Technical Note

ASSESSING THE EFFECTS OF A FREE TRADE AGREEMENT BETWEEN BRAZIL AND INDIA: A GENERAL EQUILIBRIUM APPROACH

Fernando J. Ribeiro

Nº 1

Dinte
Department of International Studies,
Political and Economic Relations

September 2021

Federal Government of Brazil

Ministry of Economy
Minister Paulo Guedes

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AUTHOR

Fernando J. Ribeiro
Coordinator of International Economic Relations at the Department of International Studies, Political and Economic Relations (Dinte) of Ipea. E-mail: <fernando.ribeiro@ipea.gov.br>.

DOI: http://dx.doi.org/10.38116/tn.dinte1

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1 INTRODUCTION

The bilateral relationship between Brazil and India has advanced substantially in recent decades, following the globalization process that strengthened the integration and cooperation among most countries. Until the 1990s, the two countries had a tenuous relationship, what can be due to some factors, like the geographical distance, the differences in cultural and historical background and the fact that both countries adopted inward-oriented economic development models, based on an import substitution strategy that gave little value to economic integration with other countries (Mukherji, 2013; Oliveira et al., 2019). One important instrument in this strategy is the high import tariff rates. In Brazil, the simple average of most favored nation (MFN) tariff was 42.9% in 1990 (48.3% for manufactures). In India, the average tariff was 80.9%.

This has changed since then, with both countries putting in place liberalization measures concerning trade and capital flows, aiming at taking advantage of the globalization forces to give exports a more important role in domestic production and to reap the efficiency gains that could be provided by an easier access to imported products, especially capital goods and intermediate goods, but also services.

Besides this liberalizing trend, the two countries started to notice that they had common characteristics and shared many interests, especially in face of the new opportunities and challenges brought by globalization. Both are big emerging countries, with extensive areas, big population and high levels of poverty and inequality; both are relatively young democracies, still in the process of solidifying its institutions and modernizing its political practices and policy-making; both were plagued by corruption practices and suffered with extensive, time-consuming and costly bureaucratic rules; both were laggards in terms of education levels and research and development investments; and, last but not least, both had a largely inefficient and non-competitive industrial sector constructed in the import substitution period.

The two countries faced big challenges in pursuing the economic and political changes needed to bring them to a new path that could lead to achieving higher levels of income and welfare. And this had to be addressed in a world facing a rapid changing environment, with fast technological progress, integration of production via global value chains and a raising number of bilateral and regional trade and investment agreements.

Recognizing the huge possible gains of more cooperation and integration between them, Brazil and India embarked on some joint initiatives. One of them is IBSA (India-Brazil-South Africa) Dialogue Forum,[1] established in 2003, encompassing cooperation in themes like Agriculture, Culture, Defense, Education, Energy and Environment. In spite of its clear geopolitical and economic relevance, uniting three big democratic countries from three different continents, this Forum is yet to deliver more concrete results.

Other relevant initiative is the BRICS Forum, composed by five emerging countries: Brazil, Russia, India, China and South Africa. Since 2009, these countries developed sectoral cooperation in more than thirty subject areas, such as science and technology, trade promotion, energy, health, education, innovation and fight against transnational crime.[2] Although much of the work of BRICS is also at an embrionary phase and there's no intention to negotiate trade and investment agreements, it´s potentially important to go ahead with some common initiatives that are of the best interest of Brazil and India.

The two countries signed a trade preferential agreement in 2004[3] – actually, an agreement between Mercosur and India, since Mercosur is a customs union and any trade agreement must be signed by the bloc. The agreement was enforced only in 2009 and has a very limited scope. Mercosur gives tariff reductions between 10% and 100% for only 452 items of the Mercosur Common Nomenclature (NCM) – mostly related to chemicals, pharmaceuticals, machinery and equipment products –, whereas the NCM has approximately 10 thousand items. India also offers 10% to 100% reduction of tariffs to only 450 items, mainly related to chemicals, leather products, textiles, iron and steel and machinery and equipment.

For many years, the possibility of enlarging this agreement has been discussed by the countries, with no advances. In fact, both countries have been very shy in negotiating and signing free trade agreements, especially comparing to what was done by many other emerging and advanced economies in the last 30 years.[4]

1. More information on IBSA available at: <http://www.ibsa-trilateral.org/>.

2. More information on BRICS available at: <http://brics2019.itamaraty.gov.br/en/about-brics/what-is-brics>.

3. More information on the agreement available at: <http://siscomex.gov.br/acordos-comerciais/mercosul-india/>.

4. According to Mario Larch's RTA-Data (available at: <https://bit.ly/3ziLmIF>) and WTO's regional trade agreements gateway (available at: <https://bit.ly/3CihLkv>).

The political forces behind protectionism continue to have a great say on policy making in these countries. That explains why both countries apply import tariffs that are higher than the world average or even the average of emerging economies. In 2019 the simple average tariff imposed by Brazil was 13.4%, a bit higher than India's 10.2%.

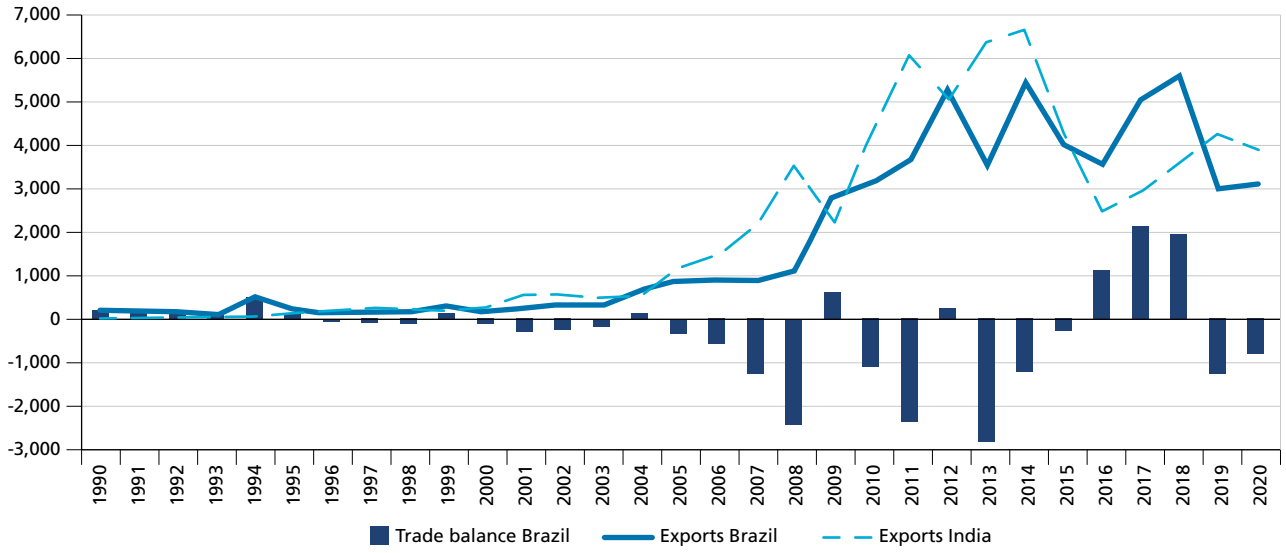
It is possible to claim, therefore, that Brazil and India have space to strengthen their ties in many different areas, especially trade flows. The aim of this article is to assess the possible economic impacts of a free trade agreement between India and Brazil (and also its Mercosur partners), using a computable general equilibrium model based on GTAP database, version 10. After a brief analysis of the bilateral trade in goods and services, in section 2, the features of the simulation are presented in section 3 and the results are discussed in section 4. Finally, section 5 presents the main conclusions.

