB's raises transaction costs of the related product, making its importation less attractive. Ray concluded that tariffs and NTB's were used by the United States, predominantly in sectors with lower international competitive level. Furthermore, the author found evidence that non-tariff measures were being implemented to complement the tariff protection that was reduced by post-war liberalization agreements (RAY, 1981).

The world trend follows the tariff reduction, which may not be accompanied by gains in terms of international competition.

Ray (1987) observed this tendency even before the creation of the WTO. In his studies about the United States, the author captured a big decrease in tariffs and a substantial growth in NTB's.

Rodrigues *et al.* (2006) state that, along with the favorable evolution of multilateral negotiations focused on the reduction of traditional barriers (tariffs), the use of NTB's for the protection of less competitive sectors in the importer markets is expected.

According to Richter (2000), amidst the main NTB's are those related to Sanitary and Phytosanitary Measures Agreements (SPS) and Technical Barriers to Trade (TBT). These agreements were instituted after the Uruguay Round of the GATT in an attempt to standardize the norms and rules regarding the protection of consumers, the environment and public health, in addition to ensuring product quality.

Within the possible NTB's, one can highlight the technical measures (included in TBT agreement) and the SPS. These measures are introduced through notifications which are documents sent to the WTO by a country wishing to adopt a new rule.

Silva (2013) explains that SPS measures regulate the countries' rights to protect people, animals and plants from health hazards via regulatory measures based on science.

1 GATT is not only the General Agreement on Tariffs and Trade but also the forum where rounds of multilateral negotiation took place (BATISTA, 1992).

The technical measures, according to the WTO (2008), specify the product characteristics such as size, shape, design, function and performance, or their labeling and packaging. In some cases, production processes may affect the characteristics of a product, and, for this reason, appropriate regulatory mechanisms may be directed to the productive process. Conformity assessment procedures are also set forth in the agreement.

It is observed then that SPS notifications apply mostly to food safety, while TBT measures may present broader solicitations. Thus, this article focuses on the latter, given that they are more flexible and affect a greater variety of products.

According to Gadret and Rodriguez (2009), all countries demand imported merchandise to comply with the rules applied to domestic production, ensuring protection to consumers. Such requirements, despite being (in theory) appreciated by governments for legitimate reasons may, in practice, create barriers to trade.

Differently from traditional barriers, TBT may have ambiguous impacts on trade flow. The technical measures could bring benefits to trade due to product normalization enabling commercial transactions. However, if too restrictive, they might place burdens to trade.

Effects of tariffs on trade are evident; as they raise the cost of transaction, therefore discouraging imports. The effects of certain NTMs, however, vary. TBT and SPS measurements can have ambiguous effects: they can trade benefits, such as product standardization, facilitating trade, or when restrictions are too severe, can create obstacles and reduces trade.

Bao and Chen (2013) highlight the same ambiguity in TBT measures. The adoption of a TBT measure could increase trade costs, which is expected to restrict the likelihood and the volume of trade. However, TBT can provide information to consumers, which will enhance consumers' confidence and increase trade flows. Furthermore, it can promote the trade performance of existing exporters by discouraging potential competitors from entering the market or by driving the marginal exporters out of the market.

Fassarella (2010) shows that, for Brazilian exports of chicken meat, TBT and SPS measures related to labeling expand trade, while measures on conformity assessment procedure reduce it.

Almeida (2011) found evidence that TBT and SPS measures taken by importers negatively affected Brazilian exports of green coffee, reducing product imports by its trading partners.

Corrêa and Silva (2011) showed that, for the chemical industry, TBT notifications, adopted by trading partners, relating to conformity assessment procedures, positively affected Brazilian exports of these goods.

Brazil, as the other countries, has adopted technical measures, which may or may not have legitimate objectives. Given the importance of international trade, it is relevant to evaluate if the notifications issued by the country are creating barriers to the entry of products, in other words, if they are negatively affecting trade.

Since Brazil is competitive in the production of agricultural goods and products of animal origin, it is hoped that the protection of its internal market from external competition will not be necessary.

