

THE COMPETITIVENESS OF BRAZILIAN MANUFACTURING IN BOTH DOMESTIC AND INTERNATIONAL MARKETS

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Abstract

The objective of this article is to analyze the competitiveness of Brazilian industry both in the international and in the domestic market. In fact, the performance of Brazilian manufacturing in the period 2000-2013 has been comprehensively analyzed, especially in what concerns the composition of exports and their capacity to promote job creation and income increase. But a thorough analysis of trade and production data reveals that the competitiveness of Brazilian manufacturing in the domestic market is significantly different from that in the international market. In the international arena, it is worth to mention the tendency towards primary good exports and the weak insertion of Brazilian manufacturing into global value chains. Concerning the domestic market, primary goods is of less importance in total production (mainly turned to the domestic market) and its composition is considerably different from exports. The methodology for analyzing the competitiveness in the international market included estimates of structural indicators and indicators related to the country's insertion into global value chains, based on data extracted from the World Input-Output Database (WIOD). The declining trend of manufacturing goods in global trade and the evolution of relative international prices are considered in our analysis. The methodology for analyzing the competitiveness in the domestic market includes the estimation of import penetration ratio and the share of import content in the intermediate and final production, based on data extracted from the Brazilian Input-Output Table. The study concludes that, despite the weak participation of Brazil in global value chains, the country's performance has been enhanced as a result of increasing imports of intermediate goods.

1. INTRODUCTION

The Brazilian international trade passed by important changes in the last decade. Despite of the intense trade flows growth, there was a huge change in exports composition. Manufacturing has lost share in exports to agricultural and mineral commodities, which gain were strongly

influenced by their international prices huge rise. However, Brazilian industry exports succeed to expand in higher rates than global industrial exports due mainly to the dynamism of sales for its Latin American neighbors.

Despite of the positive contribution of exports to the Brazilian performance in the 2000-2012 period, it was not the main factor for industrial production growth. The domestic demand was far responsible for it as domestic consumption grew at a rapid rhythm because of the raise of income and credit evolution. The industrial production average growth in the period was of 10% p.y.¹ This 'virtuous' process was interrupted in the 2009 by the international financial crisis. In Brazil, the immediate crisis impact was not very strong - or durable, as economy recovered already in 2010 - but from 2011 on, the slow recovery of US economy and the euro crisis not only impacted their demand for Brazilian exports (and also for other Brazilian partners exports) but also induced Asian countries – especially China – to look to Brazilian and LA markets with more interest. As a consequence, Brazilian industrial goods started to face a stronger competition from 2009 on.

One may note that there is a significant difference between that Brazilian trade and production structures. If agricultural and mineral commodities are a major part of Brazilian exports, its importance in national production are minor. Production is much more diversified than exports, even if a long-term tendency of specialization is observed. These differences deepened during the decade and both structures may be less divergent in the last three years. Nevertheless, this difference is an important element to understand the international and domestic competitiveness of Brazilian manufactured goods.

At the same time, modifications in world trade flows during the last 20 years reflect structural changes in world production. Fragmentation of production processes together with other factors such as trade costs reduction and technology evolution induced to a separation and reallocation of industrial activities (tasks, as it's called in trade literature – see Helpman, 2011) in different countries, according to their comparative advantages in each activity/task. This new configuration is marked by the formation of international trade and production networks or, in a different nomenclature and conceptual approach, the formation of global value chains (GVC). In this context, this paper aims to analyze the competitiveness of Brazilian industry both in the international and in the domestic market. First, the international competitiveness is examined considering the two aspects mentioned above – on one hand, the evolution of international prices and its consequences over the structure of Brazilian and global trade and, on the other hand, the formation of international trade and production networks. Secondly, the penetration of foreign goods and the import content of domestic demand are analyzed in order to understand the evolution of Brazilian industrial goods competitiveness in its domestic market.

¹ Industrial production except oil was multiplied almost by 3 between 2000 and 2012 in nominal terms (according to our estimations). During this period, there was a negative growth rate only in 2009.

The methodology for analyzing the competitiveness in the international market included estimates of structural indicators and indicators related to the country's insertion into global value chains, based on data extracted from the World Input-Output Database (WIOD) and from Trade In Value Added – TiVA (OCDE). The methodology for analyzing the competitiveness in the domestic market includes the estimation of import penetration ratio and the share of import content in the intermediate and final production, based on data extracted from the Brazilian Input-Output Table.

The rest of the paper is organized as follows. Section 2 presents a theoretical review about productive fragmentation and its impact on countries competitiveness. Section 3 focus on the Brazilian competitiveness in international market using indicators of domestic and foreign value added. Section 4 examines the competitiveness of Brazilian manufacturing on domestic market relying on the analysis of the imports penetration and import content of internal demand. The last section concludes.

2. FRAGMENTATION OF PRODUCTION AND GLOBAL VALUE CHAINS: IMPACTS ON THE COMPETITIVENESS OF MANUFACTURING

World trade has changed significantly since the 1990s, and so have the patterns of international flows of goods, marked by strong fluctuations in the 2000s, followed by a sharp increase that lasted until the financial crisis of 2008 and the loss of momentum that followed. Shifts in industry-related and geographic aspects of world trade profile are related to the reorganization of production at a global level due to the increased fragmentation of production processes along several stages and across multiple sites.

Technological and organizational changes in industrial production have allowed the breaking of vertically integrated production processes into fragmented production stages². A progressive decline in transportation and communication costs has followed and led to the reallocation of production stages in different regions or across countries, allowing international production networks to emerge (Jones, 2006). Fragmentation has been driven by multinational enterprises (MNEs) with high operational capacities, which started to transfer production sites or to outsource specific tasks to other countries in search of lower operational costs. That is, by means of international outsourcing or vertical foreign direct investment, MNEs outsourced parts or stages of their production processes with a view to profit from the competitive advantages of each country in performing specific tasks or production stages, and not in undertaking the whole production of final goods, as it used to be. This type of fragmentation has been progressively adopted by firms of different sizes and has affected a growing number of industries and countries.

² Kaplinski and Moris (2003) suggests that the organizational changes promoted by the Japanese auto industry in the 1950s are in the origin of the process of international fragmentation of production.

While, on the one hand, technology changes and the performance of MNEs have been crucial to the increasing reorganization of world trade and global production, on the other the decline of transaction costs among the many firms or business units involved in the production of a given good has been decisive. Coordination costs among the many units in charge of the different production stages have declined due to decreased transportation and communication costs and lower trade barriers associated with trade liberalization in many countries³. Trade barriers have been lowered at both a multilateral and a regional level, and trade agreements have become more comprehensive including issues beyond the flow of goods and services⁴.

As a consequence, production has been progressively reorganized into international – either global or regional - trading and production networks, which offer multiple possibilities for value creating and sharing among the participants and encompass different operations, from the design of a product to the production of parts and components, the assembly of its parts and marketing-related activities. Along the process of value creation, aspects concerning productive technology, patterns and regulation are relevant to determine market structures and boundaries of competition between firms⁵.

As part of this process of reorganization of production at a global level, firms now compete not only in markets of final goods, but also in business functions along the many production chain stages. As a consequence, the international flow of intermediate goods has grown significantly in the past two decades. Additionally, the role of services and its contribution to value creation in manufacturing have grown in size and relevance as well.

Globally interconnected production networks affect national economies more directly, from the point of view of both the macroeconomic framework and trade and industrial policies. As for the macroeconomic perspective, this new scenario brings into focus issues related to national economies being more susceptible to the transmission of financial shocks originated elsewhere or to the scale of results in the bilateral balance of trade. Indeed, traditional trade measures at first overestimate the importance of countries located at final stages of value chains especially because they produce more final products - thus underestimating the relevance of other stages of value chains which are as significant as the final ones (Bayoumi *et al*, 2013)). As a consequence,

³ In Jones and Kierzkowski (1990) the costs deriving from the physical separation of production stages are called service link costs and include costs of transportation, trade barriers and various types of coordination.

