A Computable General Equilibrium Model (CGE) assessment of the short and long-run impact on Brazil of the European Union – Mercosur Trade Agreement

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Abstract

The evaluation of trade agreements through general equilibrium models is very useful in the political decision making of States at the level of trade, production and citizens' welfare. This type of simulation allows the combination of several agents, factors of production and different regions, providing very detailed information at the macroeconomic and microeconomic level with the possibility of applying different assumptions that allow different results to be obtained.

The "Association Agreement" between the European Union and Mercosur is an agreement that, due to its scope and size of the economies of the blocks that comprise them, is one of the largest ever reached by both, and was signed in 2019 after 20 years of negotiations.

The European Union's trade policy tends towards a liberalization that transcends the purely commercial aspect and expands towards aspects related to sustainability and respect for human rights. Mercosur (made up of Argentina, Brazil, Paraguay and Uruguay) is an imperfect customs union whose main economic drive is based on trade in its internal market, and having reached a comprehensive agreement with the EU presents an opportunity to liberalize not only its trade in goods, but also in services, including aspects such as foreign direct investment (FDI) and public procurement, the latter being of special interest because it is hermetic and does not allow foreign companies to compete in its internal market to provide goods and services in the public sector. This gradual liberalization, with certain exceptions that the agreement allows, is attractive to EU companies that want to expand their operations in a huge market.

This analysis, however, will focus exclusively on the impact of the agreement on Brazil through a Computable General Equilibrium Model (CGE). Brazil represents approximately ¾ of Mercosur's GDP, so the impact on this member state would largely affect the rest of the trade block.

Introduction

On 28 June 2019, the European Union (EU) and Mercosur (Argentina, Brazil, Paraguay and Uruguay) signed a strategic partnership agreement after 20 years of negotiations. This agreement, which includes commitments on trade in goods, services, public procurement, facilitation, investment, cooperation, political and economic dialogue, among others, covers a market of approximately 800 million consumers who will be able to opt for better goods and services. As far as trade in goods is concerned, the EU undertakes to liberalize 92% of imports from Mercosur over a period of up to 10 years. Concerning Mercosur members, they commit themselves to liberalize 91% of imports from the EU over a period of up to 15 years. Regarding services, the agreement comprises all modes of supply,

including the liberalization of investment (establishment) both in the services sector and in other sectors. It also embodies the elimination of unnecessary technical barriers to trade (TBTs). The latter lead to creating a framework within which technical regulations and standards can converge.

The EU27 (without the UK) is the second largest economy in the world. It contributed 18% of the world's GDP in 2019, while Mercosur accounted for 3% of the world's GDP in the same year. On the other hand, Brazil was the ninth economy with a share of 2.1% of the global GDP in 2019, and it has become the most crucial state of Mercosur due to its share of 77% of the total regional bloc GDP (The World Bank, 2020). Brazil has been characterized as a quite protectionist country that is not very open to sign trade agreements. Actually, it has trade agreements in force with five countries in addition to the Mercosur member countries, which account for 1.4% of global GDP (IDB, 2019). The EU-Mercosur FTA will not only imply greater access to quality goods and services for Mercosur member countries but will also contribute to the reinforcement of legal bases that will enhance the entry of Foreign Direct Investment (FDI).

The European Union has exclusive competence for trade policy for the 27 member states, which allows it to assume a unique position and manage trade agreements with third countries in which the values of the EU are impregnated, which go far beyond aspects related to trade, in this way, aspects such as the protection of human rights and the environment play an important role within these agreements, which seek to increase the welfare of the citizens of both blocks. Thus, the trade agreement reached with the Mercosur countries (Argentina, Brazil, Paraguay and Uruguay) is one of the so-called "Association Agreements", which have a much broader commercial and political scope than traditional trade agreements.