Although there are a great number of papers discussing the effects of NTB's on exports, not many have analyzed its effects on Brazilian imports. More importantly, the impacts of technical measures have received little attention, despite being broadly adopted as instruments of trade policy. From 1995 to June, 2014, according to the WTO (2014), 18,290 regular notifications were issued by the organization's members states.

The objective of this article is then to contribute to the discussion on the effects of NTB's on international trade as well as to assess the effect of Brazilian notifications on international market.

2 THEORETICAL FRAMEWORK

Countries trade merchandise for many reasons; they are not capable of producing all the spectra of products consumed internally because they have scarce resources or because it is not advantageous even if production were attainable.

According to Nakano (1994), for the traditional theory of international trade, the determinant factors surround the countries' factor endowments, which would establish the comparative advantage of each country to produce a certain good and would explain international trade. Exports from a specific region would incorporate its respective abundant factors, while imports would provide those relatively scarce factors.

Economic theory points out many factors that influence trade flow among countries, such as transport costs, tariff and non-tariff barriers. Other factor

such as countries' size (GDP) and the distance among them have received greater attention with the usage of gravitational models, based on Newton's theory of gravity.

According to Baldwin and Taglioli (2006), the gravitational model is a tool broadly used in many empirical fields, with a series of applications in the study of international trade. Its popularity is based on three pillars: first, the international trade flows are a key element in all types of economic relations. Second, data is easily accessible nowadays. Third, a great number of high-level papers have brought more endorsement and acceptance to the model.

In general terms, bilateral international trade flows have a direct relation with the economic mass of the countries (GDP's) and it is inversely related to the geographic distance among them, which may be represented by the following equation:

$$X_{ij} = G \frac{M_i M_j}{D_{ij}} \quad (1)$$

in which X_{ij} is the exports of country i to country j ; G is a proportionality constant; M_i and M_j are the countries' GDP, which affect trade directly; and D_{ij} represent all the relative trade costs, commonly represented by the distance among countries.

Based on this formulation, this basic gravitational model is obtained:

$$\ln X_{ij} = \alpha + \delta_1 \ln M_i + \delta_2 \ln M_j + \eta \ln D_{ij} + \mu_{ij} \quad (2)$$

in which variables are the same as described in the previous non-linear model, and the constant G was replaced by α . However, the modeling was enhanced by the theoretical developments of Anderson and van Wincoop (2004), and it became necessary to add multilateral resistance indexes to capture the effects of different prices (generated or not by tariff barriers) in different countries and regions.

Other variables have been incorporated to gravity models to better identify trade costs and so it became possible to explain the effects of tariff and non-tariff barriers on trade flow. This new approach, which includes trade barriers,

can be found in many papers such as Lee and Swagel (1997) and Winchester (2007). It is then possible to have this expressed as follows:

$$\ln X_{ij} = \alpha + \delta_1 \ln GDP_i + \delta_2 \ln GDP_j + \delta_3 \ln dij + \sum_{m=1}^M \gamma_m \ln Z_{mij} + \mu_{ij} \quad (3)$$

in which X_{ij} are the exports (which may as well represent imports as a quantification of trade flow) of country i to country j ; GDP_i and GDP_j are the respective gross domestic products of the involved countries; d_{ij} is the distance between countries i and j ; Z_{mij} is a set of M variables that represent trade barriers for $m=1, \dots, M$; and μ_{ij} is the error term.

As mentioned by Krugman and Obstfeld (2010), the gravity model functions well as major economies tend to spend more given their higher income, while they also attract a greater part of other countries' expenditures since they have a greater variety of products.

In terms of distance, besides considering transport costs, it is possible that physical proximity facilitates negotiations, as it is the case in economic blocs. Thus, the longer the distance, the less the volume traded between two countries. In this case, trade barriers such as tariffs and NTBs would act by reducing trade flows.

