

Analyses of Global Value Chain Measures for Brazil.

Yasmim Dalila Barbant ^a.

^a Graduate Program of Economics (PPGEco), Department of Economics, Federal University of Espírito Santo, Vitória, Brazil, yasmim.barbant@edu.ufes.br.

Abstract. Global Value Chains are a newer and modern approach of production and trade networks. Increasingly, countries are structuring their production and trade frameworks as Global Value Chains. The aim is to integrate their economies through a unified production process. The South American countries presents great potential to improve their position in GVC. More specific, Brazil could expand its participation as a way of strengthening its position in agricultural trade. Also, solidifying its role as a major exporter and establishing dominance in international trade. We calculate and present different measures that reflects Brazil's position and participation in agricultural global value chains. The measures are the export orientation index, the total participation index, and Brazil's position in GVC. We use the 2023 edition of the Trade in Value Added database, provided by the Organisation for Economic Co-Operation and Development. The measures encompass the years 1995 to 2020.

Keywords. Global Value Chains, Agriculture, Brazil.

1. Introduction

Global Value Chains (GVC) are a contemporary approach to production and trade networks [1]. Can also mean the full range of activities across countries that firms engage in to bring a production form its conception to its commercialisation. In the past years, countries have been structuring their production and trade structure framework as GVC, aiming to integrate their economies and specific sectores as a single production chain.

These networks connect multiple economies and different stages of the manufacture of goods. A GVC encompasses everything from research and development of a good to its commercialization, including input supply, assembly, manufacturing, and distribution. Each of these steps could occur in a different country according to production costs, productive specialization, natural resources and labour availability, technical expertise, and technological advances. On one hand, GVC shows the productive integration between two countries; on the other, this shows a fragmentation of production, with production process being realized and outsourced to different parts of the globe. Thus, the good is the result of the pursuit of efficiency and competitive advantage, having passed through multiple distinct economies.

GVC are a form of productive organisation that emerges from the globalized economy [2]. They have implications for international trade, the global

distribution of wealth, and economic development, especially for peripheral countries [1].

In this sense, understanding Brazil's position in the GVC enables a better understanding of the country's international trade dynamics. It also countributes to expanding the framework of analysis bringing up new evidence of the integration of peripheral economies into the globalized economy.

Therefore, the aim of this short paper is to bring to light measures that could enlight the position and participation and position of the Brazilian economy in the international trade. In the next section we define the measures. In the third section we present the data and the indicadores used. and the calculations. The fourth section is dedicated to the results. The fifth section brings up a brief discussion of results, alongside with the graphs for each measure.

2. Measures of Global Value Chain

Along this short paper, we present analytical exercises conducted for Brazil. These exercises involve calculations and analyses of different measures relates to the export and the international trade of Brazil with the rest of the world. In this section we explaining the meaning of each measure calculated. A better definition of data and indicadores will appear in section 3.

2.1 Export Orientation Index

The Export Orientation Index (EOI), also known as Export Dependency is used for investigating the participation of a country value added that meets foreign final demand. EOI is the ratio between the exported domestic value added of the country and the total value added produced by the country.

$$EOI = \frac{FDD_DVA}{VALU} \times 100 \quad (1)$$

FDD_DVA is the export domestic value added, and VALU is production at basic prices.

2.2 Share of Domestic Value Added in Gross Exports

The Share of Domestic Value Added is a measure that reflects the GVC integration of a country. It indicates the proportion of foreign value added in total gross exports of a country, and reflects linkages with the GVC. If the integration is rising, the share of domestic value added will be decreasing. This means that a larger proportion of foreign value added in total gross export of a country and stronger links with other economies within GVC.

$$Share_DVA = \frac{FDD_DVA}{EXGR} \times 100 \quad (2)$$

EXGR is the total gross exports of a country.

2.3 Total Participation

The total participation reflects to what extent a country is involved in international production networks. It indicates the share of the country's export that is a part of the trade process. The higher the value of measure, the higher the country's participation in GVC.

$$GVC_participation = \frac{FVA + IV}{EXGR} \quad (3)$$

IV is the domestic value added embodied in foreign exports as a share of exports.