⁴ According to Orefice and Rocha (2011), regional and multilateral investment agreements have grown significantly since the 2000s.

⁵ That view corresponds to the “global value chains” approach proposed by Gereffi and Fernandez-Stark (2011), among others. There are conceptual differences between the terms whose analysis, however, is beyond the scope of the present paper; we have decided to employ the expression “international trading and production networks”, as employed by Milberg and Winkler (2011). The view of international trade from the perspective of production stages and activities is known in the literature as trade-in-tasks (for a comprehensive, updated literature on the subject, see Helpman, 2011).

trade estimates based on value added and the share of traded products which is actually undertaken locally might result in a significantly changed trade profile among countries⁶.

As for the trade and industrial policies, policy instruments should stimulate and support countries to participate more (and in a more beneficial manner in terms of value creation) in international trading and production networks. A number of scholars argue that a country's insertion into value chains or stages is directly related to the adoption of a more comprehensive trade liberation policy (Bayoumi *et al*, 2013). Sturgeon *et al* (2013) say that the movement of global fragmentation of production actually hinders the debate on industrial policy. The reason, they argue, is that domestic industries are no longer believed to be isolated from the competition as they used to be in the days of more protectionist policies, key-industries and "national champions" policies, or even local-content policies. According to those authors, policy instruments should aim at strengthening activities/segments that are more prepared to join high value chains and thus prioritize a type of industrialization oriented to a more comprehensive liberation, high foreign direct investments, global outsourcing and connecting industries to complex, overlapping business networks.

However, not all countries are able to join higher value-added segments, as the international fragmentation of production tends to favor the owners of intangible, knowledge-intensive assets, such as R&D, trademarks and marketing services (Medeiros, 2010). In respect to that, the idea of competitiveness now goes beyond to a country accumulating capabilities to successfully compete in specific international markets, but includes capabilities to get ahead in value chains in a scenario of interdependent and relative competitiveness. That debate is particularly relevant to developing countries, especially Brazil.

Due to the increasing fragmentation of production, international competition is now multifaceted; a given industry may include activities with different weights to value creation, while a sole segment may be connected to several families of industries. As Timmer *et al* (2013) point out, international competition now revolves more around tasks or business functions than specific industries or final products; the logic of competitiveness is now less based on "what a country sells" and more based on "what a country does". In this case, a good export performance based on the production of final goods not necessarily represents a more solid position in global context since have the knowledge about marketing activities and commercialization could generate more value. This is because those kinds of activities are themselves parts of upgrading process in the context of global value chains.

As a result, conventional measures of competitiveness may be unable to reflect the value added by the activities performed within global value chains. Additionally, due to countries' growing interdependence in the production process shown in the intermediate consumption originated in

⁶ US and China trade data presented in value-added (WTO).

imports, a competitiveness gain of a nation in a given segment may correspond to a competitive advantage of another country - the concept of competitive interdependence.

The main issue involving value-added measures used to be how to obtain them and, once they were available, how to relate them to the concept of competitiveness. At first, measures of international fragmentation of production were based on measures of vertical specialization⁷ of countries, the share of parts and components trade, or case studies of specific chains. Recently, international organizations have jointly developed world input-output matrices which have allowed a new approach to nations' competitiveness by combining national accounts and trade data.

3. THE COMPETITIVENESS OF BRAZILIAN MANUFACTURING IN INTERNATIONAL MARKET

Manufactured goods take a relevant, but decreasing part in Brazilian exports. Indeed, the composition of Brazilian exports has shifted significantly in the past 40 years. In the 1980s, manufactured goods gained relevance, but in the beginning of the 1990s that growth trend started to revert and in the 2000s, it reverted dramatically (see **Figure 1**). In 2013, basic goods accounted for 47% of total exports, which is equivalent to the share observed in 1978, according to trade data provided by SECEX. That is, manufactured goods as a share of exports increased rapidly until the 1990s, when the composition of exports stabilized; in the 2000s manufactured goods accounted for 59% of total Brazil's exports, the highest share ever registered. Since then, it decreased by 20 p.p. as a share of total exports⁸.

The "re-primarization" of exports in the 2000s is both an effect of the increased demand for primary goods and the evolution of commodity prices in the international market throughout that decade (both phenomena are, indeed, correlated). In addition to the increasing demand for primary goods, especially among Asian countries, the financialization of commodity markets and the undervalued dollar compared to other currencies also made a contribution to that evolution⁹. Serrano (2013) points out many other factors related to the supply of commodities that also influenced. Most of them are product-specific, such as the control of oil supply by OPEC, the stagnant production capacity in mining industries, or the growth of biofuel production; other factors are more generic, such as the appreciation of producers' national currencies or the so called "nationalism of natural resources".

As a consequence of increased demand and escalated prices, the value of commodities expanded not only in term of unit prices, but also in terms of the quantum of exports. That expansion took

⁷ Check Hummels et al (2001, p. 80).

⁸ The share of semi-finished goods fluctuate less, but has been decreasing in the past three years. In 2013, their share of total exports was 12.6% (based on COMTRADE data).

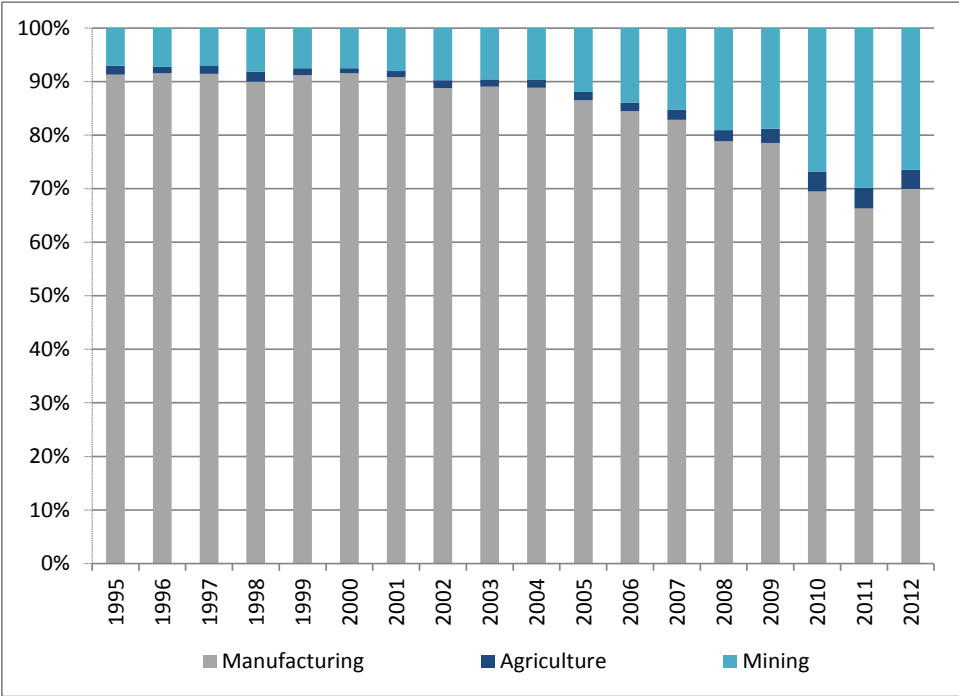
⁹ See Castilho (2011).

place in a scenario where Brazil faced currency appreciation, and, for exporters, the escalation of international prices more than compensated the potential effects of currency appreciation.