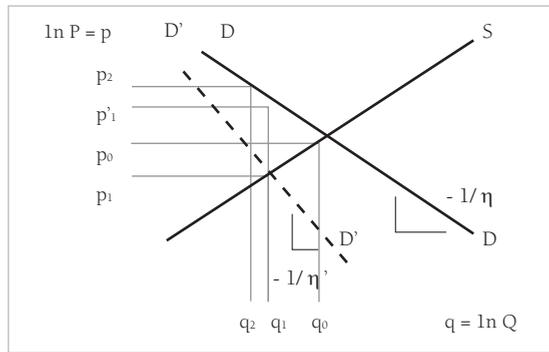
Lee and Swagel (1997) used a model that includes not only the total production of a determined good, tariffs and distances but also a non-tariff barrier variable, which measures the barriers faced by the considered good, and a black market prize variable, which allows for the inclusion of distortions generated by the trading control inhibiting importation.

For Anderson and van Wincoop (2004), trade costs should also include all costs accrued from the commercialization of a good such as transport costs, political barriers (tariff and non-tariff), information costs, contract costs, among others.

Winchester (2007) introduced, together with the variables habitually included in models of gravity, tariffs and *dummy* variables to measure the effects of borders, common language, colonial relations and whether countries are members of a free trade zone.

NTBs affect trade and are instruments, governmental or not, that seek to restrict trade without the introduction of tariffs. The adoption effects of an NTB can be seen in Figure 1, where the DD curve represents the demand for imports of a given product in perfect competition without NTBs, in accordance with the description of Deardorff and Stern (1998).

Figure 1
Quantity and Price effects of an NTB



Source: Deardorff and Stern, 1998.

The imported product may be considered an imperfect substitute for the domestic product, for this reason, the position of the DD curve depends on the price of the domestic product. On the other hand, it may represent a perfect substitute for the domestic product, in which case the DD curve would represent an excess demand curve. The exportation supply curve by foreign countries is given by the S curve, with a positive slope indicating that domestic imports are sufficiently strong to affect world prices of the product. For a smaller country, the supply curve would be traced horizontally. The initial balance of the free market, prior to NTB implementation, is at point p_0 and q_0 , representing price and quantity, respectively.

By supposing the introduction of an NTB without prior knowledge of its magnitude, is not possible estimate the real effect it would have on the market. However, most NTBs alter in a certain way the import demand curve.

The adoption of an NTB may raise the price of the product, causing a left and downward shift on the demand curve and making it steeper. The new demand curve ($D'D'$) indicates the price of the product with the barrier. It is possible then to compare it with the original demand to determine the domestic price of the imported good, or its shadow price, when consumers paid the barrier's cost.

In terms of quantity, the effect of an NTB may be observed by the reduction of the quantity imported, representing the distance from q_0 to q_1 in Figure 1, if the supply curve S is competitive, or from q_0 to any other quantity, if the supply curve is not competitive. In terms of prices, it is observed p_1 , p'_1 or both, in which this new quantity is supplied and demanded, respectively.

However, the authors still mention that the problem with both the price and the quantity measures is that they reflect the interaction between the product's supply and demand and not only the properties of an NTB itself. As a result, two NTBs in different markets with similar characteristics may produce different effects if the conditions of supply are distinct. The results will vary according to the elasticity of supply if markets are competitive, and larger differences might occur in case the supplies are not competitive.

According to Deardorff and Stern (1998), there is not one single way of measuring the effect of an NTB. Differently from a tariff, which is perfectly defined by a number, an NTB requires various parameters to be completely characterized. In order to predict the effects of an NTB, it is indispensable to know several of its characteristics such as variability, uncertainty, its costs regarding welfare and administration costs.

In the present study, the main objective is to investigate the impact of technical measures on the Brazilian imports. *A priori*, technical barriers may be considered a type of non-tariff barrier. According to Deardorff and Stern (1998), most NTBs alter in a certain way the demand for imports, reducing the imported quantity.

To sum up, in case the implementation of a technical measure generates a reduction of importation, it is characterized as a non-tariff measure. On the contrary, the measure is not a burden to trade, thus, it respects the TBT agreement.