2.4 Total Position

The total position index is a measure that reflects a location of the country in the production chain. A positive value, when IV is higher than FVA, indicates that the country lies upstream in the GVC. The negative value, when FVA is higher than IV, indicates that the country lies downstream in the GVC.

$$GVC_position = \ln\left(1 + \frac{IV}{EXGR}\right) - \ln\left(1 + \frac{FVA}{EXGR}\right) \quad (4)$$

When a country is upstream in the chain, it exports raw materials or intermediate products. When is downstream, the country uses a large portion of imported intermediate products to produce final goods for export.

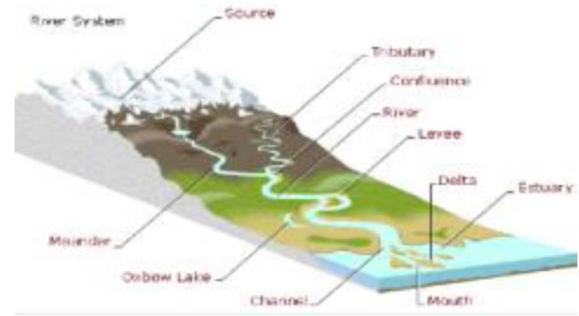


Fig. 1 – Upstream and Downstream in a GVC.

3. The database and indicators

3.1 TiVA database

Data used in calculation comes from the Trade in Value Added [3] database from the Organisation for Economic Co-operation and Development (OECD).

TiVA is a collection of indicators that can provide detailed insights into global production networks and supply chains. The indicators track the origins of value added in exports, imports and final demand from 1995 to 2020.

The next subsection explain each indicator used for the analytical exercises.

3.2 Indicators

We used the following TiVA indicators [4]:

- Domestic value added embodied in foreign final demand (FFD_DVA or DVA): it captures the value added Domestic value-added embodied in foreign final demand or FFD_DVA. This indicator captures the value added that industries export both directly and indirectly. The value added exported directly is through the exports of final goods or services. The value added exported indirectly is through the exports of intermediates goods. This last one which reaches foreign final consumers through other countries. Thus, this indicator reflects how domestic sectors upstream in a value chain connects to other countries, even in the absence of direct trade relationship. In this sense, the indicator reflects the upstream effect of final demand in foreign markets on domestic output. It interprets as "exports of value added".
- Value added (VALU): is a structural indicator defined as production or gross output at basic prices minus total intermediate inputs at basic prices (OECD, 2023). It reflects the value that is added by a specific sector in a country when producing goods and services. It follows the same definition of value added used in the System of National Accounts [5].
- Total gross exports (EXGR): the gross exports data come from the ro sum of the

international trade flows in OECD Inter-Country Input-Output (ICIO) tables. The data is consistent with the System of National Accounts estimate of total exports and imports of goods and services, adjusted for re-exports, as well as estimates for GDP. As value added, gross exports of TiVA are valued at basic prices in line with the valuation used throughout the ICIO tables.

- Foreign value added content of gross exports or foreign value added (EXGR_FVA or FVA): presents the foreign value added embodied in the exports by the domestic industry in a specific country or region.
- Domestic value added embodied in foreign exports as a share of total gross exports (EXGR_DVAFXSH or IV): this indicator presents a country's domestic value added content of gross exports by industry in partner countries, as a percentage of total gross exports by country.

4. Results

The Export Orientation Index for the total economic activity, between 1995 and 2020 (Figure 2), remains at an average of 11.53%. The index for total economic activity reached its highest value, 15.71%, in 2004. The lowest value, 6.62%, is from the year 1996. The Export Orientation Index for the agriculture, hunting, forestry, and fishing sector, between 1995 and 2020, maintains an average of 25.70%. The index for the agriculture, hunting, forestry, and fishing sector reached its highest value, 43.38%, in 2020. The lowest value, 14.77%, is from the year 1995.