2 BILATERAL TRADE

Trade flows between Brazil and India had their best moment in the years from 2004 onwards – by coincidence or not, right after they signed the partial trade agreement. Chart 1 shows that, during the 1990s, bilateral trade flows remained at relatively low levels, although Indian exports to Brazil had a significant growth during this period. But between 2004 and 2014 Brazilian exports to India grew at 23.5% annually, reaching US$ 5.4 billion, while Indian exports to Brazil grew 28.2% per year, to US$ 6.6 billion. The chart also shows that trade balance shifted from side to side, but most of the time it was favorable to India, reaching its peak in 2013 (US$ 2.8 billion).

From 2015 to 2020 bilateral trade performance stalled, with a sharp decrease of Indian exports in 2015 and 2016 – probably due to economic recession in Brazil, that led to decreasing total imports – and Brazilian exports to India varied, falling significantly in 2019 and 2020 – when total Indian imports were also reduced.

CHART 1
Brazil-India bilateral trade (1990-2020)
(In US$ 1 million)



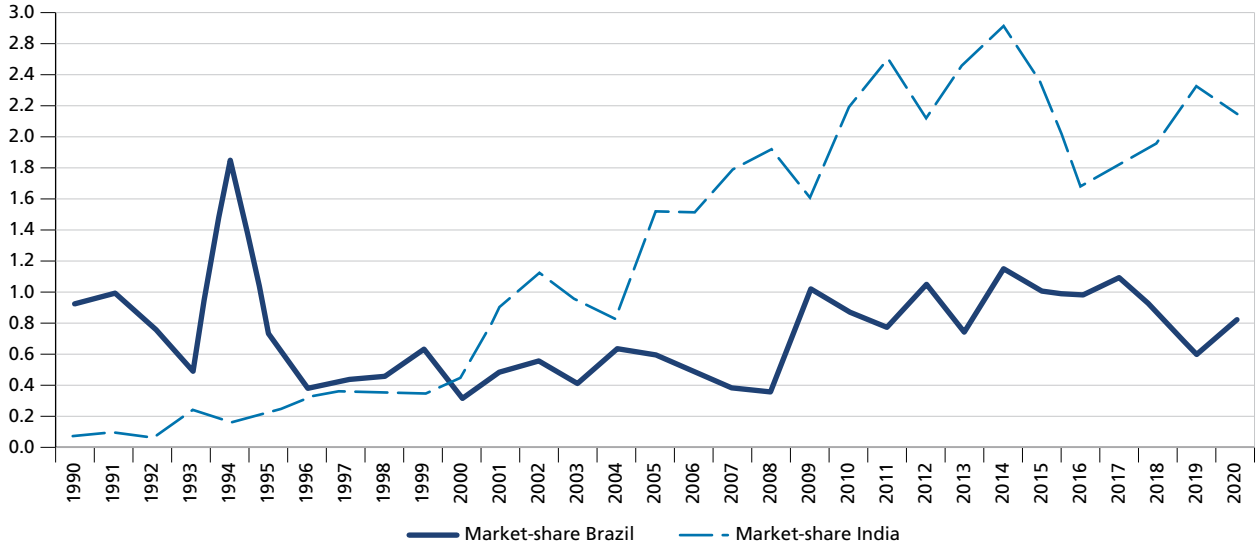
Source: Comtrade/UNCTAD.

Chart 2 shows that India was more successful in terms of raising its market-share in Brazilian imports. It grew from less than 0.5% in the 1990s to almost 3% in 2014. In recent years it went down to 2.4%, but the country was able to consolidate a higher market-share even in a period of economic turmoil in Brazilian economy. Brazil was able to raise its market-share in India´s imports to something near 1.2% in 2014, but this went back to 0.8% in the last three years. This percentage is not so different to the one that prevailed in the 1990s and, in fact, is lesser than the market-share enjoyed between 1990 and 1994. In short, Brazil was not able to take advantage of the accelerated Indian trade growth since the 1990s.

This is probably related to the difficulties faced by Brazilian industrial sector to compete in international trade, especially with Asian countries, natural partners of India due to geographical proximity. In fact, more than half of the growth of Brazilian exports to India between 2004 and 2014 was due only to oil exports. And most of the remaining exports are sugar, soybean oil, iron ore and copper.[5]

India's exports to Brazil are also very concentrated. More than half of the export growth between 2004 and 2014 was related to oil refinery products, and they also explain almost all of the reduction registered in the following years. The remaining exports are mainly of chemical products, but also with a significant contribution of motor vehicles, machinery and equipment, textiles and wearing apparel. In short, bilateral trade is highly concentrated and has a clear sectoral pattern: Brazil exports some mineral and food commodities and India exports industrial products.

CHART 2
Market-share of Brazil´s and India´s exports on the partner imports (1990-2020)
(In %)



Source: Comtrade/UNCTAD.

Additionally, India has benefited much from the partial trade agreement with Mercosur, as 40% to 50% of its exports to Brazil since 2004 were related to products covered by the agreement. It´s no true for Brazil, since less than 10% of the Brazilian exports in recent years were related to products in the agreement.

These features reinforce the potential relevance of an extensive free trade agreement as a way to promote greater trade flows and also to diversify these flows. Table 1 shows the sectoral profile of applied tariffs. Brazilian tariffs are higher than 10% in almost all sectors, except agriculture, forestry, fishing, mining, oil and oil refining and chemicals. The tariffs are especially high in textiles, wearing apparel and leather and shoes. It´s also high for automobiles (35%), but not for all types of motor vehicles. India has higher tariffs on agriculture, forestry and food and beverages, sectors that are of big interest to Brazilian exporters. They are also relatively high for non-metallic mineral products, textiles, wearing apparel, leather and shoes and motor vehicles.

Both countries also apply a great number of non-tariff barriers, in such a way that they can be more restrictive than tariffs. According to estimates made by Niu et al. (2018), the ad valorem equivalent of non-tariff barriers was 76% for Brazil and 74% por India, based on data for 2015. The authors also estimate that the ad valorem equivalents for these countries rose significantly since 1997 (as it also did for most countries), when they were 39% for Brazil and 6% for India.

Finally, trade in services has also to be taken in account. Numbers from Brazilian registers[6] show that Brazilian services exports to India amounted to only US$ 158.3 million, just 0.5% of Brazilian total, and imports from India were US$ 133.3 million, only 0.3% of total imports. Although they represent a substantial growth compared to some years ago, they´re clearly below potential, considering both countries size.