3 METHODS

In this section, the methodology used to verify the impact of technical measures on Brazilian imports of agricultural products will be specified.

■ 3.1 Definition of sectors

Technical measures to trade may be related to various types of requirements that affect producers in different ways. To measure the effect of each requirement on trade, all notifications issued by Brazil need to be analyzed.

The first step consists of defining the sectors of products of animal and vegetable origin with the larger proportions in Brazilian imports. For this purpose, values of imports by chapter of the Harmonized System (HS)² until the year of 2013 were gathered. The selection was made considering as base year the last year available (2013), given that the objective is to analyze the most recent effects of technical measures on the most important chapters. Using the sum of the whole period or choosing another base year could generate biased results. The five chapters with larger volume of imports were chosen for the analysis. It was also established the ten main countries of origin of the imports for each year. Thus, data of the selected sectors and countries, between the years of 2004 and 2013, was gathered.

Table 1 shows the selected chapters, in order of relevance, and its respective countries of origin for imports. The five sectors represent around 75% of total Brazilian imports of products of animal and vegetable origin in 2013.

2 International method of merchandise classification based on a structure of codes. It was created to facilitate and promote the development of international trade (MDIC, 2014). Chapters are aggregations of similar products with a code of 2 digits. More information at: <http://www.mdic.gov.br/sitio/interna/interna.php?area=5&menu=411&refr=374>.

Table 1

HS chapters of agricultural products with larger participation in Brazilian imports and its main origins

10	3	15	7	8
Argentina	Chile	Indonesia	China	Argentina
United States	China	Portugal	Argentina	Chile
Paraguay	Norway	Spain	Bolivia	Spain
Uruguay	Argentina	Argentina	Canada	Turkey
Canada	Vietnam	Malaysia	Netherlands	Portugal
France	Portugal	Uruguay	Spain	United States
Vietnam	Morocco	Paraguay	France	Italy
Italy	Uruguay	Colombia	Chile	Ghana
Bolivia	Spain	Italy	Mexico	China
Suriname	Peru	Chile	Belgium	Cote d'Ivoire

10: Cereals; 3: Fish and crustaceans, mollusks and other aquatic invertebrates; 15: Animal or vegetable fats and oils and their cleavage products prepared edible fats; animal or vegetable waxes; 7: Edible vegetables and certain roots and tubers; 8: Edible fruit and nuts; peel of citrus fruit or melons.

Source: Elaborated with WITS data.

3.2 Classification of technical measures

Once the sectors were defined, the notifications of agreements with different requirements for product importation, according to the description present at each notification, were collected and separated.

In this study, the requirement's classification was based on the criteria adopted by a group of "experts" indicated by UNCTAD, which is a United Nations' body that deals with trade and development. This group is known as MAST (Multi-Agency Support Team), presented in Table 2.

Table 2

Classification of TBT notifications according to MAST criteria

Type 1 – Products changes
<ul style="list-style-type: none"> Standards that define products’ characteristics (e.g., size, color, and quality components) and contribute to the safety and suitability of products. Those related to product performance are also included.
<ul style="list-style-type: none"> Labeling, marking and packaging requirements (information for shipping and customs).
<ul style="list-style-type: none"> Tolerance limits (waste, toxic substances, maximum concentration of certain components) and bans on the use of certain substances.
<ul style="list-style-type: none"> Restrictions on genetically modified organisms.
<ul style="list-style-type: none"> Requirements that aim at preventing environmental damage or ensuring the protection of the environment.
Type 2 – Process changes
<ul style="list-style-type: none"> Definition of standards for process and / or the supply chain that contribute to the safety and suitability of products.
<ul style="list-style-type: none"> Requirements on good management practices, establishing a form of production.
<ul style="list-style-type: none"> Requirements on transport and traceability.
Type 3 - Conformity Assessment Procedures
<ul style="list-style-type: none"> Control, inspection and approval procedures, including procedures for sampling, testing and inspection, evaluation, verification and assurance of conformity and approval.
<ul style="list-style-type: none"> Requirements for certification in the exporting or importing country.
<ul style="list-style-type: none"> Other requirements for conformity assessment.