For Mercosur, this agreement represents the biggest event in terms of trade, sustainability, food security, intellectual property, opening of the internal market, etc., that it has achieved in the 30 years of the block's history. Brazil, for its part, is the member state with the greatest weight in terms of GDP, population, territory and goods and services industries. According to a study conducted in pre-Covid-19 times by the firm (PriceWaterhouseCoopers (PWC), 2017), in 2030 Brazil will rank 8th in terms of GDP measured by Purchasing Power Parity (PPP), and will reach 5th place in 2050 on the same indicator. This is because Brazil is undergoing constant improvements in its institutional framework, which would allow technological progress to take off in the long term, as well as attract foreign direct investment (FDI) from advanced economies. Thus, analysing the impact of the agreement in Brazil is a complex task due to the country's intrinsic characteristics, but the results would reflect a gain or loss for the Mercosur block.

This article is, to our knowledge, one of the first of its kind that has taken into consideration all the characteristics of the agreement already signed, basing its analysis in the sense of the collection and cleaning of the data used for this task, of an agreement already closed, being sufficient for its implementation of the political will and approval of the 27 EU Member States. Among the previous works that have been taken as a reference and on which we have compared ourselves, we cite (London School of Economics (2018, 2020); Carrico et al., (2020); Timini and Viani (2020); Sinabell, Grübler and Reiter (2020)).

In the same way, and aware that a general impact on macroeconomic variables would not provide a differentiation with similar works, this article provides a more detailed description of the GTAP 10 sectors, grouped into 36 sectors (26 goods and 10 services), thus providing a specific picture of which sectors will or will not benefit from the trade agreement.

Thus, this document will be structured as follows: a review of the literature in which we will cite previous studies similar to the one proposed and their results in order to make a comparison; an explanation of the methodology used, which we will advance by saying that the impacts will be estimated through a static and a dynamic model, as well as a detail of the meticulous work that has been carried out with the data, being one of the most time-consuming tasks to arrive at modelling figures that are as up to date and close to reality as possible; the interpretation of the results of the static and dynamic model and how these play a role in the overall economy of Brazil; and finally the conclusions directed towards public policy recommendations.

Literature review

LSE (2018, 2020)
Carrico et al., (2020)
Timini and Viani (2020)
Sinabell, Grübler and Reiter (2020)

Model and data

To analyze the impact of the EU-Mercosur FTA on Brazil, we use a Computable General Equilibrium (CGE) methodology, which simulates the macroeconomic behavior of an economy through the interaction of the microeconomic activities. With a CGE model, we can estimate the overall effect of a shock for one or many variables in the real economy. Our model has 36 sectors, 10 regions (EU, Spain, Brazil, Argentina,Uruguay,Paraguay, US, Canada, China, Row) and 4 factors of production (land, labor, capital, natural resources).

The 36 sectors mentioned are composed of 26 goods sectors and 10 services sectors, and are based on the 65 sectors of GTAP 10, which have been grouped and renamed in order to simplify the results. This grouping has been done between related and related sectors, as well as sectors with little trade flow, see Table 1.

In this paper, we use both the static and dynamic setting of the Global Trade Analysis Project (GTAP) (Hertel and Tsigas, 1997; Corong at al., 2017; Aguiar et al., 2019a), based on GEMPACK (General Equilibrium Modelling Package) software. The use of both the static and the dynamic model allows to estimate the effect of the agreement in the short and long run. The static model reflects how each economy's equilibrium moves from one equilibrium point to another. It is suitable to estimate the impact of a shock in the short run. By contrast, the dynamic setting allows simulating the impact of the agreement on a year-by-year basis, once the agreement comes into force. Hence, with the dynamic model we simulate the influence of the progressive tariff relief on trade.

To estimate the impact in the long-term of the FTA between Mercosur and the EU27 in Brazil, we simulate each scenario against a baseline scenario in which this FTA is not in force. The baseline projection is obtained by simulating the model forward from the 2014 base year of the dataset to 2038. It includes updates in GDP, GDP per capita, population, and labor force. These updates correspond to the second path of socioeconomic development (SSP2)[1] derived from the Shared Socioeconomic Pathways Database developed by the International Institute for Applied Systems Analysis (IIASA).

We also update the values of tariffs from the GTAP database. We actualize these values considering the data accounted for by the International Trace Center for 2020.