In the composition of Brazil’s exports, minerals gained more importance than agricultural commodities and they accounted together for 26% of total exports in the last observed year (2012), as shown in **Figure 1**. Prices of mineral commodities rose above the average of price of agricultural commodities. Additionally, the evolution of agricultural commodity prices as a whole was less homogeneous, with a number of products having their prices escalated differently from others¹⁰. Notwithstanding, increased agricultural commodity prices at an international level benefited the most relevant products in Brazil's exports, such as soy and coffee beans.

Depending on the type of classification, the composition of exports may show some variation, but it is undeniable that mineral commodities have gained importance. However, when processed agricultural commodities are also considered - such as ground soybeans and other food products like meats, for example - their share in the composition of exports is more significant¹¹.

Figure 1 – Evolution of the composition of Brazilian exports – 1995 to 2012 (in %)



Source: Authors’ elaboration based on data from Comtrade - UN.

¹⁰ For more details, visit UNCTAD website.

¹¹ For example, some sub-products of soybean or coffee – such as “Soya Oil-cake or solid Residues Resulting from Extraction of Soya-bean Oil” – are considered as a manufactured good in some classifications despite their low degree of processing.

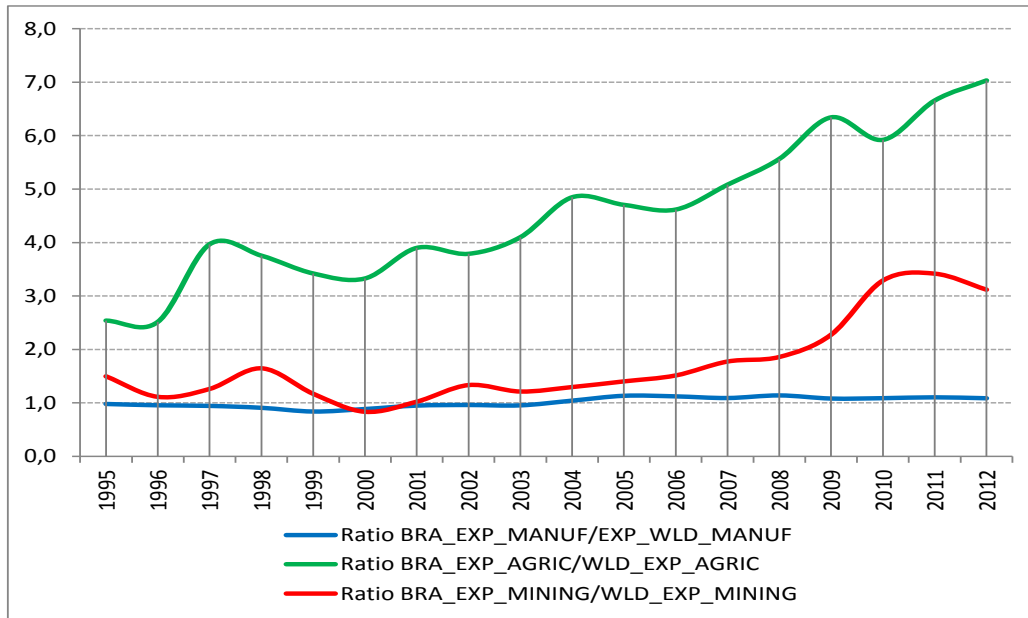
The process of primarization of Brazil's exports described above has been accounted, more than once, as one of symptoms of an early deindustrialization Brazil's economy might be facing¹². Nonetheless, the direct correlation between the two phenomena does not seem to apply to the recent history of Brazil, because not only deindustrialization is methodologically challenging and difficult to measure, but also it may be taken as a natural movement, with different countries in different stages of economic development having shown signs of it. According to Palma (2005), early deindustrialization may have negative effects on a country's development, that is, when deindustrialization starts in a period of relatively low income (compared to the cases of developed countries). In the case of Brazil, however, export structure and production structure have taken very divergent paths, which makes the direct correlation between those two phenomena harder to establish. Such a divergence is supported by several statistics, such as employment, output and trade data, and it believed to be related to the capacity of domestic markets to absorb domestic-made goods.

Despite growing relatively less than exports of agricultural and mineral commodities, exports of manufactured goods have followed a path in international market that is not odd nevertheless. **Figure 2** ahead shows the evolution of Brazil's export market share of those three groups of products. It is worth to note that Brazil's share of global exports of agricultural and mineral commodities increased sharply, while its share of manufactured good exports remained quite stable, with a subtle growth trend in the 1990s. In the period 2000-2013, Brazil's exports of manufactured goods increased 8.8% p.y., overcoming the growth rate of 6.3% p. y. of world exports. As a consequence, Brazil's market share in total exports of those goods increased from 0.8% in 1988 (the lowest) to 1.2% in 2013¹³. Indeed, the world economy as a whole seems to going through a "primarization" phase: the composition of world exports has also been affected by the evolution of relative prices and quantities, which has caused manufactured goods to fall from 91,3% in 1995 to 85,1% in 2012.

¹² The relationship between the two phenomena - the re-primarization of the composition of exports and deindustrialization - is mentioned by Oreiro and Feijó (2010).

¹³ The average growth rate of exports of agricultural and mineral commodities was 18% p.y., and their market share in the international market reached 3,3% and 11,2% in 2012, respectively.

Figure 2 – Evolution of Brazil's market-share of world exports – 1995 to 2012



Source: Authors' elaboration based on data from Comtrade - UN.

The robust increase in the exports of agricultural and mineral commodities has a very geographical base. It is not a coincidence that China has become the main destination of Brazilian exports from 2010 on, and that, in 2014, 12,7% of total Brazilian exports were headed to that country. China has become an important trade partner of Brazil's - and not only in terms of exports, as we shall see ahead - especially after the world crisis of 2008. As traditionally trade partners of Brazil's lost importance, such as Europe and North American, China grew strong as a partner and pushed the demand for Brazilian agricultural and mineral commodities, while the others demanded less and less. A good example of primarization having a geographic base is obtained by comparing the share of manufactured goods of total Brazil's exports (62%) and the share of total exports exclusive China's (73%) in 2013, noting that in 2000 the share was 83% and 81%, respectively. That is, the primarization of Brazil's export composition is strongly connected to the composition of exports to Chinese market¹⁴.

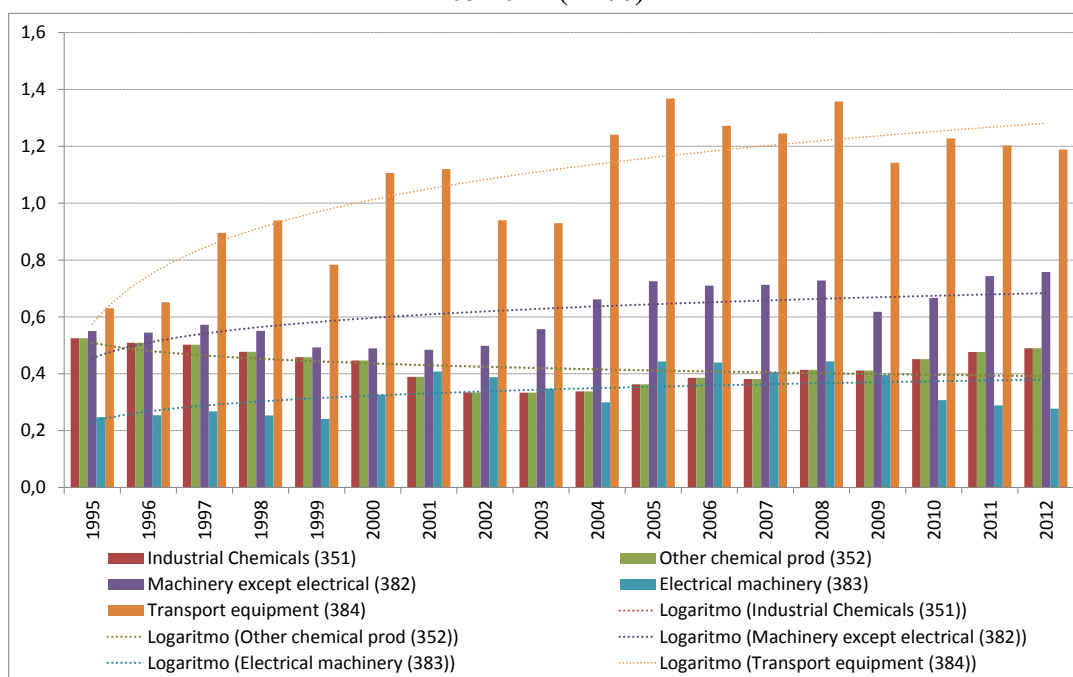
Exports of manufactured goods have behaved significantly different across industries, and one might expect that a decreasing level of sophistication of exports would compensate for the primarization process. But that trend is not observed in industries which are clearly producers of more sophisticated goods, as **Figure 3** shows. Brazil's market share in exports of selected industries - chemicals, machinery except electrical, transport equipment, other chemical products and electrical machinery - does not show that decreasing trend in the period. The exports of other

