

Participation and Position of Brazil in Global Value Chains: a comparative analysis with selected Latin American countries (1995-2018)

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Abstract. By analyzing the global economy, it is possible to see that production and international trade are increasingly structured in the form of global value chains (GVCs). Different sectors and countries are integrated differently into these chains, assuming distinct levels of participation and position. The way a country inserts itself in GVCs generates impacts from the point of view of its international trade and its economy as a whole, being very important from the perspective of its development strategy. In light of this, this paper aims to analyze how Brazil is inserted in this form of the global economy by comparing it with other selected countries in Latin America: Chile (CHL), Colombia (COL), Costa Rica (CRI), Mexico (MEX), Argentina (ARG), Brazil (BRA) and Peru (PER). The participation index and the position index are used to analyze the form of integration of the countries in the chain and were calculated using data from Trade in Value Added (TiVA) database. The results of this research can assist policymakers in making decisions in the midst of development strategy in peripheral countries.

Keywords. fragmentation, value added, global value chain, development strategies

1. Introduction

In the last few years, many industries have gone from nationally delineated entities to fragmented business networks, in organizational terms, and globally distributed, consisting of "lead firms companies" and supplier and service providers - that often operate globally. Because of this, countries and regions can specialize in specific aspects of production, instead of entire industrial sectors. These new global production systems are commonly called "global value chains" or GVCs (Sturgeon, T.; Gereffi, G.; Guinn, A.; Zylberberg, E. 2013)

Analyzing the global economy, it is possible to see that production and international trade are increasingly structured in the form of global value chains (GVCs). A value chain identifies the full range of activities that firms undertake to bring a product or a service from its conception to its end use by final consumers and takes place in numerous

locations in different countries (Gereffi, G. 2014).

Different sectors and countries are integrated differently into these chains, assuming distinct levels of participation and position. The way a country inserts itself in GVCs generates impacts from the point of view of its international trade and its economy as a whole.

The literature on development and international trade already points out that the specialization patterns of countries affect their development path and their ability to perform catching up. From seminal contributions around the mid-twentieth century, such as Prebisch (1949), to more recent ones such as Rodrik (2006), point out that the products that countries export and import and the way countries insert themselves in international trade are very important from the point of view of their development process.

In light of this, this work aimed to analyze how

Brazil is inserted in this form of the global economy by comparing it with other peripheral countries in Latin America.

2. Methodology

2.1 Goal

The main goal of this work is to analyze Brazil's integration in the Global Value Chains compared to other selected Latin American countries using the Trade in value added (TiVA) database and relevant methods.

2.2 Research methods

The methodology used during the development of this work was first a systematic literature review analyzing the main contributions in the literature related to international trade theory and GVCs in order to understand the theoretical evolution of the concepts. Among the contributions recognized in the literature and analyzed in this paper are: Dicken, P. (2008); Gereffi, G. (1999); Gereffi, G. et al. (2005); Sturgeon, T. (2008); Henderson, J. et al. (2002); Koopman et al. (2010); Johnson, R. C., & Noguera, G. (2012); Borin, A., & Mancini, M. (2019).

Subsequently, indicators were analyzed to measure the integration, participation, and position in GVCs of selected countries in Latin America using data from the Trade Value Added (TiVA) database, 2021 edition (TiVA, 2022). The base is constructed from the OECD Inter-Country Input-Output (ICIO). This database provides indicators for 66 economies between 1995-2018, for 45 sectors services sectors (according to the 2-digit sectoral classification of the International Standard Industrial Industrial Classification revision 4 (ISIC rev.4)). Its construction is based on the decomposition, through input-output matrices, of the value added to the exports of the countries, analyzed. In this way, it is possible to accurately identify the insertion patterns of countries into global value chains. This is possible because in these chains, with the fragmentation of the stages of the production process, each country is responsible for acting in a certain set of activities and, thus, the value added incorporated into a final product is dispersed among several industries present in countless countries.