The data to be used for this model come from different sources, the most important of which corresponds to the trade flows of the 8-digits Harmonized Systems (HS) codes. Tariff reductions (i.e., as stated in the Annex on goods of the trade agreement) have been negotiated using this nomenclature. This offer, which was originally negotiated in a version of the HS in 2012 (H4), has been brought up to the 2017 version (H5) currently in force, taking into account the different years of adoption in each region, so that the HS codes are related to the trade and tariff information associated with them. For the correlation between versions of the European Union offer, the website of Eurostat (n.d.) was consulted and, for Brazil, the website of the Brazilian Ministry of Economy (n.d.), where the respective tables of correponden were found.

The trade flows (value and tones) were extracted from ITC-Trademap (2020) in the period 2017 – 2019 from the point of view of the importer of each party. The data expressed in monetary units were downloaded at the 8-digits level of the HS and the tones at the 6-digits level of the HS, the latter information being necessary for estimating quotas for goods of a sensitive nature. For tariff information, the *Ad-Valorem Equivalent* (AVE) expressed as a percentage was taken, which corresponds to the Most Favored Nation (MFN) tariff applied in countries where is no trade agreement. This tariff was consulted at the 6-digits level of the HS in ITC-Macmap (2020) in the period 2017 – 2019, being the same data for the three years, so the 2019 AVE will be considered for the impact estimation.

The information in Harmonized System codes were converted to the sectors in the GTAP database (Aguiar et al., 2019b), using the correspondence files provided by the GTAP website (2020). This conversion groups several HS codes together, so that the MFN tariff applied to each GTAP sector corresponds to those goods that have a greater weight in total trade within that sector. With this information and knowing the tariff regime that was negotiated, it was possible to estimate the reduction in percentages for each year after the entry into force of the agreement. The European Union negotiated to eliminate a large part of its tariffs over a maximum period of 10 years and Mercosur (Brazil) over a maximum period of 15 years.

Regarding ***"non-tariff measures"***, The WTO (2012) report indicates that are all policy measures other than tariffs that can affect trade in goods. On the other hand, "services measures" are those policies that affect trade in services and are described in the WTO's General Agreement on Trade in Services (GATS) as "market access limitations". The two

[1] According to IIASA (2018) the SSP2 assumes an extension of the current trends in urbanization in all parts of the world, along with similar middle of the road assumptions about population growth, technological change, and economic growth.

terms, the WTO (2012) report notes, are not mutually exclusive, as they can have "cross-cutting effects" that are made more important by the evolution of trade that is intensified by global production sharing.

The effects of "non-tariff measures" have been taken into account since the beginning of the GATT/WTO in 1947, in the sense that the application of these measures does not distort or restrict trade, but rather serves as a means to comply with legitimate policy objectives. Thus, in the beginning, the application of NTMs sought to ensure non-discrimination, transparency and avoid protectionism, objectives that have been transformed in the 21st century and have resulted in the search for international harmonization of standards, mutual recognition agreements and regulatory cooperation. On the other hand, "services measures" made their appearance in the Uruguay Round that began in 1986, which distinguishes concepts such as "limitations on market access", "national treatment" and "domestic regulation" (WTO, 2012).

The UNCTAD (2017a) report notes that "non-tariff measures" can be of two kinds: I) non-tariff barriers (NTBs) such as quotas, price controls, non-automatic licensing, intellectual property, rules of origin, among others, all also known as "non-technical measures", the objective being to reduce or eliminate them, and II) sanitary and phytosanitary measures (SPS) and technical barriers to trade (TBT) related to the protection of human, animal, plant and environmental health, also known as "technical measures", which cannot be eliminated by fulfilling a specific function, but can instead converge to a common regulation that reduces the costs and time of these measures.

Although these measures are currently intended to comply with legitimate public policy objectives, it is also true that there are gaps and mystery in their creation and subsequent administration, and far from thinking that they can solve a specific problem, they can also create adverse effects on trade, such as increasing the price of a good or service that would prevent access to a market, hence transparency and regulatory convergence mainly in the so-called SPS/TBT "technical measures" becomes important in the global trade scenario.