¹⁴ In 2013, 72% of Brazil's exports to China were composed of two products basically: soybeans and iron ore (37% and 35%, respectively). The exports to China of those two products alone accounted for 13.7% of total Brazilian exports in 2013.

chemicals are the only ones showing that decreasing trend in the market share in the whole period. In all the others industries, Brazil's exports did not lose market share in world trade along the 2000s.

Indeed, traditional and less sophisticated goods were the type of manufactured goods whose exports decreased the most in the period. That is, Brazilian manufacturers of those types of goods were not able to overcome Asian competition and lost share in the main international market throughout the 2000s. That was the case of the US and Europe and, more recently, of South American countries.

Figure 3 – Evolution of Brazil's market share in world exports: selected industries – 1995 to 2012 (in %)



Source: Authors' elaboration based on data from Comtrade - UN.

Integrating into global production and trade networks has become increasingly important to improve the competitiveness of nations and industries. Integration of Brazilian economy, for instance, is still restricted to the initial stages of input supply chains. According to distinction made by UNCTAD (2013) between upstream and downstream participation¹⁵ of a country in the GVC, Brazilian participation in value chains is predominantly downstream – as well as other exporters of natural resources based goods like Australia, Russia and Saudi Arabia.

¹⁵ UNCTAD (2013) distinguishes two different forms of participation in GVC: the upstream participation – that corresponds to the foreign value added share of a country exports – and the downstream participation – “exports that are incorporated in other products and re-exported” (p. 10). Most natural resources based countries have an important upstream component but also countries like Korea and China that export a lot of intermediate goods.

A country's competitiveness has been considered more and more a function of a country's integration to global value chains. However, measuring the integration into GVCs poses two methodological challenges for researchers. First, traditional export and import indicators that relate trade flows and GDP make a mistake in correlating a gross measure of trade with an value-added one. Second, the increasing share of imported content of exports also makes the traditional measures inadequate for the task.

In face of those challenges, to determine the effective contribution of exports to a given economy, a strategy is to identify not only the imported content of exports, but also the domestic value added of exports¹⁶. Those indicators, which shall be detailed ahead, seek to disaggregate the gross value of exports into two components by origin (foreign and domestic): the one corresponding to the domestic value added contained in a country's exports - also called the domestic value added of exports (VAX) - and the one corresponding to the value added generated abroad - the foreign value added of exports (VA*X) – see Methodological Box. The latter includes foreign-made inputs employed in the manufacturing of exported goods, but excludes domestic-made inputs embodied in those same imported inputs. An accurate measure of that kind must take into account the different transactions made among the countries and can only be rigorously calculated using world input-output matrices.

The new databases now available, such as the OECD-WTO Trade in Value Added (TiVA) and the World Input-Output Database (WIOD), allow for the investigation of the value added generated by the each country exports, by identifying the origin and destination of all intermediate goods and services produced and traded by a given country and industry. This indicator is particularly relevant in what it allows for determining which part of a country's exports embodies the value added generated by many different countries (Johnson and Nogueira, 2012; Koopman et al, 2010).

Methodological Box: Domestic and Foreign Value Added of Exports

The Domestic Value Added of a country exports, considering n industries, may be derived as the following (UNCTAD, 2012; Yamano and Mirodout, 2011; OCDE, 2010):

$$(1) \text{VAX} = \mathbf{v}_{1*n}^d * (\mathbf{I}_{n*n} - \mathbf{A}_{n*n})^{-1} * \mathbf{X}_{n*1} = \mathbf{v}_{1*n}^d * \mathbf{L}_{n*n} * \mathbf{X}_{n*1}$$

Where:

\mathbf{v}_{1*n}^d = unity vector which contains the ratio between domestic value added and gross output for each industry n ;

\mathbf{I}_{n*n} = Identity matrix;

\mathbf{A}_{n*n} = matrix of technical coefficients;

¹⁶ The many international agencies, leaded by WTO, have been trying to estimate the value added of exports. One of the reasons for that question has a macroeconomic motivation and seeks to minimize the growing trade deficit of the US and other developing countries with China. For example, according to estimates by Johnson and Nogueira (2012), US-China trade deficit could have been 30-40% smaller if measured by value added.

\mathbf{X}_{n*1} = vector of exports for each industry n ;

\mathbf{L}_{n*n} = Leontief inverse matrix which is the total requirement matrix that gives the amount of gross output in producing what the country required for a one-unit increase in final demand;

To better illustrate the model, an example is given using three countries and just one industry, where country r plays the role of interested country. Thus, equation (1) may be rewritten as the following:

$$(2) \begin{pmatrix} VAX^{r,r} & 0 & 0 \\ VAX^{2,r} & 0 & 0 \\ VAX^{3,r} & 0 & 0 \end{pmatrix} = \begin{pmatrix} v^r & 0 & 0 \\ 0 & v^2 & 0 \\ 0 & 0 & v^3 \end{pmatrix} \cdot \begin{pmatrix} l^{r,r} & l^{r,2} & l^{r,3} \\ l^{2,r} & l^{2,2} & l^{2,3} \\ l^{3,r} & l^{3,2} & l^{3,3} \end{pmatrix} \cdot \begin{pmatrix} x^{r,*} \\ 0 \\ 0 \end{pmatrix}$$

In the Leontief matrix, coefficient $l^{r,r}$ indicates when country r is in need of domestic-made inputs to produce one unit of a given product, whereas $l^{2,r}$ represents how many inputs supplied by country 2 to produce one unit of a product. The same reasoning applies to all the other coefficients. The component $x^{r,*}$ includes all exports originating in country r .