Source: Own elaboration based on MAST classification, contained in article by Tongeren et al, 2009.

Next, the gravity model was estimated.

3.3 The Gravity Model

To measure the effect of technical barriers to imports in Brazil, an equation based on the gravity models presented above was estimated. The equation estimated is:

$$\ln Y_{kijt} = \alpha + \delta_1 \ln GDP_{it} + \delta_2 \ln GDP_{jt} + \delta_3 \ln D_{ij} + \delta_4 \ln(1 + T_{kijt}) + \sum_{m=5}^7 \delta mTBT_{mijt}^k + F_j + H_k + \mu_{kijt} \quad (4)$$

in which:

Y_{kijt} = Brazilian imports from country j of a product in chapter k^3 in period t ;

GDP_{it} = Brazilian GDP in period t ;

GDP_{jt} = GDP of country j in period t ;

D_{ij} = Distance between Brazil and country j ;

$(1 + T_{kijt})$ = average effective tariff imposed by Brazil to country j for product k in period t ;

$TBT_{mijt}^k = 1$, if there is a notification for product k of type $m=1, 2$ or 3 , imposed by Brazil in period t ; 0 , if the opposite is true.

F_j = dummies to control country specific effects;

H_k = dummy variables to control chapter specific effects;

μ_{kijt} = error term.

Hence, it is possible to measure the effect of technical barriers to importation as well as the effect of other relevant variables to understand international trade, through a regression analysis with panel data.

It is known that a tariff reduces imports of a certain good; however, the effects of TBT measures are ambiguous. Different studies, such as Li and Beghin (2012), Fontagné *et al.* (2013), and Corrêa *et al.* (2015) report different nontariff measurement effects.

Li and Beghin (2012) concluded that SPS measures affect the agricultural sector and the food industry more than other sectors. These measures also tend to be bigger obstacles to imports of developed countries originating from emerging countries than similar barriers in trade between developed countries do.

Fontagné *et al.* (2013) analyze the effects of specific trade concerns (SPS) measures in exports of French companies between 1995 and 2005. Results show that imposing these measures reduces the participation of companies in exports, but the negative effect decreases for large companies.

Corrêa *et al.* (2015) measured the effects of TBT measures, adopted by Brazil, on imports from various economy sectors and observed that TBT measures were trade facilitators; that is, that TBT measures adopted from 2000 to 2012 had positive effect on imports from selected sectors.

This modeling had already been applied successfully, for different products over time and with more than one trade partner, by Fontagné *et al.* (2013) and Silva and Santos (2013). However, the analysis focused on exportation and SPS notifications.

In general terms, the gravity model is estimated for all pairs of countries and not only for Brazil as a importer, yet the objective is to measure the obstacles imposed by this country. Some modifications were then made as to use only Brazil as an importer country. This approach was held by other studies such as Karov *et al.* (2009), Mata and Freitas (2008) and Fassarela (2010).

The importance of country-specific effect control is given in Baldwin and Taglioli (2006). According to the authors, this type of estimation allows for the inclusion of multilateral resistance terms (different for each country) as non-observable factors in the equation. This would avoid biased results from omission of such terms present in the error of the equations. This can be solved by setting a dummy variable equal to 1 for trade flows of a specific country, and 0 for the opposite.

Sheperd and Wilson (2008) mentioned the importance of controlling the specific effects of the sectors. For the authors, this would represent a coherent agenda between theory and empirical treatment.

The estimation was done through Poisson Pseudo Maximum Likelihood (PPML) method, which generates consistent results in case of presence of unobserved heteroskedasticity or null bilateral flows, as argued by Santos Silva and Tenreyro (2006). Dummy variables for each country were used to control fixed effects. Differences between chapters were corrected in the model itself, by clustering and, consequently, adjusting standard errors.

■ 3.4 Data

For each variable in the model the data and its sources are:

- Y_{kijt} : Value in dollars of Brazilian imports. Available at WITS (2014).
- PIB_{it} : GDP of countries at market prices in dollars (World Bank, 2014).