Regarding the weight of "non-tariff measures", Figure 1 shows the updated information on these, with "technical measures" such as TBT and SPS having the highest representation in the world, Brazil and the European Union. It is notable that on the European side, the greatest weight of these measures is concentrated in the so-called "technical measures", this information is related to previous work such as that of Gourdon et al. (2018, Figure 2, p. 13), whose objective was to present a different approach to the effects that "non-tariff measures" have on the volume and price of trade.

The "Agreement in Principle", a document summarizing the results of the negotiation of the Association Agreement between the European Union (EU) and Mercosur, details commitments made to apply modern procedures to facilitate trade, many of them related to the reduction of "non-tariff measures" and "services measures". Among the first, we can mention that for "technical measures", a simplification of administrative procedures for European exporters in the SPS, a convergence on international technical regulations and standards (TBT) for Mercosur countries, which go beyond WTO rules and which will produce a decrease in adaptation costs, this is related to previous work by authors such as (Disdier et al. , 2013; Piertamini and Budetta, 2009), who recognize that the adoption of international standards has beneficial trade effects.

On the other hand, for "non-technical measures", non-automatic import or export licenses are prohibited, except for those necessary to implement certain measures of the agreement, and certification of the exporter's origin is introduced. With regard to services, the provisions of the WTO's General Agreement on Trade in Services (GATS) concerning "national treatment" are incorporated, which implies equal treatment for the trading partner, the four modes of services are opened up (with certain exceptions) in some sectors such as postal services, telecommunications, financial services, electronic commerce and maritime services, making it possible to eliminate discriminatory and unnecessary barriers in both the services and manufacturing sectors.

How do we estimate NTMs in the proposed model? For the goods sectors, we have used the latest available information on "non-tariff measures" estimated by the World Bank (2019), which is presented in the form of an Ad Valorem Equivalent (AVE), which, when expressed in percentages, has an interpretation equal to a tariff measure. Based on this information and on the commitments made in the agreement, which include, in addition to those already mentioned, the so-called "dialogue forums" that seek to strengthen mutual trust and cooperation between the parties to achieve the legitimate objectives of the agreement, it is expected that there will be political will to make progress in the reduction of TBT and convergence of the SPS. For all these reasons, the simulations have incorporated reductions of non-tariff measures of the "non-technical" type of 20% and "technical" measures of 5% in Mercosur (Brazil). On the EU side, "non-technical" measures could be reduced by 10% and "technical" by 3%.

For the "services measures", estimates by OECD researchers (Benz and Jaax, 2020) have been taken for the GTAP sectors of communication, business services, financial services, insurance and transport, both for Brazil and the European Union. For the hotels and restaurants sector, estimates are taken from (Fontagné et al., 2016). It can be observed that "services measures" are higher than "non-tariff measures" for goods, this is due to the little progress in services liberalization at the global level. These reduction percentages respond to a reference consulted in the work of Benz and Jaax (2020, Table 10, p. 25) in which they compare the average AVE of the "services measures" of the countries that form the European Economic Area (EEA) recognized as applying harmonized rules of the European single market, with the average AVE of the same measures of countries that do not have an agreement on trade in services. The difference between these two groups is approximately 80% and 90%, however, to be conservative in our analysis we have assumed approximately a quarter of this reduction. It should be noted that the simulated reductions are derived from the chapters containing the services supply side of the agreement, i.e., Mode 1 - Cross Border Trade.

With regard to ***"public procurement"***, the "Agreement in Principle" foresees making it easier for European companies to submit bids and win contracts, in the first instance with Brazil's federal agencies including ministries, the judiciary and the legislature, and will eventually be extended to contracts with sub-central entities made up of state, provincial and municipal bodies. This marks a historic milestone in this field, as it is the first time that Mercosur countries, especially Brazil, have opened their domestic market to foreign companies. On the part of Brazilian companies in the European Union market, the commitment made is the same: access to competition will first be allowed in the central bodies of the EU and central governments of each member state and will eventually be extended to a sub-central level.