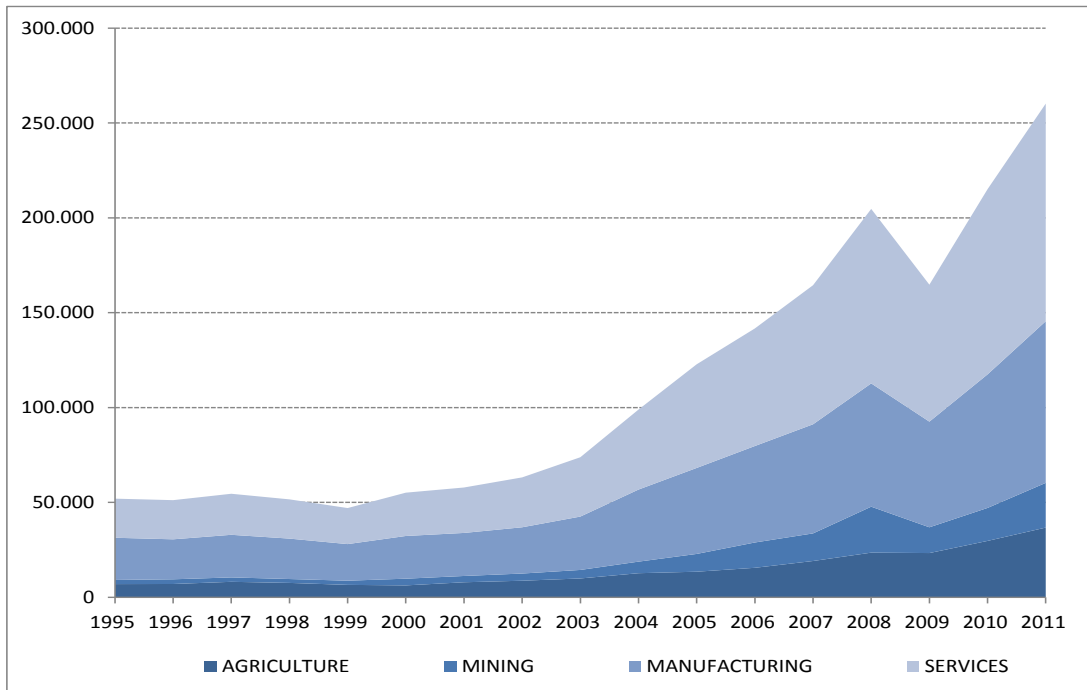
By definition, the domestic value added of exports plus the foreign value added exported give the total of gross exports. Thus, when focused as a share of exports, VAX can be seen as the domestic content of exports:

$$(3) VAX + VA^*X = \sum X_n$$

$$(4) DCX = VAX / \sum X_n \text{ and } FCX = VA^*X / \sum X_n$$

Figure 4 ahead presents the evolution of Brazilian domestic value added to its exports. It presents a trajectory similar to those of gross exports: a huge growth from 2003 to 2011, except 2009 because of international financial crisis. All sectors VAX increased but in a different pace. The share of services, mining and agricultural in total VAX rose to the detriment of the manufacturing share decline. The manufacturing 10 p.p. reduction was compensated by the major gain of mining (5 p.p.) and the significant gain of services (4 p.p.). In fact, it's similar to what happened in gross exports (if services foreign sales are also considered).

Figure 4 – Evolution of Brazil’s domestic value added of exports (VAX) – 1995 a 2011 (in US\$ billions)



Source: Authors' elaboration based on data from WIOD.

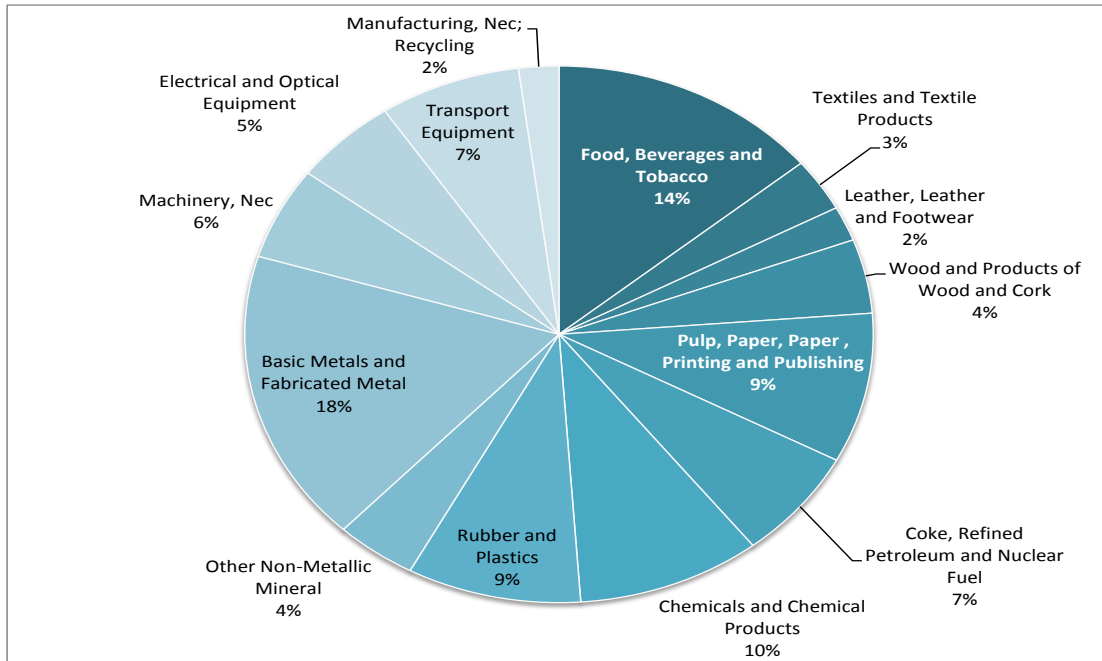
Brazilian is characterized to have a downstream participation in the CVG because of its specialization on agricultural and mineral based sectors. Statistics of total Brazilian exports show a very high level of VAX, corresponding to around 90% of gross exports¹⁷. This pattern however is not observed in manufacturing where the foreign value added (VA*X) is more important, corresponding to around 50% of gross exports. The VAX showed some fluctuations during the period 1995-2011 but they were not very strong. The only significant variation occurred after the international financial crisis deflagration in 2009, when a 7 p.p. change in VAX and VA*X was observed as a reflex of the commodities share rise in exports in this year.

Figure 5 presents the sectoral structure of the VAX. Its composition is quite different from the sectoral structure of gross exports, not only in terms of main sectors but also in terms of concentration (gross exports are more concentrated than VAX). Basic metals and Fabricated metals are the main sectors in terms of VAX. Differently from the gross exports structure, Food, beverages and tobacco is the second sector in terms of generation of VAX (its share in gross exports rises to 30,1%). These two sectors are responsible for 31,1% of Brazilian VAX in manufacturing. Other five sectors present an intermediate share (between 7 and 9% each). Among them, there are two natural resource based sectors - Paper and Pulp and Coke and Petroleum - and also Rubber and Plastic. The share of the Paper and Pulp and Rubber and Plastic

¹⁷ From 2004 to 2010, according to our estimations based on WIOD data, the VAX corresponded to more than 90%. In 2011, it declined to 88%.

industries in gross exports is much lower than in VAX terms. Transport Equipment answers for 7% of manufacturing VAX, this result represents half of the one in gross exports (14% in 2011). Traditional sectors such as Textiles, Leather and Footwear and Wood products have low contributions for the VAX and its share have been reducing along the 1995-2011 years. This movement reflects the loose of international competitiveness in those kind of chains even in terms of conventional trade statistics.