5. According to data available at Comtrade/UNCTAD's website.

6. Data from Siscoserv (Sistema Integrado de Comércio Exterior de Serviços e Intangíveis, in it´s Brazilian initials). Available at: <https://bit.ly/3hAD5Kc>.

TABLE 1
MFN average import tariffs in Brazil and India, by sectors
(In %)

Product	Brazil	India
Total	**13.4**	**10.2**
Agriculture	7.7	42.5
Fishing	8.0	0.0
Forestry	7.6	19.8
Metal ores	2.0	2.5
Mining	4.0	13.0
Basic metals	11.1	7.9
Food and beverages	12.6	41.3
Chemicals	7.9	9.5
Oil refinery	3.0	10.0
Rubber and plastics	14.9	10.9
Paper	14.2	9.6
Publishing and printing	10.7	9.3
Metal products	16.3	10.5
Non-metallic mineral products	12.0	13.6
Textiles	25.9	13.4
Wearing apparel	34.4	18.6
Leather and shoes	27.1	15.2
Wood products	11.1	10.0
Machinery and equipment	12.7	8.0
Eletrical machinery and apparatus	14.9	9.7
Medical, optical and precision equipment	12.7	7.1
Motor vehicles	15.4	25.2
Office and computing machinery	10.3	2.3
Other transport equipment	15.7	12.1
Communication equipment	10.0	4.8
Furniture and other manufacturing	16.8	16.0

Source: GTAP and Niu et al. (2018).

3 FEATURES OF THE SIMULATIONS

The simulations of the effects of a trade agreement between Brazil and India are made with the computable general equilibrium model GTAP (Global Trade Analysis Project), in its 10th version, calibrated with data for 2014, encompassing 141 countries/regions and 65 sectors. The complete documentation of this model is presented in Hertel (1997) and all the information about databases and the characteristics of GTAP version 10 can be found in Aguiar et al. (2019). The theoretical structure of the dynamic GTAP model is described in detail in Ianchovichina and McDougall (2000) and Ianchovichina and Walmsley (2012).

For the present purposes, the regions are aggregated in just four – Brazil, India, Other Mercosur countries (Argentina, Paraguay and Uruguay) and Rest of the World – and the sectors are aggregated in 25, as shown in table 2.

The simulation considers two different scenarios:

- scenario 1: 100% reduction in tari,ffs for all sectors, uniformly distributed in a 10-year timeframe (2021 to 2030); and
- scenario 2: 100% reduction in tariffs for all sectors and also a non-tariff barrier reduction of 25% for all sectors, uniformly distributed in the same timeframe.

In fact, many recent studies show that non-tariff barriers are becoming a more important restriction to trade flows than tariffs (Marks and Rahardja, 2012; Kee, Nicita and Olarreaga, 2009; Niu et al., 2018). Almost all free trade agreements have clauses aimed at reducing non-tariff barriers between the parties, especially related to reduction or elimination of quantitative restrictions, simplification of customs procedures, harmonization of rules and technical requirements etc. Assessing non-tariff barriers in trade agreements is a very important matter, especially when one takes in account that non-tariff barriers are rising in almost all countries, mostly after the 2008 financial crises, as shown by some estimates of ad valorem equivalent (Kee, Nicita and Olarreaga, 2009; Niu et al., 2018).

In the GTAP model, tariff reductions are modelled directly, by applying reduction shocks in the variable *tms,* the power of tariff in sector i, calculated as $[1 + t_i/100]$, where i is the sector and t is the initial level of AVE in percentage points. The initial tariff levels used in the simulations are not the MFN tariffs, but the effectively applied tariffs by country A on imports from country B in the base year of GTAP version 10 (2014). These are calculated from the input-output tables available in GTAP database, and are calculated by dividing the amount of import tariffs effectively charged by country A on imports products of sector *i* came from country B by the total amount of imports by country A of products of sector *i* came from country B. Table 2 shows the initial tariffs applied by Brazil and India on each sectors' products.

In order to simulate the effects of changes in other factors that affect imports, like non-tariff barriers or trade costs in general, it can be used the variable *ams*, that is defined as "Iceberg Trade Costs import-augmenting 'tech change' variable" that can be used to consider "efficiency-enhancing measures that serve to reduce the effective price of goods and services imports".[7] In the simulations made in this article, the shocks on *ams* were calculated by taking the ad valorem equivalent (AVE) of non-tariff barriers for each of the sectors considered and applying a moderate (albeit arbitrary) reduction of them, in an uniform manner throughout ten years (as well as tariffs).

Once the reduction of non-tariffs barriers brings an increase in the efficiency of imports (and/or a reduction in prices of goods and services), the percentage change of *ams* for each sector in each year has the opposite sign of the corresponding AVE reduction.

The initial AVEs for the sectors are obtained from the estimations made by Niu et al. (2018), that uses the methodology first developed by Kee, Nicita and Olarreaga (2009). The authors calculate AVEs for a large sample of countries, for products at 6-digit level of the Harmonized system (HS) international classification, and for some years between 1997 and 2015. For this article, the most recent estimations were used, referred to Brazil, India and Argentina (as a proxy for AVEs for the other Mercosur countries). Departing form HS data, the average AVE for each of the 25 GTAP sectors considered in the simulations is obtained by using a table of concordance that links each HS-6 item to one of the GTAP sectors, provided in GTAP website.[8] The initial average AVEs for the sectors considered in the simulations in Brazil and India are shown in table 2.

Choosing the magnitude of the reduction on AVEs is quite an arbitrary decision, depending on the degree of ambition of the agreement and on the timeliness and effectiveness of implementation. It's cautious to consider just a moderate reduction, in order to not overestimate the effects. In this article, it has been applied a 25% reduction on AVEs over ten years. It's important to keep in mind that a larger (smaller) reduction would imply a greater (smaller) impact on growth of bilateral trade.

The reductions in AVEs are calculated by the same way as tariffs, by first obtaining the initial power of tariffs (defined as $1 + t_i/100$, where *i* is the sector and *t* is the initial level of AVE in percentage points) and the final power of tariffs (that is $1 + (t_i \times 0{,}75)/100$ in the case of AVEs). Then the percentage change between final and initial power of tariffs are obtained and this change is uniformly distributed through ten years.

7. Available at: <https://bit.ly/3luF7g6>.

8. Available at: <https://bit.ly/3CcOckw>.

The simulations are made for the period 2021 to 2035, so as to consider the ten years on which the policy shocks are applied (2021 to 2030) and some years ahead, to capture some important lagged effects of the shocks. The simulations were made using the software RunDynam and all the results are presented as deviations from the baseline simulation, say, the evolution for all the variables that would prevail if there were no policy shocks.