It is important to point out that both the services and public procurement offers detailed in this document have a certain complexity in their interpretation, which is not as intuitive as it is for goods, and that the form of negotiation of each offer must be followed, i.e., whether the sectors and commitments acquired within them form positive or negative lists. Positive lists list sectors and sub-sectors in which the trading partner assumes certain commitments, while negative lists list exceptions to the opening of sectors and sub-sectors, so that everything that is not included in these lists is considered open (European Commission, n.d.). Positive lists have been used for the supply of services, and for public procurement a combination of positive and negative lists. The next step was to map what was negotiated in these lists to the GTAP codes. For this task, correspondence files were used to map the codes of the lists in the Central Products Classification (CPC) and International Standard Industrial Classification (ISIC) to the activities of the GTAP service sectors (2019). A preliminary step to this task was to update the CPC and ISIC codes to the most recent version (United Nations, 2015).

This conversion to GTAP sectors allowed us to take the next step in interpreting what was negotiated in these schedules by assigning a score of 0, 0.5 and 1 according to the text of the commitments made. Thus, when a positive list contains the word "none", it is interpreted that there is no restriction on market access or national treatment in the sector or sub-sector to which it refers, we assign a score of 1. On the other hand, when the word "unbound" appears, it is interpreted that a State or group of States reserves the freedom to introduce or maintain restrictive measures on market access or national treatment, we assign a score of 0. Finally, for those commitments that do not correspond to those mentioned above and that relate to particular or specific indications for certain member states of both parties, we assign a score of 0.5 (WTO, n.d.).

The steps described above allowed for a more intuitive interpretation of the commitments reached in the agreement, especially in the area of public procurement, which, added to the possibility of opening this market to national governments and, after a time, to state, local and municipal governments, has led to the need to consider a reduction and simulation in two stages. That is, between years 1 and 5 of the agreement's entry into force, a reduction in "non-tariff measures" related to public procurement of 2% for Brazil and 4% (double) for years 11 and 16 of the agreement will be considered. For the European Union, a reduction of 2% has been considered for years 1 and 5 of the entry into force of the agreement and 4% (double) for years 11 and 16.

Results/outcomes

1. Results on the Short-Term

1.1 Macroeconomic Results

We place this impact in the year 16, that is, after 15 years of application of the Trade Agreement, a time that coincides with the total liberalization of tariffs negotiated on the Mercosur side, specifically Brazil in our analysis. This trade liberalization corresponds to trade in goods, services, and the opening of public procurement, the latter of which was closed to foreign companies (outside Mercosur).

The results are shown for macroeconomic variables such as GDP, private consumption, aggregate imports and exports, wages, return on capital and the consumer price index (CPI). The variables are expressed in "real terms", and their increases ceteris paribus are produced by the force alone that the trade agreement would generate when it enters into force.

The results of the static and dynamic modelling contain all the components of the final agreement reached, i.e., the information on which the tariff and non-tariff reductions in goods and services have been calculated are based on the chapter listings of the agreement signed on 28 June 2019 (European Commission, 2019). Thus, this exercise will focus on the impact of three elements: 1) tariffs and quotas (referred to as "tariffs"), 2) non-tariff measures on trade in goods and services (referred to as "NTMs"), and 3) public procurement (referred to as "PP").

Table 2 shows the static impact in year 16 for Brazil and the EU27, i.e., after 15 years of implementation of the trade agreement, coinciding with the period in which Brazil will fully eliminate tariffs on negotiated goods.

1.2 Sectoral Results

[....]

2. Results on the Long-Term

With the dynamic model, we simulate a gradual reduction in barriers to trade over 10 years in the EU and 16 years in the Mercosur countries. As we mentioned, the EU negotiated to eliminate a large part of its tariffs over a maximum period of 10 years, while Mercosur agreed to reduce its tariffs over a maximum period of 16 years. Results from the dynamic model in this section will show the cumulative impact of the FTA, this means the difference between the BAU in 2038.

2.1 Macroeconomic Results

Table 3 offers a rich set of macroeconomic results to several regions. Among them Brazil and the EU27. Our preliminary results suggest that the FTA between Mercosur and the EU will be more beneficial to Mercosur countries than to the EU27.