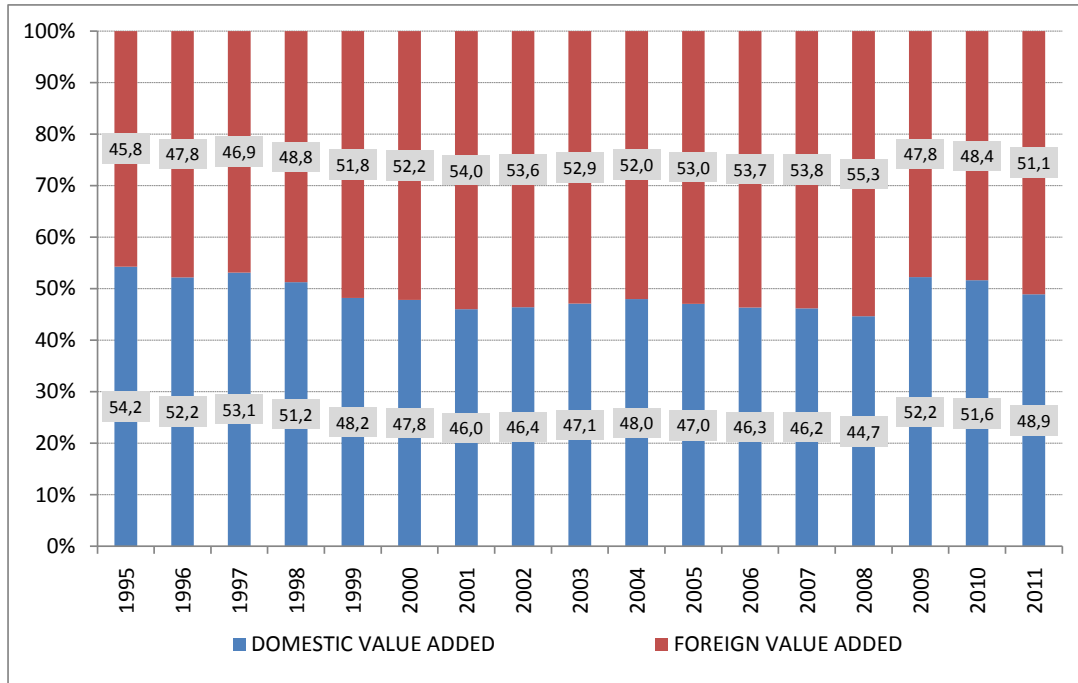
Figure 5 – Composition of Brazilian domestic value added of exports (VAX) in manufacturing – 2011 (in %)



Source: Authors' elaboration based on data from WIOD.

As already mentioned, the domestic value added is lesser important for manufacturing than for the other sectors of the economy - Mining and Agriculture are intensive in local natural resources and service is essentially a non-tradable sector. As we can see from **Figure 6**, the foreign value added of manufacturing exports tended to increase along the period, especially until the financial crisis outbreak. In 2009, there was an increase of domestic value added as the share of two natural resources sectors (Coke and oil as well as Food, Beverages and Tobacco) raised their share in total VAX. In gross exports, these sectors also gained importance – for Coke and Petroleum, the growth was gradual and constant along the decade, but for Food, Beverage and Tobacco, there was a huge share increase in 2009. It reflects the change occurred from this year when the demand for industrial products was negatively affected by the crisis while the (Chinese) demand for food (as well as mineral and agricultural commodities) maintained stable and gained importance face to other Brazilian trade partners.

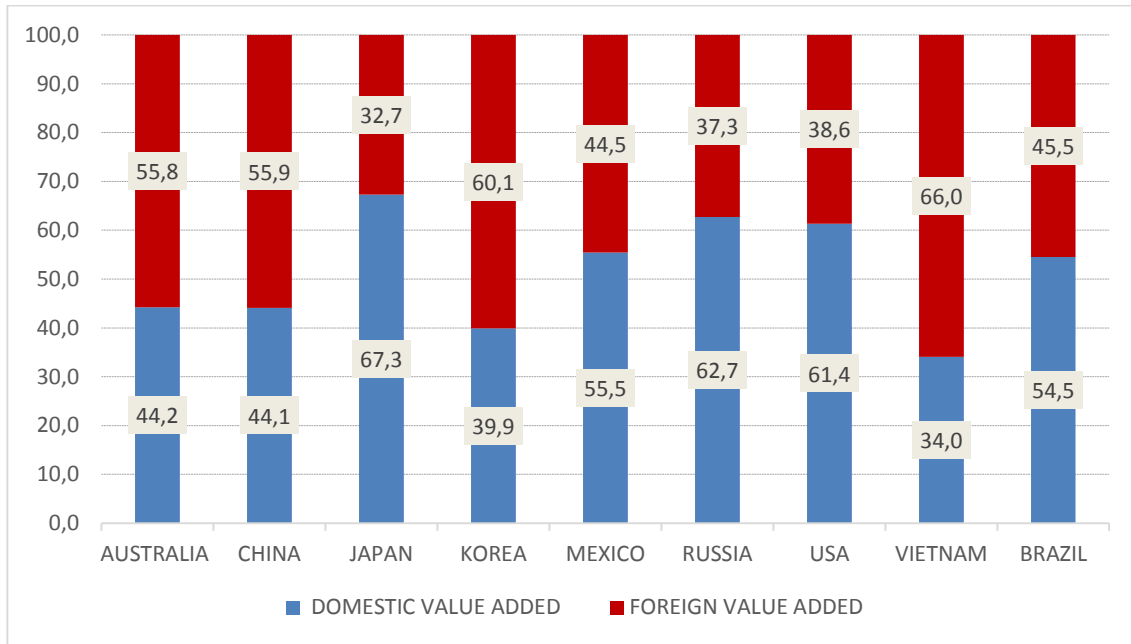
Figure 6 – Domestic and foreign value added share of Brazilian manufacturing exports – 1995 a 2011 (in %)



Source: Authors' elaboration based on data from WIOD.

Comparing to other countries, Brazilian manufacturing shows an intermediate position in terms of foreign or domestic value added share of exports. Its indicators are very close to those of Mexico – what’s surprising as the import content of Mexican manufacturing is very high because of maquiladoras. Vietnam, Korea and China shows the highest shares of foreign value added, what reflects their close engagement in GVC. Australia, however, shows a similar indicator probably associated to its exports of natural resources based manufactured goods. With higher domestic value added in exports, figures Japan, Russia and USA. Both three have important domestic markets with diversified industry, what could explain their relative closeness to trade. Moreover, USA and mainly Russia exports a lot of resource based manufactured goods. In this scenario, Brazil seems to have close characteristics to the last group. As mentioned before, domestic market was the main factor for the industry growth during the 2000. And Brazil, as well as USA and Russia, export also intensive resource based goods that have low foreign content.

Figure 7 – Domestic and Foreign value added of exports in manufacturing for selected countries – 2009 (in % of gross exports)



Source: Authors' elaboration based on data from TiVA-OCDE.

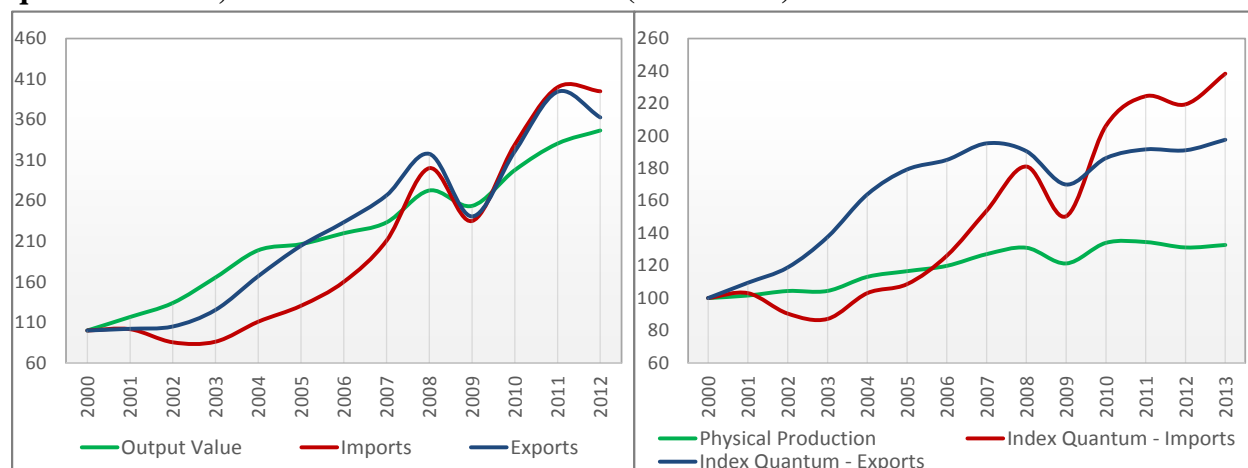
4. THE COMPETITIVENESS OF BRAZILIAN MANUFACTURING IN INTERNATIONAL MARKET

There is a big debate in Brazil over the effects of economic liberalization introduced in the 1990s and its potential impacts on the country's economy - especially, on domestic manufacturing industries. Depending on one's point of view, manufacturing's exposure to international competition due to trade liberalization might have been behind the total factor productivity growth and economic growth as foreseen by Edwards (1995) and others; or it might be reckoned as a strategy producing different types of outcomes depending on the country's economic conditions, its current level of development, and the type of liberalization path followed by the government (Rodriguez and Rodrik, 2001).