TABLE 2
Initial tariffs and ad valorem equivalent of non-tariff barriers in Brazil and India, by GTAP sectors
(In %)

Sector	India		Brazil	
	Average tariff	Tariff equivalent to NTBs	Average tariff	Tariff equivalent to NTBs
Cereals	0.00	0.71	0.03	7.26
Other agropecuary	7.38	41.30	26.92	58.64
Oil seeds	4.00	17.76	0.00	28.34
Oil and gas	0.00	30.90	0.00	37.72
Minerals	3.57	58.44	3.29	83.42
Meat	0.00	39.80	0.00	43.84
Sugar	16.00	38.49	60.00	45.57
Food and beverages	11.20	54.02	2.31	73.47
Textiles and apparel	l24.39	54.67	11.24	68.48
Leather and shoes	25.04	55.41	7.37	57.69
Wood products	12.67	42.39	10.00	45.45
Paper	6.50	74.20	7.18	97.88
Oil products	0.82	72.63	5.67	69.95
Chemicals	8.31	46.94	7.90	59.08
Pharmaceuticals	7.53	26.50	9.83	35.35
Rubber and plastics	13.69	87.64	9.97	112.23
Mineral and metals products	13.81	66.90	7.96	68.61
Electronic equipment	11.92	108.38	3.13	120.94
Electric equipament	13.75	73.52	7.75	82.03
Machinery and equipment	12.97	95.86	7.47	101.12
Vehicles and parts	13.22	55.54	9.83	72.29
Other transport equipment	11.55	57.09	5.04	67.32
Other manufactures	13.29	77.80	8.41	79.92
General services	0.00	n.d.	0.00	n.d.
Business services	0.00	n.d.	0.00	n.d.

Source: GTAP and Niu et al. (2018).

4 RESULTS

4.1 Macroeconomic variables

The effects of a trade agreement between Mercosur and India on selected macroeconomic variables for Brazil and India are shown in table 3, for the two scenarios described in the previous section. The results are presented as deviations from the baseline scenario, showing the cumulative change until 2035. In general, the numbers are positive por GDP, investment, real wages, exports, imports and terms of trade for both countries. The two main exceptions are Brazil´s GDP growth in scenario 1 and Brazilian negative trade balance in both scenarios. In fact, import growth is significantly higher than export growth (in US$ values or quantities) in Brazil in both scenarios.

In India, import and export growth rates would be very similar in both scenarios, what means a modest increase in overall trade balance. It must be said that import growth rates would be much higher in Brazil than in India, a feature that will be best understood when sectoral trade numbers are considered. Anyway, the free trade agreement would have a positive effect on total trade flows in both countries.

The effects on GDP growth would be modest, an expected result once bilateral trade is very low as compared to both economies size, but not negligible, especially in scenario 2. The negative effect on Brazilian GDP in scenario 1 is not a common result in general equilibrium simulations of tariff reductions. Probably, the efficiency gains and the cost reducing effects of the agreement would not be enough to counteract the production reducing effects due to the substitution of imported products for domestic ones. Anyway, the GDP effect turns positive in scenario 2, what highlights the importance of including measures to reduce non-tariff barriers and other bilateral trade costs in Mercosur-India FTA.

In terms of investment, the trade agreement would be more helpful to Brazil than to India, so that investment gains in this country would be very low. It probably reflects the fact that Brazil, and Mercosur in general, is not a competitive supplier of capital goods, so India would not retain significant gains from improving imports of this kind of goods under the FTA.

Finally, both countries would obtain modest but significant gains of real wages and terms of trade. In these variables, like all the others, the gains are higher in scenario 2 than in scenario 1. This is a clearly expected result, once the non-tariff barriers reduction is equivalent to a productivity shock, and this kind of shock typically has positive effects on macroeconomic variables.

TABLE 3
Macroeconomic effects on Brazil and India of a Mercosur-India FTA

Variable	Brazil		India	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2
GDP (%)	-0.02	0.07	0.03	0.10
GP deflator (%)	0.11	0.46	0.06	0.22
Investiment (%)	0.56	1.68	0.03	0.10
Real wages (%)	0.06	0.21	0.08	0.23
Export quantitiy (%)	0.49	1.24	0.40	0.89
Export value (%)	0.59	1.68	0.48	1.14
Import quantitiy (%)	1.39	3.85	0.47	1.08
Import value (%)	1.25	3.51	0.47	1.09
Trade balance (US$ 1 million)	-1,139.8	-2,965.8	46.4	418.1
Terms of trade	0.23	0.77	0.08	0.24

Author's elaboration.
Obs.: Percentage deviation from the baseline, cumulative until 2035.

4.2 Welfare analysis

Traditional trade theory, based on partial equilibrium analysis, highlights the welfare gains brought by international, with the reduction in import tariffs raising consumer surplus in such an amount that compensates for the reduction of producer surplus and of the government revenue. On general equilibrium analysis, the welfare effects are much more complex, being derived from the allocation of national income between private consumption, government consumption and savings. Hanslow (2000) argues that welfare effects of a trade policy change depend on what the change does to its national income and on the effect of the policy change on prices, and hence the purchasing power of that income.

In general, welfare changes depend mainly on four factors (Hanslow, 2000): i) endowment contributions from changes in the availability of primary factors, such as the stock of machinery, buildings and agricultural land; ii) technical efficiency contributions from changes in the use of available inputs in production, such as improvements in labor productivity; iii) allocative efficiency contributions relative to pre-existing distortions; and iv) terms of trade effects, once an increase in these means an increase in purchasing power.

Table 4 shows that the Mercosur-India FTA would bring significant welfare gains for both Brazil and India, though they would be greater for the second one. The gains would also be more significant in scenario 2 than in scenario 1. In Brazil, the welfare gains would amount to US$ 872.3 million in scenario 1 and to US$ 6.65 billion in scenario 2, in both cases due to technical change and to terms of trade gains. The endowment and allocative effects are negative on welfare, meaning that the trade agreement would not eliminate distortions on resource allocation and also would not bring relevant changes on capital accumulation.

In India, the welfare gains would amount to US$ 3.2 billion in scenario 1 and to US$ 12.0 billion in scenario 2. The bulk of the gains are related to technical change, meaning that the country would experience significant improvements in productivity. Allocative and terms of trade effects are also positive, and only endowment effects are negative, meaning that the trade agreement would not have positive effects on capital accumulation.

TABLE 4
Welfare changes and decomposition for Brazil and India, resulting from a Mercosur-India FTA
(In US$ 1 million deviation from the baseline, cumulative until 2035)

Variable	Brazil		India	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Total	**872.3**	**6,652.8**	**3,210.8**	**12,005.9**
Endowment effects	-275.8	-995.9	-372.8	-1,255.1
Allocative effects	-498.5	-319.2	694.3	896.5
Technical change	660.2	4,316.3	2,519.3	10,708.2
Terms of change	842.8	3,019.6	30.8	367.3
Other effects	143.5	632.0	339.3	1,289.1

Author's elaboration.

4.3 Main sectoral variables

The FTA would have a negative effect on production levels of a majority of sectors in Brazil, as can be seen on table 5. In scenario 1, just eight sectors would experiment production gains, highly concentrated on sugar (5.0%), Other agricultural and forestry products (0.4%) and Minerals and metals products (0.5%). The most negatively affected sectors would be Textiles and apparel, with a 2.9% reduction on production, and Leather and shoes (-0.5%). These two are the sectors with the highest current tariff levels, and are typically labor-intensive, making Brazilian production sensible to competition from low wage countries, like India. In fact, India is a relevant exporter of textiles and apparel, and these are still among the most important in Indian exports to Brazil in recent years.