Reductions on barriers to trade (i.e., tariffs, non-tariff measures, and public procurements) will imply an increase in GDP on the economies directly involved in the FTA. For the rest of the regions considered in the model, the impact will be slightly negative.

As we can see, reductions in trade barriers will lead to an increase of 1.28 percent and 0.04 percent in the GDP in Brazil and the EU27, respectively. The growth of the aggregate exports by 6.56 percent in Brazil and 0.67 percent in the EU27 would explain the increase in GDP in both regions.

With the rise in total production factor's demand also growth and consequently wages and capital remuneration, too. As we can see, with the FTA, Brazil will face an increase in

wages and capital remuneration. However, factors remunerations in the EU27 will fall [...]

2.2 Sectoral Results

This section presents the main microeconomic results for Brazil and the EU27. Table 2 shows how production, exports, and imports across sectors in both regions will adjust with the reduction in trade barriers. The first set of columns shows the results for the EU27 and the second set of columns provide the outcomes for Brazil.

As we can note, the fall in barriers to trade will lead to an increase on several sectors across both regions. Regarding the sectors which will face the most prominent increases in their production in the EU27 we can highlight pharmaceutical products, petroleum and coal, leather products, other manufactures, air transport, and other machinery. These sectors will face an increase on total production between 0.66 percent and 0.96 percent.

With respect to Brazil, the sectors which will face the most prominent increases in their total production are vegetable oils, plants and animal fibers, live animals and animal products, wearing apparel, motor vehicles, other animal products, hotels and restaurants, and other manufactures. These sectors will experiment a growth on total production between 3.30 percent and 14.22 percent.

Conclusions

[...]

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Tables

Table 1. Clusters of GTAP sectors used in the model

Sectors	No.	Code	Description	GTAP 10 - Sectors
Goods	1	CER	Cereals	1, 2, 3, 5, 23
	2	V_F	Vegetables, fruits, nuts	4
	3	SGR	Sugar	6, 24
	4	OCR	Plant & animal fiber, others	7, 8, 12, 14
	5	CMT	Bovine and other rumiant meats	9, 19
	6	OAP	Other animal products	10
	7	MIL	Dairy products	22
	8	FRS	Forestry	13
	9	GAS	Gas, coal, oil extraction or distribution	15, 16, 17, 18, 47
	10	OMT	Live animals, meat and animal products	20
	11	VOL	Vegetable oils and fats	21
	12	OFD	Food products nec	25
	13	B_T	Beverages and tobacco products	26
	14	TEX	Textiles	27
	15	WAP	Wearing apparel	28
	16	LEA	Leather products	29
	17	L_P	Wood products	30, 31
	18	PCH	Petroleum, coal and other chemical products	32, 33
	19	BPH	Pharmaceutical products	34
	20	RPP	Rubber and plastic products	35
	21	MMP	Metals and metal products	37, 38, 39
	22	ELQ	Electronic products	40
	23	OMA	Other machinery	41, 42
	24	MVH	Motor vehicles and parts	43
	25	OTN	Transport equipment	44
	26	OMF	Other manufactures	36, 45
Services	27	CNS	Construction	49
	28	WTP	Maritime Transport	53
	29	ATP	Air Transport	54
	30	CMN	Communication	56
	31	OFI	Banking	57
	32	INS	Insurance	58
	33	AFS	Hotels and Restaurants	51
	34	OBR	Business Services	59, 60
	35	ROS	Personal Services	61
	36	OSE	Other services	48,50,52,55,62,63,64,65

Source: GTAP 10
Elaboration: by the authors
Sector "46 ELY - Electricity" of GTAP 10 not shown because data not available

Table 2. Static impact in year 16 for Brazil and EU27 (after 15 years of implementation of the trade agreement), data expressed in percentages

Region: Brazil

	Tariff reduction	NTMs reduction	PP - NTMs reduction	Total
GDP	0,28	0,04	0,03	0,34
Private Expenditure	0,24	0,12	0,08	0,43
Aggregated Exports	4,97	0,01	0,28	5,26
Aggregated Imports	8,69	1,05	0,88	10,62
Wages	0,04	0,19	0,19	0,42
Capital remuneration	0,13	0,17	0,18	0,48
CPI	1,05	0,07	0,09	1,21