Regarding Brazil's economy, studies such as Kupfer's (2003) reveal the hardships faced by the country after trade liberalization had been introduced. The author concludes that the trade reforms were not able to improve the competitiveness of Brazilian manufacturing industries, as the composition of exports did not go through significant changes, while the composition of imports surely did. This section will provide evidence on the exposure of Brazilian manufacturing to imports since the 2000s.

Figure 8 depicts the evolution of manufacturing imports and exports *vis-à-vis* the evolution of manufacturing production expressed by a fixed base index¹⁸ taking 2000 as base year. Both the quantum index and the other variable are in growth trend. The output value remained above that of manufacturing exports and imports between 2000 and 2005 and shifted downward after that. Exports grew at a faster pace than imports until the crisis of 2009, when they converged and took the same path. In 2011 that trend reverted, with exports decreasing and imports remaining practically the same at the end of the analyzed period¹⁹.

Figure 8 - Evolution of manufacturing production, exports and imports in value and quantum index, 2000-2012. Fixed base index (2000 = 100)



Source: Authors' elaboration based on data from PIA-Empresa/IBGE data (output value), SECEX/MDIC (exports and imports), FUNCEX (quantum index of exports and imports), and PIM/IBGE (physical production, available until 2012).

From the perspective of the quantum index, that is, with no effects of price fluctuations, in general, and exchange rates, in particular, the analysis shows that imports increased even more significantly in the period, notably when compared to the evolution of domestic physical production. The quantum index of exports increased sharply until 2007, probably driven by the escalation of commodity prices in that period, but it was not able to keep up with the performance of the quantum index of imports from 2009 on. The latter has been increasing at a rate of 6.4% per year. Physical production increased 33.7% from 2000 and 2012, but it did not follow the pace of import/export data. Such outcome gives room to a debate on to which extension domestic production is being supplied by imports and how domestic-made and foreign goods compete in the domestic market.

¹⁸ Import and export indicator is based on data sets expressed in US dollars provided by SECEX/MDIC, while output value series are expressed in Brazilian Reais provided by IBGE/PIA-Empresa.

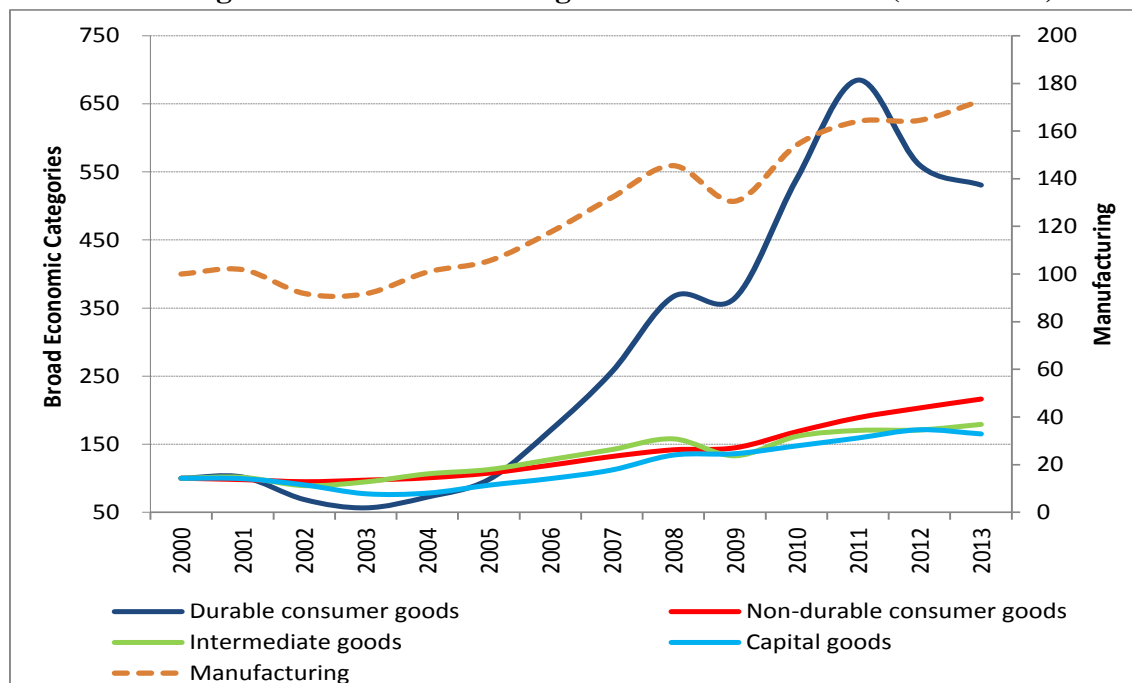
¹⁹ Cumulative growth rate of imports in years 2000 and 2012 are 295% and 262.7, respectively. Output value also increased (246.6%), but not as vigorously as the other focused variables.

With a view to analyze the competitiveness of Brazilian manufacturing in the domestic market, two indicators have been examined. The first one refers to import penetration (IP_i) and relates the quantum index of imports and the apparent consumption of manufacturing industries at constant prices. The apparent consumption combines manufacturing imports and domestic production of manufactured goods of industry i , subtracting the exports related to both Domestic and Imported Use of each industry.

$$(5) IP_i = \frac{ImportedUse_i}{[DomesticUse_i + ImportedUse_i - (EXP_{DomesticUse_i} + EXP_{ImportedUse_i})]}$$

The evolution of the indicator of manufactured goods by broad economic categories is described in **Figure 9** and points out very clearly the growing exposure of Brazilian manufacturing industries to foreign competition. Apart from the periods 2001-2004 and 2008-2009, in all the other years the quantum index of imports increased in face of domestic supply, leading to an increased share of foreign-made inputs in the Brazilian manufacturing industries. According to data provided by the National Confederation of Industry (in Portuguese, Confederação Nacional da Indústria - CNI), import penetration increased from approximately 18% in 2000 to 22% in 2014. The analysis of import penetration by broad economic categories suggests that imports affected each category differently. All of them showed increased import penetration, but the import ratio in durable goods showed a cumulative growth of over 500% between 2000 and 2013.

Figure 9 - Evolution of import penetration at constant prices for Manufacturing and according to broad economic categories. Fixed index base (2000 = 100)



Source: Authors' elaboration based on data from IPEA (apparent consumption) and FUNCEX (quantum index of imports).