- D_{ij} : Distance (kilometers) between Brazil and country j (capitals), available at Centre D'Études Prospectives et d'Informations Internationales (CEPII, 2014).
- T_{kijt} : Average effective tariff imposed by Brazil, chapter k , year t . Available at WITS.
- TBT_{mijt}^k : Technical notifications issued by Brazil. Available at WTO (2014).

4 RESULTS

Table 3 shows the results of the estimated model. The values of the control dummies were not included in the table because their results are not relevant to the conclusions, serving only to prevent its effects from affecting the coefficients of other variables.

Table 3
Results of gravity model

Variable	Coefficient	Robust Standard Errors
ln GDP Brazil	1,163164**	0,2287418
ln GDP Partner	0,7636556ns	0,5439927
ln D	-2,386921**	0,3745638
ln (1+T)	0,0317489ns	0,1667229
TBT Type 1	-0,2825993*	0,1100324
TBT Type 2	0,0074937ns	0,3285754
TBT Type 3	0,1512202ns	0,114964
Constant	-8,81511ns	8,401024
Pseudo R ²	0,59	

***, **, * Indicates statistical significance at levels of 1%, 5% and 10%, respectively, while ns indicates no significance.

TBT type 1: product changes; TBT type 2: process changes and; TBT type 3: Conformity Assessment Procedures.

Source: Own elaboration.

The Brazilian GDP variable was significant and had a positive sign, as expected, supporting the idea that the increase in GDP leads to an increase in international trade volume. This is because the country with the highest GDP has more resources to import, as well as higher aggregate demand for imports. On the export side, it would also be valid because the GDP is the total production of the country, so if a country produces more, it can export more.

The distance had a negative sign, also according to the theory. An 1% increase in the distance between countries reduces trade at around 2,38 pp. This is due to the large increase in costs, increased by transport. Transport costs are an important component in the final cost of the imported product. In addition, there is the matter of time, because the farther the country, the time to complete the transaction tends to be longer.

The tariff variable was not significant. This may have occurred due to the level of aggregation of products given that each one has different tariffs and they were aggregated in one average value by year and chapter.

In relation to the technical measures adopted by Brazil, important considerations can be drawn. First, regarding the type 1 measure (product change), the parameter was significant and with a negative sign. The implementation of a type 1 measure tends to reduce importation. This may be explained by the fact that product changes (for example, new labeling) generates an increase in costs for the producer. These costs may not always be absorbed, so prices may be higher for the final product or production may even be reduced. In comparison to manufactures, agricultural products have low prices; a slight increase in cost can generate heavy burdens to producers. In both cases, imports tend to fall. Hence, it can be concluded that notifications of type 1 are NTBs.

This does not mean that they are necessarily adopted for protectionist purposes. The reason is even expected to be legitimate, such as consumer protection and information. But even if it is legitimate in the short term, it constitutes an obstacle to international trade. It is important to say that this impact is likely to dissipate in the long term, when the producers adapt the new measures. So, although it is worth continuing a given measure in subsequent years, the impact thereof on imports is probably different.

The sample contains few type 2 notifications (only two for all chapters throughout the period), which may explain their non-significance. Changes in the production process were not very common requirements in the TBT agreement.

Regarding the type measures 3 (conformity assessment procedures), the coefficient was not significant. This can be explained by the ambiguity of the effects thereof. It is true that the standardization of compliance testing provides greater confidence, reduces retesting costs the products in the country of origin and facilitates transactions. But in the short term, the cost of adopting these new conformity assessment procedures can be very high for certain products and certain producers, which could inhibit trade. Thus, it is difficult to measure the net effect of such measure to such a wide range of goods as proposed by the present article.

In addition, the WTO encourages the use of international certification bodies in the TBT agreement, which makes tests accepted in most countries, reducing costs that occur when each country adopts a different procedure of accreditation.