TABLE 5
Impacts on sectoral production of Brazil and India of a Mercosur-India FTA
(In % deviation from the *baseline*, cumulative until 2035)

Sector	Brazil		India	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Cereals	-0.1	-0.5	0.1	-0.2
Other agricultural and forestry	0.4	0.2	-0.2	-0.4
Oil seeds	-0.4	-0.9	-0.0	-0.2
Oil and gas	-0.1	0.5	-0.3	-1.4
Minerals	-0.0	-0.1	-0.1	-0.2
Meat	-0.4	-1.1	-0.4	-1.2
Sugar	5.0	5.3	-6.5	-8.1
Food and beverages	-0.1	-0.1	0.1	-0.1
Textiles and apparel	-2.9	-5.4	1.1	1.5
Leather and shoes	-0.5	-1.4	0.2	-0.1
Wood products	-0.1	-0.4	0.0	-0.0
Paper	-0.1	-0.5	-0.0	-0.1
Oil products	0.1	-0.9	0.0	0.3
Chemicals	-0.1	-0.3	0.5	0.9
Pharmaceuticals	-0.1	-0.5	0.1	-0.1
Rubber and plastics	-0.2	-0.5	0.3	0.6
Minerals and metals products	0.5	1.4	0.0	-0.0
Electronic equipment	0.1	0.4	0.0	0.2
Electric equipment	-0.3	-1.2	0.3	0.8
Machinery and equipment	0.0	-0.0	0.1	0.3
Vehicles and parts	-0.1	-0.2	0.3	0.5
Other transport equipment	0.2	1.0	0.2	0.3
Other manufactures	-0.1	-0.1	-0.1	-0.3
General services	0.0	0.1	0.0	0.1
Business services	-0.1	-0.8	-0.2	-0.2

Author's elaboration.

In scenario 2, the picture is similar, but with bigger positive and negative changes. Sugar and Minerals and metals products remain having the biggest production increases, but now there would be significant gains in Other transport equipment and Oil and Gas. In fact, with the reduction on non-tariff barriers, there would be an increase in Brazilian exports of Oil and gas (0.5%), but a decrease of Oil products (-0.9%), showing a kind of substitution.

In India, the highest production gains in scenario 1 would be in Textiles and apparel (1.1%), while the biggest decrease would be in Sugar (-6.5%) – a mirror image of what happens in Brazil. Sixteen of the 25 sectors would register production gains, especially Chemicals, Rubber and plastics, Electric equipment and Vehicles and parts. Considering scenario 2, the differences from scenario 1 are not so significant as they are in Brazilian case. The main differences relate to Oil and gas, Meat and Sugar, in which the production would decrease at higher taxes than in the first scenario, and in Textiles and apparel, Oil products, Chemicals, Rubber and plastics and Electric equipment.

Table 6 shows the results of the trade agreement on Brazilian total exports, imports and trade balance by sector. In scenario 1, exports would increase in 12 of the 25 sectors, but at low rates for most of them. The best performances relate to Sugar (11.7%), Mineral and metals products (2.4%) and Chemicals (1.0%). Only one sector would suffer a significant export loss: Textiles and apparel (-2.7%). Otherwise, imports would grow in all sectors, especially Textiles and Apparel (21.9%), Leather and shoes (7.6%), Wood Products (3.8%), Other Manufactures (2.4%), Rubber and plastics (2.3%) and Mineral and metals products (2.0%).

Trade balance would deteriorate in almost all sectors, with two major exceptions: Sugar, that accumulates a gain of US$ 2.3 billion through 2035, and Minerals and metals products, with an increase of US$ 1.06 billion. In the remaining sectors, the biggest reduction of trade balance would be recorded in Textiles and apparel, of US$ 2.08 billion. Various sectors would register a trade balance decrease of US$ 100 million or more, including General services and Business services. It´s important to remember that services are not subject to import tariffs, so it´s natural that they suffer little or no impact in scenario 1.

In scenario 2 the sectoral pattern of change in exports and imports in Brazil is similar to scenario 1, although the absolute magnitude of the rates of change are higher in almost all cases. At the export side, the only sectors that would have a different performance are Oil and gas, that grows 10.2%, in contrast to a decrease of 0.3% in the first scenario, and Oil products, that goes from an increase of 0.4% to a decrease of 0.8%. Chemicals, Minerals and metals products, Electronic equipment and Other Transport Equipment reveal the most significant differences in rates of growth of exports between scenarios 1 and 2. At the imports side, all sectors would see a larger increase in scenario 2, highlighting the high rates registered by Textiles and apparel, Leather and shoes and Wood Products. It´s an expected result, considering that the non-tariff barriers reduction is equal to a productivity shock that directly implies an increase in imports.

TABLE 6

Impacts on sectoral trade in Brazil of a Mercosur-India FTA

Sector	Exports (%)		Imports (%)		Trade balance (US$ 1 million)	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Cereals	-0.7	-1.8	0.4	1.0	-30.7	-77.5
Other agricultural and forestry	0.2	-0.2	1.3	2.1	-28.2	-98.3
Oil seeds	-0.5	-1.2	1.3	2.3	-79.3	-210.3
Oil and gas	-0.3	10.2	0.2	5.2	-131.0	2,116.6
Minerals	0.0	0.0	0.2	0.5	17.3	19.1
Meat	-1.0	-3.0	0.6	1.5	-302.1	-892.2
Sugar	11.7	12.8	1.3	2.6	2,344.5	2,555.3
Food and beverages	-0.3	-0.3	0.6	1.5	-147.8	-251.3
Textiles and apparel	-2.7	-5.5	21.9	36.5	-2,080.4	-3,503.9
Leather and shoes	-0,3	-1.2	7.6	15.6	-173.4	-430.3
Wood products	-0.1	-1.2	3.8	7.7	-15.3	-68.9
Paper	-0.4	-1.5	0.4	1.2	-75.6	-294.6
Oil products	0.4	-0.8	0.3	2.0	-4.5	-748.6
Chemicals	1.0	2.7	0.9	2.1	-72.9	-32.3
Pharmaceuticals	0.4	-0.3	0.9	2.1	-48.8	-213.3
Rubber and plastics	0.3	1.1	2.3	5.9	-162.4	-404.1
Minerals and metals products	2.4	7.2	2.0	5.2	1,057.8	3,283.8
Electronic equipment	0.3	5.7	0.5	1.8	-87.2	-125.2
Electric equipment	-0.2	-0.8	1.4	4.2	-136.0	-429.1
Machinery and equipment	0.2	1.1	1.2	3.9	-163.6	-489.1
Vehicles and parts	-0.3	-0.9	0.8	1.8	-264.3	-626.3
Other transport equipment	0.6	3.0	0.7	2.4	11.3	125.8
Other manufactures	0.0	-0.2	2.4	6.8	-75.4	-227.7
General services	-0.3	-0.7	0.2	1.4	-325.2	-1,328.2
Business services	-0.3	0.0	0.2	1.8	-166.6	-615.2

Author's elaboration.
Obs.: Percentage deviation from the baseline, cumulative until 2035.