The second indicator under examination refers to import content (IC_{ij}) of output and it captures the share of imported inputs in overall domestic industry demand. It is a different way to look at the foreign competition in the domestic market. In general, indicators of import content are calculated based on input-output matrices. In the case of Brazilian industries, the only input-output matrices²⁰ available at this point refer to years 2000 and 2005. With a view to update the input-output matrix to include other years, a methodology²¹ has been developed based on tables of resources and uses provided by the Brazilian Institute of Geography and Statistics (in Portuguese, Instituto Brasileiro de Geografia e Estatística - IBGE). The share of import content²² of component j demanded by industry i will be estimated as the following:

$$(6) IC_{ij} = \frac{ImportedUse_{ij}}{[(DomesticUse_{ij}+ImportedUse_{ij})]}$$

The **Figure 10** ahead reveals the import content²³ at constant prices of 2000 of Brazil's economy, in general, and domestic-made goods, in particular, according to the intermediate demand and two components of final demand: consumption²⁴ and investment. Regardless the perspective, the share of imported inputs in domestic-made products increased. As import content data peaked in 2008 but got interrupted in 2009, its behavior in the following years is unknown; however, as seen in the previous charts, it is believed to have kept the growth trend even after the 2009 decrease due to the effects of the international crisis.

²⁰ The WIOD database provides a series of input-output matrices in years 1995-2011. However, data sets are at current prices. Since input-output data at constant prices was needed to perform this analysis, the input-output matrices compiled by IBGE were preferred over WIOD's.

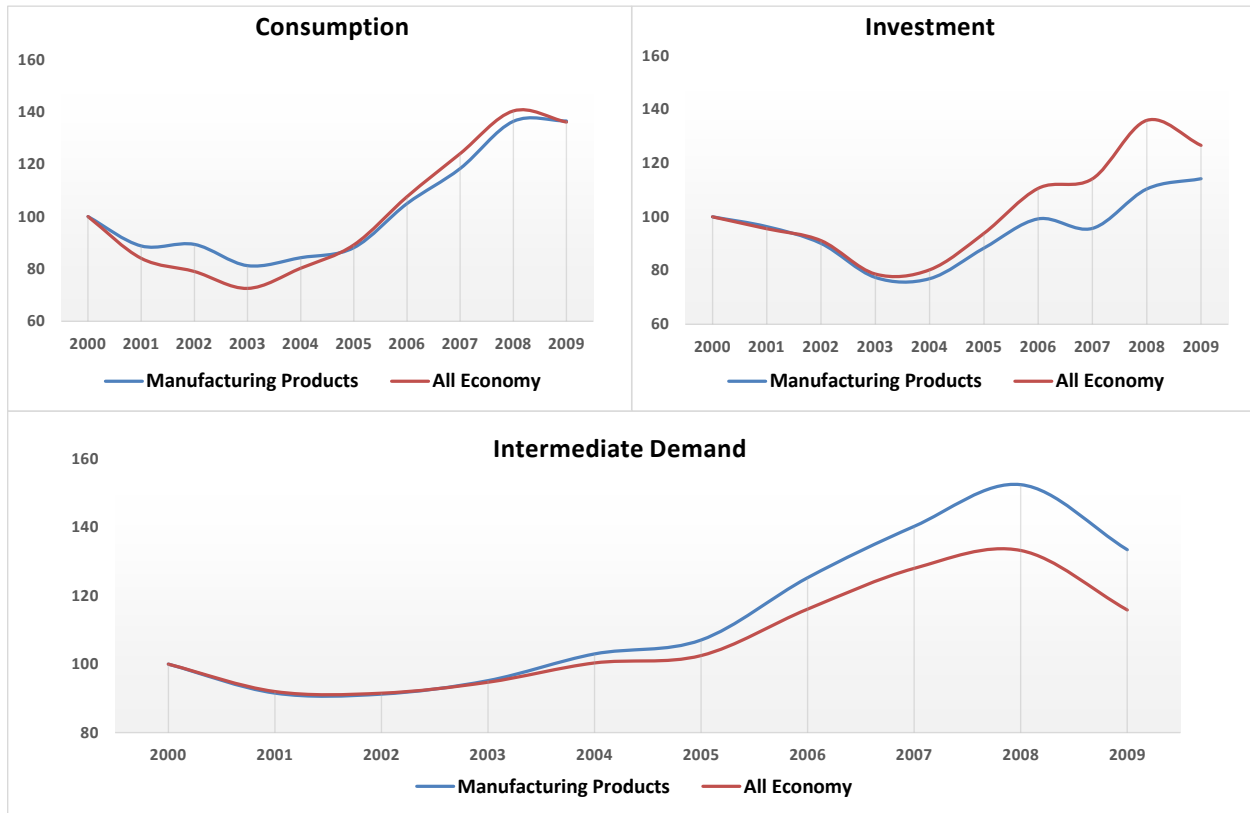
²¹ For more details on that methodology, see Neves (2013).

²² It is worth to mention that the import content of output referred to in this study is the direct import content. The indicator is not able to capture the indirect import content of output, that is, the share of imported content embodied in inputs purchased from domestic suppliers. The effect of indirect import content of output can be estimated based on a Leontief matrix.

²³ The import content series goes until 2009, which is the last year referred to in the table of Resources and Used provided by IBGE.

²⁴ The term consumption is understood as the sum of general government consumption and household consumption, which includes consumption by non-profit organizations.

Figure 10 - Evolution of import content by components of final demand at constant prices - 2000 to 2009. Fixed base index (2000 = 100)



Source: Authors' elaboration based on input-output matrices based on National Accounts data provided by IBGE.

From the point of view of imported intermediate goods, about 24% of all tradable goods used as inputs in Brazilian manufacturing industries in 2008 are believed to be imported. That share decreases to 13.5% when the overall Brazilian economy is focused. As for the cumulative growth rate of import content, it is estimated that import content of domestic-made goods increased over 50% between 2000 and 2008. Despite their share of expenditures in imported intermediate goods being smaller (10.6% in 2008), government consumption and family consumption also increased significantly in the period. Among the examined variables, investment shows the highest relative share of imported goods in relation to the total demand of domestic firms. Approximately 34% of all capital goods purchased by Brazilian firms are imported, and the share of imported capital goods increased by 14% in the decade under study.

5. CONCLUSION REMARKS

The aim of this paper was to consider the competitiveness of Brazilian manufacturing in a context of productive fragmentation. The significant difference when this scenario is in relevance is a vision of competitiveness that prioritizes the activities, tasks and all the value created in these process more than transactions of final goods and traditional trade statistics usually treated in conventional literature. For countries like Brazil, the productive fragmentation is important for some reasons. There was always an attempt to access higher value added chains to improve the external insertion of the country and expand internal sources of better quality employment and sustainable growth income.

The analysis of Brazilian manufacturing competitiveness has two perspectives: one that is based on international context and another focused on domestic dimension. The first one took into account the pattern of Brazilian exports and their composition in comparison with world results and how this type of export basket is related to the evolution of domestic and foreign value added of its exports. The Brazilian exports are intensive in natural resources and is increasingly geared to this kind of trade specialization. However, this is seems to be a generalized movement, since the Brazil's market-share in world manufacturing exports shows a trajectory characterized by stable participation.

The fact that Brazil has an export basket concentrated in mineral and agricultural goods makes its integration in global value chains reduced; almost 90% of its exports is due to domestic value added. Nevertheless, in the universe of manufacturing goods, this number is 50% in average. This results shows that only half of manufacturing production value added is domestically generated.

The second perspective is clearly associated to the other one. In internal market, the competitiveness of Brazilian goods is threatened by the rising of imports penetration in overall manufacturing, especially after the world financial crisis in 2009. The same observation is realized when looked to the import content of everything demanded by Brazilian agents. There was an increase of the import content in all components of demand.

Indeed, the international financial crisis seems to have induced to important changes to Brazilian manufacturing competitiveness both in international and domestic arena. In the global context, despite of its international market share stability, natural resources manufactured goods have gained importance. This can explain the recent rise of domestic value added of exports. In the domestic side, the import penetration growth showed an acceleration trend, mainly in the case of durable goods.

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