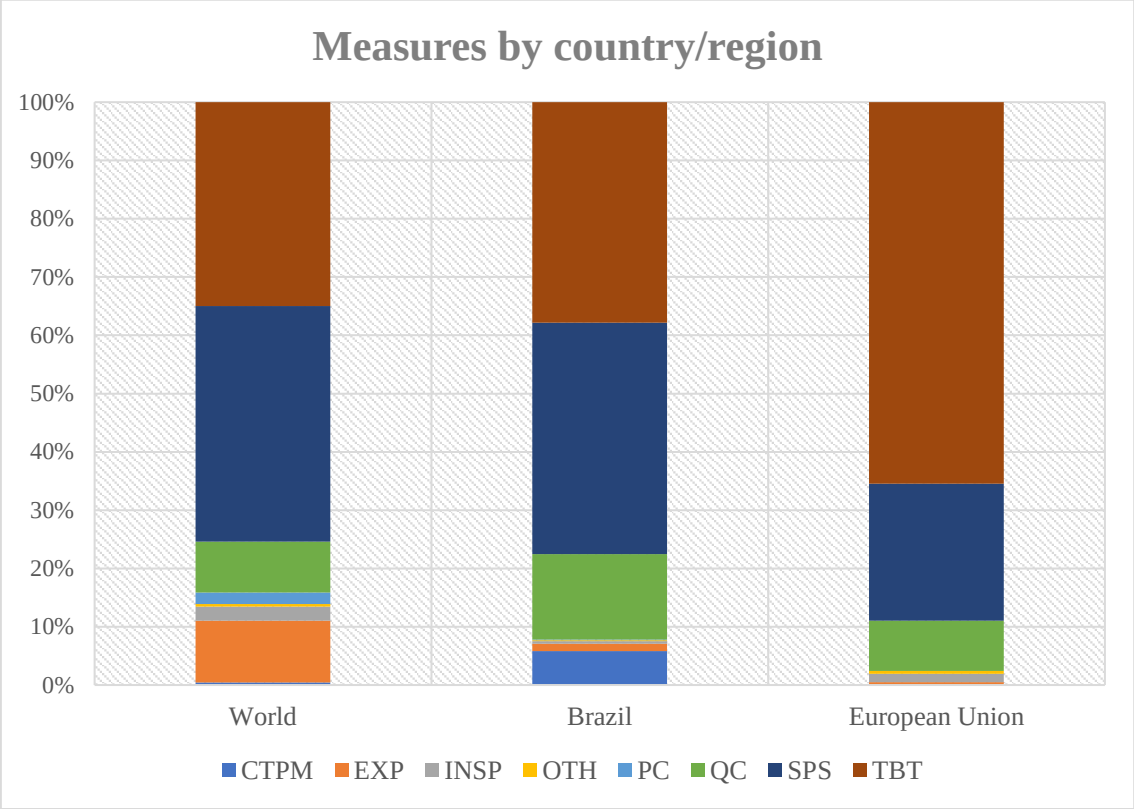
Region: EU27

	Tariff reduction	NTMs reduction	PP - NTMs reduction	Total
GDP	0,04	0,01	0,00	0,05
Private Expenditure	0,12	0,00	0,00	0,12
Aggregated Exports	0,25	0,01	0,01	0,27
Aggregated Imports	0,46	0,02	0,02	0,49
Wages	0,41	0,03	0,02	0,46
Capital remuneration	0,39	0,04	0,03	0,46
CPI	- 0,04	0,02	0,01	- 0,01

Source: authors' estimation

Figures

Figure 1



Source: author's elaboration, based on UNCTAD – TRAINS. Measures: Sanitary and Phytosanitary [SPS], Technical Barriers to Trade [TBT], Pre-shipment inspection [INSP], Contingent trade protective measures [CTPM], Quantity control measures [QC], Price control measures [PC], Other measures [OTH], Export-related measures [EXP]