Trade balance also shows a similar sectoral pattern in comparison to scenario 1, with deficit sectors registering a higher deficit and surplus sectors having higher surpluses. The only exception is Oil and gas, that would go from a little deficit to a surplus of US$ 2.1 billion. Sugar and Minerals and metals products would continue to have the biggest surpluses, while the higher deficit comes from Textiles and apparel and General services.

Table 7 shows what would happen to sectoral trade in India. In the first scenario, exports would grow significantly in some manufacturing sectors, especially Textiles and apparel, Rubber and plastics, Electric equipment, Vehicles and parts and Machinery and Equipment. Negative rates of growth would be concentrated on commodities like Cereals, Meat and Oil and gas, but also in Other manufactures and General and Business services. On imports, Sugar would register the highest increase (185.5%), while almost all the remaining sectors would have a small increase – with the exception of Leather and shoes (2.8%), Oil seeds (1.7%) and Wood products (1.4%).

Most of the sectors would suffer a decrease on trade balance, especially Sugar, Oil and gas, Minerals and metals products and, kind of a surprise, General Services and Business Services – considering that India has some competitive advantages on services. Among the sectors that would register an increase on trade balance, the most important is Textiles and apparel.

TABLE 7
Impacts on sectoral trade in India of a Mercosur-India FTA

Sector	Exports (%)		Imports (%)		Trade balance (US$ 1 million)	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Cereals	-0.3	-0.9	0.3	0.7	-23.0	-65.5
Other agricultural and forestry	-0.1	-0.5	0.6	1.3	-133.7	-362.4
Oil seeds	-0.1	-0.3	1.7	2.2	-7.2	-19.6
Oil and gas	-1.1	-3.0	0.2	0.8	-895.4	-3,669.3
Minerals	-0.0	-0.0	0.0	-0.2	-15.0	178.6
Meat	-0.5	-1.5	0.4	1.7	-133.4	-393.1
Sugar	0.1	-0.2	185.5	215.7	-2,487.4	-2,915.7
Food and beverages	0.4	0.2	0.4	4.6	255.6	-774.0
Textiles and apparel	2.6	3.7	0.7	1.6	3,877.9	5,494.4
Leather and shoes	0.5	0.4	2.8	7.0	178.9	8.3
Wood products	0.4	0.3	1.4	3.1	-6.7	-29.7
Paper	-0.1	-0.4	0.2	0.7	-35.2	-98.9
Oil products	0.1	2.1	0.2	0.4	-53.4	1,424.1
Chemicals	1.8	4.3	0.6	1.1	369.3	1,283.3
Pharmaceuticals	0.4	0.3	0.4	0.9	49.2	-40.1
Rubber and plastics	2.3	5.9	0.5	1.4	317.8	800.7
Minerals and metals products	0.7	1.8	0.5	1.3	-430.5	-1,186.1
Electronic equipment	0.7	3.5	0.1	0.5	-48.2	-17.7
Electric equipment	1.6	5.3	0.3	0.9	250.8	847.0
Machinery and equipment	1.1	4.0	0.3	1.0	144.4	618.4
Vehicles and parts	1.4	2.6	0.5	1.2	469.9	853.1
Other transport equipment	0.8	1.5	0.4	1.4	132.1	168.1
Other manufactures	-0.2	-0.4	0.3	0.8	-201.9	-545.4
General services	-0.2	-0.1	0.2	0.8	-644.4	-889.5
Business services	-0.3	0.0	0.2	0.7	-884.3	-250.8

Author's elaboration.
Obs.: Percentage deviation from the baseline, cumulative until 2035.

Scenario 2 brings little change concerning export growth for the bulk of sectors, except for a largest decrease in Meat and Oil and Gas exports, and somewhat larger increases in Textiles and apparel, Chemicals, Rubber and plastics, Electronic equipment, Electric equipment and Machinery and Equipment. At the import side, all sectors would have a greater increase than in scenario 1, highlighting the differences in Sugar, Meat, Food and beverages, Leather and shoes and Wood products. Concerning trade balance, some sectors would change the signal between scenarios 1 and 2, like Minerals, Food and beverages, Oil products and Pharmaceuticals. The highest surplus would continue to be come from Textiles and apparel, while the greatest deficits would be on Oil and gas, Sugar and Minerals and metals products. General services and Business services would also register a decrease in trade balance, while this would be smaller in Business services.

4.4 Bilateral trade

Brazilian exports to India would grow at a strong pace in almost all sectors in scenario 1, highlighting Sugar, Other agriculture and forestry products and Textiles and apparel, all of them with rates of growth of more than 100% in comparison to the baseline (table 8). The growth rates are also high for all manufacturing sectors, including Electric equipment, Machinery and Equipment, Vehicles, Chemicals, Pharmaceuticals, Wood products and Leather and shoes. The reduction of import costs would be enough to induce India to increase its imports from Brazil even of products where this country is not so competitive in the international market, probably substituting for imports from third countries.

The few sectors that would not have any significant growth, or even a small decrease (like Cereals, Oil seeds, Meat, Business services and General Services) are the ones in which the import tariffs applied by India area also null today. In fact, there´s a high correlation between the initial level of import tariff and the rate of change of exports among sectors (table 2).

In scenario 2, all sectors would show export growth, since the reduction of non-tariff barriers have a positive impact independent of the initial tariffs. Typically, the rates in scenario 2 are two to four times higher than in scenario 1, and some manufacturing sectors would show very strong rates (higher than 300%), like Textiles and apparel, Rubber and plastics, Electric equipment and Machinery and Equipment. Needless to say, that these numbers are highly dependent on the initial levels of ad valorem equivalent of non-tariff barriers (table 2) and of the magnitude of reduction of non-tariff levels arbitrated to the simulations.

TABLE 8
Impacts on exports from Brazil to India of a Mercosur-India FTA

Sector	Change (%)		Absolute change (US$ 1 million)	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Cereals	0.0	6.6	0.0	0.0
Other agricultural and forestry	190.0	299.8	73.8	117.1
Oil seeds	0.0	20.7	0.0	0.0
Oil and gas	-0.1	126.2	-5.5	7,616.0
Minerals	5.8	15.4	73.0	197.8
Meat	0.0	72.3	0.0	0.2
Sugar	211.3	243.6	2,436.9	2,827.5
Food and beverages	9.5	51.0	69.6	377.1
Textiles and apparel	127.5	357.9	8.22	2.7
Leather and shoes	74.3	222.5	57.3	172.2
Wood products	88.6	192.2	21.5	46.9
Paper	50.2	180.5	5.6	20.1
Oil products	26.0	72.6	87.3	247.7
Chemicals	65.0	180.4	471.4	1,311.1

(Continues)

(Continued)

Sector	Change (%)		Absolute change (US$ 1 million)	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Pharmaceuticals	84.1	162.1	76.8	148.9
Rubber and plastics	86.9	302.2	58.8	204.9
Minerals and metals products	72.4	224.1	1,718.8	5,345.2
Electronic equipment	30.6	297.4	37.7	367.1
Electric equipment	92.3	374.6	51.3	208.5
Machinery and equipment	78.7	348.9	121.8	541.8
Vehicles and parts	68.8	176.9	63.51	63.6
Other transport equipment	51.9	228.4	102.1	450.9
Other manufactures	82.7	281.9	23.8	81.5
General services	-0.1	43.6	-0.9	277.4
Business services	-0.2	41.3	-1.9	438.6

Author's elaboration.
Obs.: Percentage deviation from the baseline, cumulative until 2035.