Data for the following countries in Latin America are available in the database: Chile (CHL), Colombia (COL), Costa Rica (CRI), Mexico (MEX), Argentina (ARG), Brazil (BRA), and Peru (PER).

The international input-output table by TiVA allows decomposing gross trade into value added components. Thus, by breaking down gross exports it is possible to obtain information about domestic value added (DVA), foreign value added content of exports (FVA), and domestic value added sent to third economies (IV).

Domestic value added embodied in gross exports (DVA; or EXGR_DVAc,i,p in TiVA) refers to the domestic value added content of exports, by industry *i* in country/region *c* to partner country/region *p* and represents the exported value added that has been generated anywhere in the domestic economy (i.e. not just by the exporting industry).

Foreign value added embodied in gross exports (FVA; EXGR_FVAc,i) refers to the value of intermediate goods and services that are embodied in a domestic industry's exports. The value added can come from any foreign industry upstream in the production chain. Domestic value added sent to third economies (IV; EXGR_DVAFXShc,i) represents the country *c* domestic value added content embodied in the gross exports of industry *i* in foreign countries. It is often considered as a measure of 'forward linkages' in analyses of GVCs.

As suggested by the literature internationally renowned (Koopman et al.,2010; Johnson and Noguera, 2012; Borin and Mancini, 2020), to calculate the integration (1) in the GVC's we used Domestic value added content of gross exports (EXGR_DVA) and Gross exports (EXGR) as follows:

$$GVC_{integration} = \frac{EXGR_DVA}{Export_{gross}} \quad (1)$$

Integration into the GVC shows us how much a country is inserted into global value chains. The lower the domestic value added in relation to gross exports, the higher the integration of the country, as part of the value contained in exports was added in other countries.

To calculate the GVC participation (2) and GVC position (3) we used Gross exports (EXGR), Foreign value added (FVA) and Content of exports and domestic value added sent to third economies (IV) as follows:

$$GVC_{participation} = \frac{FVA + IV}{Export_{gross}} \quad (2)$$

$$GVC_{position} = \log\left(1 + \frac{IV}{Export_{gross}}\right) - \log\left(1 + \frac{FVA}{Export_{gross}}\right) \quad (3)$$

The GVC participation index indicates the share of country's export that is part of multi-stage trade process. The higher the value of the index the higher the country's participation. The GVC position index allows to analyze the vertical specialization of the country in the chain. If the value is positive, the country lies upstream in the GVC and exports raw materials or intermediate products. The negative value indicates that the country lies downstream in the chain and uses a large portion of imported intermediate products to produce final goods.

3. Results

Several conclusions can be drawn from the analyzed data. Regarding how the integration of global value chains varied, the results can be found in the figure 1.

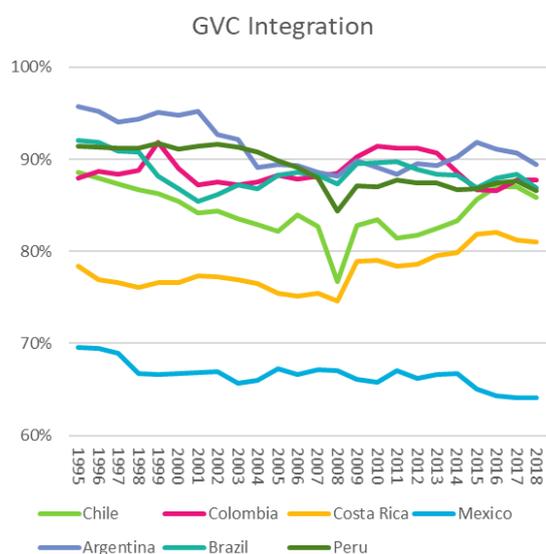


Fig. 1 - GVC Integration

In general, when compared to other central countries, it can be said that Latin American countries are not very integrated into the global value chains. It is possible to observe within the series that many countries presented a trend towards greater integration until 2008 and that after the crisis the trend was softened.

Nevertheless, with the exception of Costa Rica, all countries have seen a decrease, albeit often slight, in their integration into global value chains from the period 1995 to 2018, adding more value domestically. It can be observed that Mexico is the most integrated country in the chains and Argentina the least integrated.