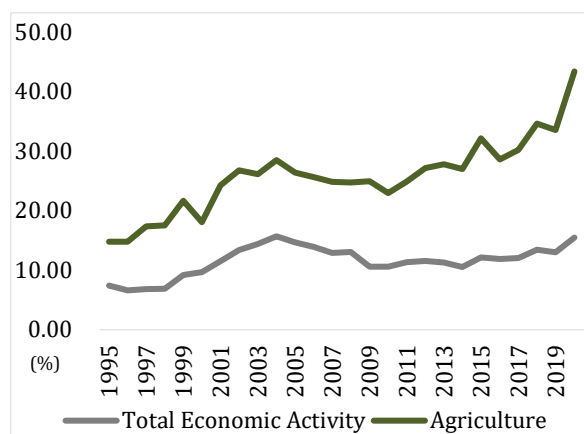


Fig. 2 - Export Orientation Index of Brazil's Total Economic Activity and Agriculture Sector (1995-2020).

The calculated EOI for Brazil shows trajectories with similar trend. As the index for the agriculture, hunting, forestry, and fishing sector increases over the historical series, the same seems to occur with the dependence of total economic activity on external final demand—despite the notable difference in percentage values. The activity of the agriculture sector exhibits a greater dependency on external final demand than the total economic activity.

The share of domestic value added in the Brazilian agricultural sector exhibits a significant decline between 1995 and 2020 (Figure 3). This trend suggests that a larger proportion of foreign value added is present in Brazil's gross exports. In other words, the ties between the Brazilian agricultural sector and other economies are strengthening. Furthermore, the decrease in the calculated index reflects the sector's increased integration within the GVC. Conversely, the share of domestic value added to total economic activity remains stable during the calculated period. Despite the agricultural sector—a domestically significant sector for the country—enhancing its integration within the GVC, the same trend does not apply to the rest of the economy. This may indicate that the Brazilian agriculture sector, over time, has increased its share in the country's total exports. It could also suggest that the Brazilian agriculture sector is becoming more competitive in international trade.

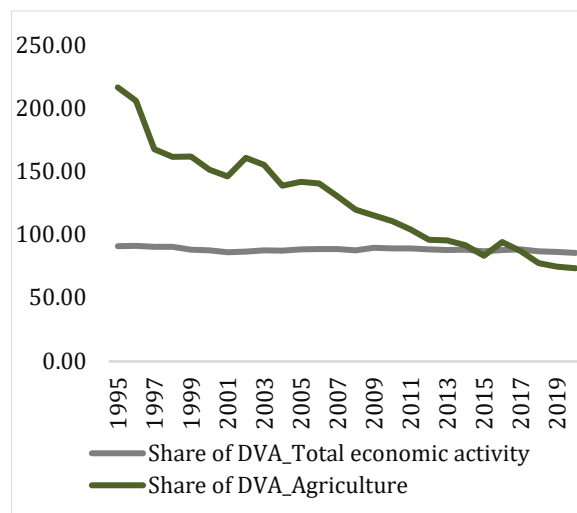


Fig. 3 - Share of Domestic Value Added of Brazil's Total Economic Activity and Agriculture (1995-2020).

We calculated the Total Participation and Position of Brazil's Agriculture in GVC because of the importance of the sector and its increasing integration in GVC. The calculated indices are shown in Figure 4.

The GVC position index for agriculture indicates that until 2000, Brazil lied upstream in the GVC. This means that the country exported raw materials or intermediate products for other economies in the GVC. The participation of agriculture sector index informs us that between 1995 and 2020 the participation in GVC remained around 14%. The sector maintained a positive participation in GVC during the period, indicating that the share of the sector's exports was a part of the multi-stage trade process.