In terms of the absolute change of export value, table 8 shows that the gains would be highly concentrated in only 4 sectors: Sugar; Minerals and metals products; Chemicals; and Oil and gas (in this case, only in scenario 2). The export bill would also turn to be more concentrated after the FTA than in the baseline scenario, with the four sectors highlighted above representing 3/4 of the total exports, rather than 2/3 on the baseline.

Looking at the Indian exports to Brazil, table 9 shows that almost all sectors would have a strong growth in scenario 1, except the ones where Brazil also has zero import tariffs (Cereals, Oil and gas, Meat, Services). Many sectors would experiment an export growth higher than 100%, e.g., Textiles and apparel, Leather and shoes, Minerals and metals products, Electronic equipment, Electric equipment, Machinery and Equipment, Other Transport Equipment, Other Manufactures. Not surprisingly, these are the ones that face higher import tariffs in Brazil. In scenario 2, all sectors (except Oil and gas and Cereals) would have significant export growth, with the ones cited above registering growth rates higher than 400%.

In absolute terms, 76% of the export value change in scenario 1 would refer to only four sectors: Textiles and apparel, Chemicals, Rubber and plastics and Minerals and metals products. In scenario 2, the result is less concentrated, with six sectors (the four above plus Oil products and Machinery and equipment) having a 67% share on total export value change.

Anyway, as in Brazil, the FTA would reinforce the current sectoral pattern of Indian exports to Brazil, and the concentration would grow after the FTA, with the share of the six sectors mentioned above rising from 43% in the baseline to 57% in the FTA scenarios.

TABLE 9
Impacts on exports from India to Brazil of a Mercosur-India FTA

Sector	Change (%)		Absolute change (US$ 1 million)	
	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Cereals	0.0	1.2	0.0	0.0
Other agricultural and forestry	46.3	78.1	40.8	68.8
Oil seeds	31.4	38.1	13.1	16.0
Oil and gas	0.0	0.0	0.0	0.0
Minerals	21.8	15.5	1.4	1.0
Meat	0.0	72.2	0.0	0.3
Sugar	80.9	202.0	21.1	2.8
Food and beverages	67.8	115.5	62.8	106.9
Textiles and apparel	310.4	472.1	3,831.7	5,827.5
Leather and shoes	502.9	928.4	239.1	441.4
Wood products	157.1	228.9	19.7	28.7
Paper	63.0	148.4	10.2	24.0
Oil products	33.1	40.4	1,095.6	1,337.1
Chemicals	80.9	158.4	1,164.9	2,282.5
Pharmaceuticals	70.6	113.0	166.4	266.4
Rubber and plastics	155.4	331.8	385.7	823.4
Minerals and metals products	182.4	368.6	706.7	1,427.8
Electronic equipment	183.8	680.5	96.1	355.7
Electric equipment	226.7	596.4	269.1	708.0
Machinery and equipment	186.7	547.9	335.3	984.2
Vehicles and parts	113.9	199.0	411.0	7,719.0
Other transport equipment	115.9	419.5	42.8	155.0
Other manufactures	161.4	409.3	133.1	337.6
General services	-0.0	45.0	-0.7	816.2
Business services	-0.1	35.9	-5.8	2,129.4

Author's elaboration.
Obs.: Percentage deviation from the baseline, cumulative until 2035.

Finally, table 10 shows the absolute change of the sectoral bilateral trade balance (from the perspective of Brazil). The biggest changes would happen on three sectors: Oil and gas (a gain of US$ 7.6 billion for Brazil in scenario 2), Sugar (more than US$ 2 billion for Brazil in both scenarios), Minerals and metals products (an increase between US$ 1.1 billion to US$ 3.8 billion for Brazil) and Textiles and apparel (a gain between US$ 3.4 billion to US$ 5.8 billion for India). In scenario 1, the total trade balance would have an increase of US$ 1.4 billion in favor of India, while in scenario 2 this amount would be US$ 1.6 billion in favor of Brazil – basically explained by the growth in Oil and gas.

TABLE 10
Impacts on trade balance between Brazil and India of a Mercosur-India FTA
(In US$ 1 million)

Sector	Absolute change	
	Scenario 1	Scenario 2
Total	**-1,391.6**	**1,620.8**
Cereals	0.0	-0.0
Other agricultural and forestry	45.4	51.0
Oil seeds	-7.3	-15.7
Oil and gas	-5.5	7,616.0
Minerals	72.8	196.9
Meat	0.0	-0.1
Sugar	2,435.7	2,825.4
Food and beverages	23,027	5.2
Textiles and apparel	-3,437.4	-5,809.4
Leather and shoes	-166.6	-281.4
Wood products	5.9	14.9
Paper	-1.4	-5.8
Oil products	-11.8	-1,443.3
Chemicals	-440.5	-1,036.4
Pharmaceuticals	-54.5	-116.8
Rubber and plastics	-257.6	-683.4
Minerals and metals products	1,122.4	3,794.0
Electronic equipment	-48.8	-2.3
Electric equipment	-191.7	-533.2
Machinery and equipment	-174.1	-495.2
Vehicles and parts	-266.6	-562.9
Other transport equipment	57.3	323.1
Other manufactures	-94.0	-260.3
General services	-0.2	-538.8
Business services	3.9	-1,690.7

Author's elaboration.

5 CONCLUSIONS

The economic relationship between Brazil and India evolved favorably in the last two decades, reflecting liberalization processes put in place by both countries since the 1990s that increased their integration to the world economy. The countries also embarked on some joint initiatives, like IBSA (India-Brazil-South Africa) Dialogue Forum and the BRICS Forum, and signed a trade preferential agreement in 2004, albeit very limited in scope.

Anyway, the political forces behind protectionism continue to have a great say on policy making in these countries, and both countries apply import tariffs that are higher than the world average or even the average of emerging economies. This fact, beside some common characteristics, interest and challenges shared by them, points to a significant potential to strengthen their ties in many different areas, especially trade flows. In spite of the recent growth, the market-share of Brazil and India in the partner´s import is still low, and the bilateral trade bill is highly concentrated in a few products.

This article explored the possible economic effects of a Free Trade Agreement between Brazil and India (and also its Mercosur partners), using a computable general equilibrium approach. Two scenarios were considered, one that applies only tariff reductions (100% reduction for all sectors in both countries, uniformly distributed in a 10-year timeframe, from 2021 to 2030) and another with this same tariff reduction and also a 25% reduction on non-tariff barriers for all sectors, uniformly distributed in the same timeframe. The results were presented as deviations from the baseline scenario, showing the cumulative change until 2035.