Tab. 1 - GVC Integration

Country	Variation
Chile	- 3,05%
Colombia	-0,30%
Costa Rica	3,38%
Mexico	-7,95%
Argentina	-6,57%
Brazil	-5,54%
Peru	-5,34%

Regarding participation in GVCs, all countries have seen an increase in their participation. The country that increased its participation the most was Argentina with a variation of 60% from 1995 to 2018. The country that experienced the least change was Costa Rica which had a change of less than 1.5%.

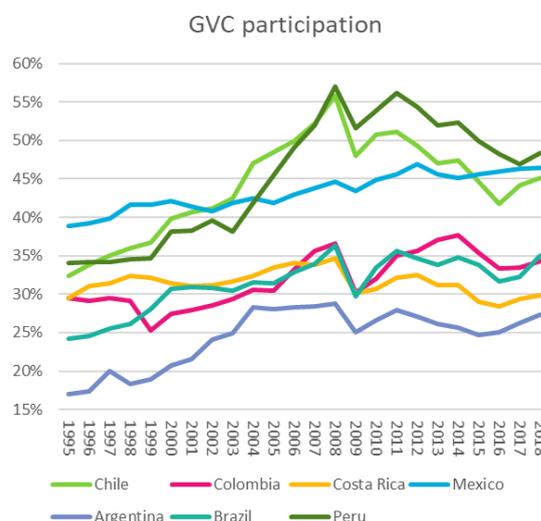


Fig. 2 - GVC participation

The participation index can be used in conjunction with the position index, allowing you to see where the country stands, that is, what its vertical specialization looks like. This is very important to verify how the country is situated in the hierarchy of international trade. By analyzing the data presented in table 2 it is possible to see that most of the countries studied are situated upstream in global value chains. No country in the analyzed period has transitioned from a downstream to an upstream position.

Tab. 2 - GVC position

Country	1995	2018
Chile	0,08156	0,137992
Colombia	0,04793	0,08328
Costa Rica	-0,12083	-0,07121
Mexico	-0,18413	-0,20732
Argentina	0,07833	0,05475
Brazil	0,07393	0,07609
Peru	0,14502	0,17347

When it comes to position, most of the countries lie upstream in the GVCs with the exception of Mexico, which even suffered a reduction in its position index and Costa Rica. Apart from Argentina and Mexico, already mentioned, all the countries showed an increase in their position index.

The data also allows us to observe the impact that the

2008 global crisis had on the chains. Many countries were moving toward greater integration or participation until 2008 and changed their behavior after the crisis. Further studies should be conducted to assess what other factors influenced this change and to really measure the impact of the crisis in this shift.

The literature on development and international trade, from the seminal contributions around mid-twentieth century, such as Prebisch (1949), to more recent ones such as Rodrik et al. (2006) point out that what countries exports and how they are inserted in international trade affects their ability to perform catching up. Given the importance of this subject further research should be conducted in this area to analyze the factors influencing the insertion patterns of these countries in the GVCs and how this affects their development processes.

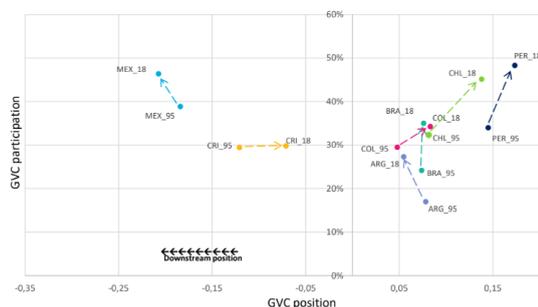


Fig. 3 - Shifting patterns of GVC participation and position

4. Conclusions

To summarize the results obtained (given the space restriction imposed by this poster) we can inform that Brazil lies upstream in the GVC's and increased its participation during the analyzed period, like most Latin American countries. The country's integration in the period increased by more than 5 percentage points and its position index went from 0,07393 in 1995 to 0,07609 in 2018.

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