It is important to note that, although TBT type 1 represents a barrier to trade in the short term, this type of requirement also has benefits: products with higher quality, safety and standardization for consumers. Moreover, according to the principle of national treatment, a country cannot be stricter with imported goods than it is with domestically produced goods. Therefore, when a country imposes a new measure, it signals that it also follows these standards internally.

A matter expressed in Table 1, yet not included in the model, is the trade specialization. The influence of political relations between countries is undeniable. Nonetheless, it is possible to observe different countries as exporters for each chapter, which allows the understanding of the specialization effect. Each country exports more the goods in which it is more efficient, one country cannot be efficient in all products. Thus, countries need various trade partners, and this generates mutual benefits.

5

CONCLUDING REMARKS

International trade is of great importance for all countries. It not only brings various benefits, such as being a source of hard currency; but also allows for a broader availability and variety of products to consumers and improves the quality of products and processes through competition.

Since trade volume is quite expressive, regulation is necessary. For this purpose, the WTO acts to solve divergences, promote trade and reduce barriers. Therefore, the Technical Barriers to Trade (TBT) agreement was created.

To evaluate the impact of TBT notifications on Brazilian import, the following HS chapters were assessed: 10) cereals; 3) fish and crustaceans, mollusks and other aquatic invertebrates; 15) Animal fats and oils or vegetable; their cleavage products; vegetable products; waxes of animal or vegetable origin; 7) Vegetables, roots and tubers, edible; 8) Fruit; peel of citrus fruit or melons. These were, in 2013, the chapters of agricultural products the most imported by Brazil.

The results showed that technical measures that require changes to the product negatively affect Brazilian imports. This can occur due the high costs of implementing changes. Therefore, type 1 measures may be considered non-tariff barriers.

Although they constitute barriers in the short term, type 1 TBT measures also bring benefits: products with higher quality, safety and standardization for consumers. Moreover, in the long term, standardization acts as a trade facilitator. Also, because of agreement rules (national treatment principle), domestic producers must obey what is determined by a technical measure established by their country. This is a way to bring national goods and productive processes to an international quality standard. Moreover, it provides information exchange and learning between countries (since notifications are public documents). Furthermore, it is possible that there is an international spillover effect when a country adopts a measure. If a country adopts a new requirement, all countries (even without imposing TBT measures) that import those goods affected by the same partners of the country that imposed the TBT will benefit from higher quality or reliability.

In conclusion, the participation of the WTO is of extreme importance to restrain the implementation of unnecessary measures because it could be a constraint to international trade. As non-tariff measures are the new protectionism, the TBT agreement and its transparency are indispensable when a country considers burdensome any measure adopted by other countries and wants to safeguard its rights in the WTO.

The world is getting smaller, more connected, and, therefore, countries, governments, companies and even people need do adapt to this new situation. Globalization introduces opportunities for every country to expand their markets, enter areas never before explored, and acquire all kinds of knowledge and technology. However, those that do not adjust to this new reality will be fated to stagnation.

MEDIDAS TÉCNICAS AO COMÉRCIO INTERNACIONAL E SEUS EFEITOS SOBRE AS IMPORTAÇÕES AGRÍCOLAS BRASILEIRAS

Resumo

O comércio internacional é benéfico para os países devido a seus diversos benefícios como ser uma fonte de recursos financeiros e a promoção de uma ampla variedade e disponibilidade de produtos para os consumidores. Apesar disso, algumas nações visam proteger seus produtores por meio de medidas tarifárias e não-tarifárias. O Brasil, apesar de competitivo no setor agrícola, pode ter interesse em tal proteção. Para avaliar o efeito das barreiras técnicas ao comércio (TBT) sobre as importações agrícolas brasileiras, estimou-se uma equação gravitacional. Os resultados mostraram que as medidas que alteram os produtos constituíram barreiras e tiveram impacto negativo no comércio. Porém, essas medidas também trazem benefícios: produtos com maior qualidade, segurança e padronização para os consumidores. Portanto, o acordo TBT é importante para evitar restrições desnecessárias ao comércio, além de proporcionar mais transparência.

Palavras-chave: acordo TBT, modelo de gravidade, comércio internacional.

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