The results of the simulations are generally positive for main macroeconomic variables. The effects on GDP growth would be modest, an expected result once bilateral trade is very low as compared to both economies size, but not negligible, especially in scenario 2. Concerning trade, import growth in Brazil is significantly higher than export growth (in US$ values or quantities) in both scenarios. In India, import and export growth rates would be very similar in both scenarios, with a modest increase in overall trade balance. It's important to note thar that import growth rates would be much higher in Brazil than in India.

The Mercosur-India FTA would bring significant welfare gains for both Brazil and India, though they would be greater for the second one. The gains would also be more significant in scenario 2 than in scenario 1, and would be due mainly to technical change effects and to terms of trade gains.

As commonly happens in any tariff reducing process, there are winners and losers in terms of sectoral production. In Brazil, there would be a loss of production in the bulk of manufacturing sectors in both scenarios, though these losses would be very small – except for some labor-intensive ones, like Textiles and apparel and Leather and shoes. The winning sectors would be basically Sugar, Other agricultural and forestry products, Oil and gas and Minerals and metals products. In India, the opposite occurs, with less production in minerals, food and agriculture commodities and gains in labor intensive, but also in capital and technology intensive manufacturing sectors – a mirror image of what happens in Brazil. There are no huge differences between scenarios 1 and 2

Total exports would increase in 12 of the 25 sectors in Brazil, but at low rates for most of them. The best performances relate to Sugar, Mineral and metals products and Chemicals. Otherwise, imports would grow in all sectors, especially Textiles and Apparel, Leather and shoes, Wood Products, Other Manufactures, Rubber and plastics and Mineral and metals products. In scenario 2 the sectoral pattern of change in exports and imports in Brazil is similar to scenario 1, although the absolute magnitude of the rates of change are higher in almost all cases.

In India, exports would grow significantly in scenario 1 in some manufacturing sectors, especially Textiles and apparel, Rubber and plastics, Electric equipment, Vehicles and parts and Machinery and Equipment, while negative rates of growth would be concentrated on commodities like Cereals, Meat and Oil and gas, but also in Other manufactures and General and Business services. On imports, Sugar would register the highest increase, while almost all the remaining sectors would have a small increase. Scenario 2 brings little change concerning export and import growth for the bulk of sectors, although the rates of change are typically higher than in scenario 1.

Looking at bilateral trade, Brazilian exports to India would grow at a strong pace in almost all sectors in scenario 1, except ones in which the import tariffs applied by India area also null today. In scenario 2, all sectors would show export growth. The most relevant feature, though, is that three sectors would respond for 83.4% of the total value change in scenario 1: Sugar, Chemicals and Minerals and metals products. In scenario 2, the Oil and gas sectors appears as having the biggest absolute change (US$ 7.6 billion), and, together with the other three cited above, they would respond for 80.7% of the total change.

Concerning Indian exports to Brazil, almost all sectors would have a strong growth in scenario 1, except the ones where Brazil also has zero import tariffs. In scenario 2, all sectors (except Oil and gas and Cereals) would have significant export growth. In absolute terms, though, 76% of the export value change in scenario 1 would refer to only four sectors: Textiles and apparel, Chemicals, Rubber and plastics and Minerals and metals products. In scenario 2, the result is a bit less concentrated, with six sectors (the four above plus Oil products and Machinery and equipment) having a 67% share on total export value change.

In summary, the FTA would have positive effects for both countries, either on welfare and macroeconomic variables, or in terms of export and import growth. In fact, both countries would experiment significant gains of exports – total and bilateral – in a great number of sectors, beyond the traditional ones. It´s true that the FTA would reinforce the current sectoral pattern of bilateral trade. But it's not a problem related to the FTA, being, in fact, a consequence of the productive specialization pattern of the countries – something that must be addressed by domestic policies.

REFERENCES

AGUIAR, A. et al. The GTAP data base: version 10. **Journal of Global Economic Analysis**, v. 4, n. 1, p. 1-27, 2019.

HANSLOW, K. **A general welfare decomposition for CGE models**. GTAP, Jan. 2000. (GTAP Technical Paper, n. 19). Retrieved from: <https://bit.ly/2XmLZUB>.

HERTEL, T. **Global trade analysis**: modeling and applications. Cambridge: Cambridge University Press, 1997.

IANCHOVICHINA, E.; McDOUGALL, R. **Theoretical structure of dynamic GTAP**. GTAP, Dec. 2000. (GTAP Technical Paper, n. 17). Retrieved from: <https://bit.ly/3kdd6ug>.

IANCHOVICHINA, E.; WALMSLEY, T. **Dynamic modeling and applications for global economic analysis**. Cambridge: Cambridge University Press, 2012.

KEE, H. L.; NICITA, A.; OLARREAGA, M. Estimating trade restrictiveness indices. **The Economic Journal**, v. 119, p. 172-199, Jan. 2009.

MARKS, S.; RAHARDJA, S. Effective rates of protection revisited for Indonesia. **Bulletin of Indonesian Economic Studies**, v. 48, n. 1, p. 57-84, 2012.

MUKHERJI, R. Ideas, interests, and the tipping point: economic change in India. **Review of International Political Economy**, v. 20, n. 2, p. 363-389, 2013.

NIU, Z. et al. Non-tariff and overall protection: evidence across countries and over time. **Review of World Economics**, v. 154, n. 4, p. 675-703, 2018.

OLIVEIRA, I. et al. **The political economy of trade policy in Brazil**. Brasilia: Ipea, 2019. Retrieved from: <https://bit.ly/3Ci3vrZ>.

COMPLEMENTARY BIBLIOGRAPHY

ANDRIAMANANJARA, S.; FERRANTINO, M. J.; TSIGAS, M. E. **Alternative approaches in estimating the economic effects of non-tariff measures**: results from newly quantified measures. Washington: USITC, 2003.

DEAN, J. M. et al. Estimating the price effects of non-tariff barriers. **The BE Journal of Economic Analysis & Policy**, v. 9, n. 1, 2009.

FUGAZZA, M.; MAUR, J.-C. **Non-tariff barriers in computable general equilibrium modelling**. New York; Geneva: UN, 2008. (Policy Issues in International Trade and Commodities Study Series, n. 38).

HUFF, K.; HERTEL, K. **Decomposing welfare changes in the GTAP model**. GTAP, Jan. 2000. (GTAP Technical Paper, n. 5). Retrieved from: <https://bit.ly/3lqYhn6>.

OECD – ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT. **Analysis of non-tariff barriers of concern to developing countries**. Paris: OECD Publishing, 2005. (OECD Trade Policy Papers, n. 16).

YI, C.-D. The computable general equilibrium analysis of the reduction in tariffs and non-tariff measures within the Korea-Japan-European Union free trade agreement. **Japan & The World Economy**, v. 56, 2020.

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The manuscripts in languages other than Portuguese published herein have not been proofread.

Livraria Ipea
SBS – Quadra 1 – Bloco J – Ed. BNDES, Térreo
70076-900 – Brasília – DF
Tel.: (61) 2026-5336
Correio eletrônico: livraria@ipea.gov.br

Composed in linux libertine 10/13 (text)
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