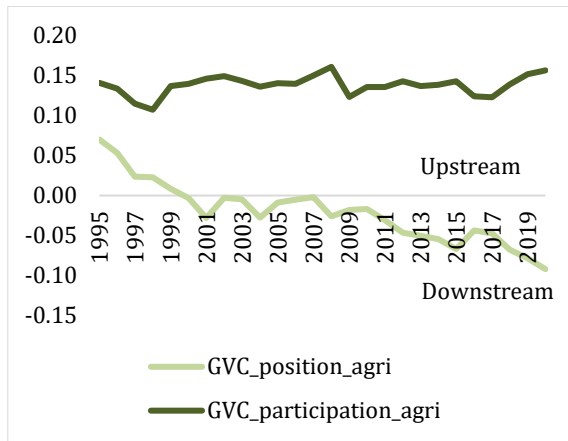


Fig. 4 - Total Participation and Position of Brazil's Agriculture in GVC (1995-2020).

In turn, Brazil's total of economic activity lies upstream in the GVC, as the index remains positive during the period. The participation in GVC of the total of economic activity is higher than the agriculture sector. Remaining around 30%, it reflects the higher participation in the multi-stage trade process.

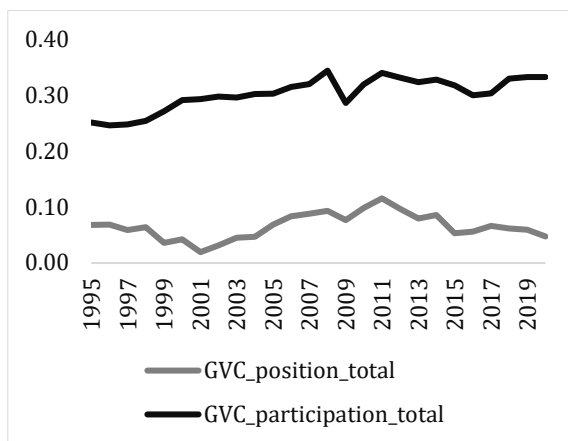


Fig. 5 - Total Participation and Position of Brazil's Total Economic Activity in GVC (1995-2020).

5. Conclusion

This paper aimed to shed light on the evolving dynamics of Brazil's integration into GVC. By conducting analytical exercises, it was possible to present important trends and patterns related to the agricultural sector and the total of economic activity.

The calculated indices reveal that Brazilian agricultural sector has experienced significant changes. This last ones, particularly in its participation and position within GVCs. The EOI highlighted the extent to which Brazil's economic activity depends on external final demand. In turn, the agricultural sector exhibits a higher dependency on external demand. This indicates its increasing integration in international trade.

In turn, the Share of DVA in Brazil's exports has declined during the period. Suggesting a greater presence of foreign value added in the country's gross exports. This trend suggests to results. First,

the strengthening links between Brazil's agricultural sector and global markets. And second, the enhanced integration within GVCs.

Last, the analysis of Total Participation and Position provides extra insights. Brazil's agriculture sector maintained a positive participation in GVCs, despite its change from upstream to downstream in GVCs. But Brazil's total economic activity remained upstream in GVCs while maintained an upstream position. This last indicates its pivotal position in global production networks.

These findings contribute to a deeper understanding of Brazil's international trade dynamics within GVCs. The implications of these trends for international trade could be unravelled in future research. Identifying the trends lays the groundwork for new studies on Brazil's global integration.

6. Acknowledgement

I would like to express my gratitude to Professor Ivo Zdráhal from Mendel University for his patience and guidance in teaching me new analytical methods during my scientific internship. I am also thankful for the invaluable opportunity to continue our collaboration, which has been both enriching and fruitful.

7. References

- [1] Nenci S., et al. Mapping global value chain participation and positioning in agriculture and food: stylised facts, empirical evidence and critical issues. *Bio-Based and Applied Economics*. 2022; 11.2: 93-121.
- [2] Gereffi G., Fernandez-Stark K. The offshore services value chain: upgrading trajectories in developing countries. *International Journal of Technological Learning, Innovation and Development*, 2011; vol. (1/2/3): 206-234.
- [3] Organisation for Economic Co-operation and Development (OECD). Trade in Value Added database. 2023.
- [4] Guilhoto J. M., et al. *Guide to OECD TiVA indicators*. 2022.
- [5] United Nations, et al. *System of national accounts 2008*. New York: United Nations. 2009: 722 p.