Unraveling the Trade Potential of BRIC: A Comprehensive Analysis of Global Value Chains and Intra-BRIC Trade in Value-Added

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INTRODUCTION

- The growth of transactions and capital movements in the trade of goods and services is higher than the growth of the world economy (Amador; Cabral, 2008; Baldwin; Lopez- gonzalez , 2013).

- This significant increase in trade is the result of organizational changes, partnerships between the global North-South, reduction in transport and communications costs, and increased technological progress (Melitz ; Redding , 2012; Antràs ; Yeaple , 2013; Costinot ; Rodríguez - clare , 2013 ;

- The growth in trade in intermediate goods also stands out as a key factor for relevant structural changes in trade.
  - Intermediate goods trade flows currently account for more than half of world trade (Wang; Wei; Zhu, 2018) .
  - Most trade is bilateral (*two-way trade*), in which countries import and export the same or very similar goods.
  - Thus, decomposing trade in intermediate goods has become crucial in fully generating the added value accounted for in trade flows.

OBJECTIVES AND JUSTIFICATION

- The objective of this article was to identify patterns of evolution both in terms of added value incorporated in trade flows, as well as indicators of vertical specialization and their implications for intra-BRICs trade ;

- This analysis is justified since the creation of the BRICs is seen as one of the most important pillars of global economic policy in the first two decades of the 21st century (Stuenkel, 2020).

- In the political field, the creation of the BRICs represented an important opposition to the hegemonic triad formed by the United States, the European Union, and Japan.

- Therefore, there have been significant advances in economic policies between the global South and the creation of a multilateral trade agenda.

RESEARCH PROBLEM AND CONTRIBUTION

- The main research question is: *How did value-added trade and industrial patterns of vertical specialization of intra-BRICs trade evolve between 2000 and 2014*?

- This research's contributions permeate discussions regarding the political and economic aspects of the creation of the BRICs.

- intra-BRIC relations are analyzed in detail from the perspective of value-added trade and generalized vertical specialization by Wang, Wei, and Zhu (2018) .

- About the specific theme of value-added trade, for the first time, a detailed overview of intra-BRICs trade is presented;
- As well as analysis of specific components of domestic added value for intermediate and final goods;
  - Components of vertical specialization at the aggregate industry and country level,
  - And indicators in terms of trade intensity (OECD, 2021) .

DATABASE

- The research uses the Input-Output matrices from the World Input-Output Database (WIOD) between 2000 and 2014, which includes 56 sectors and 44 countries (43 plus the "rest of the world").

- The last release of the WIOD input-output tables was in 2016. They cover the 28 member countries of the European Union, the 15 largest economies in the world, and the other countries aggregated as the "rest of the world." These countries account for more than 85% of the world's GDP.

- The use of WIOD matrices is justified due to their construction and conceptual structure based on the system of national accounts (ISWGNA, 1993; 2010) and based on input-output matrices officially published by the countries and merged with national accounts and international statistics of bilateral trade.

- In contrast to other international initiatives, WIOD stands out by not relying on proportionality assumptions or optimization algorithms to impute bilateral input flows (Johnson, 2018). This unique approach piques interest and underscores the value of WIOD for research.

METHODOLOGY

- The sectors analyzed in the WIOT's were classified according to the degree of technological intensity of the United Nations (2008) and revisions suggested by the OECD (2017).
- Technological intensity, or "R&D intensity" (Research and Development), is the ratio between R&D investments and GDP at basic prices.
- Among the advantages of this classification is that sectoral hierarchies of technological development are created, whether industrial or service sectors.
- In this way, industries are classified according to characteristics of capital accumulation, as well as organizational behaviors, development, and technological absorption (MORCEIRO, 2018).

METHOD

4 complex network indicators were calculated :

Degree centrality: *measures the position of a node within the entire network.*

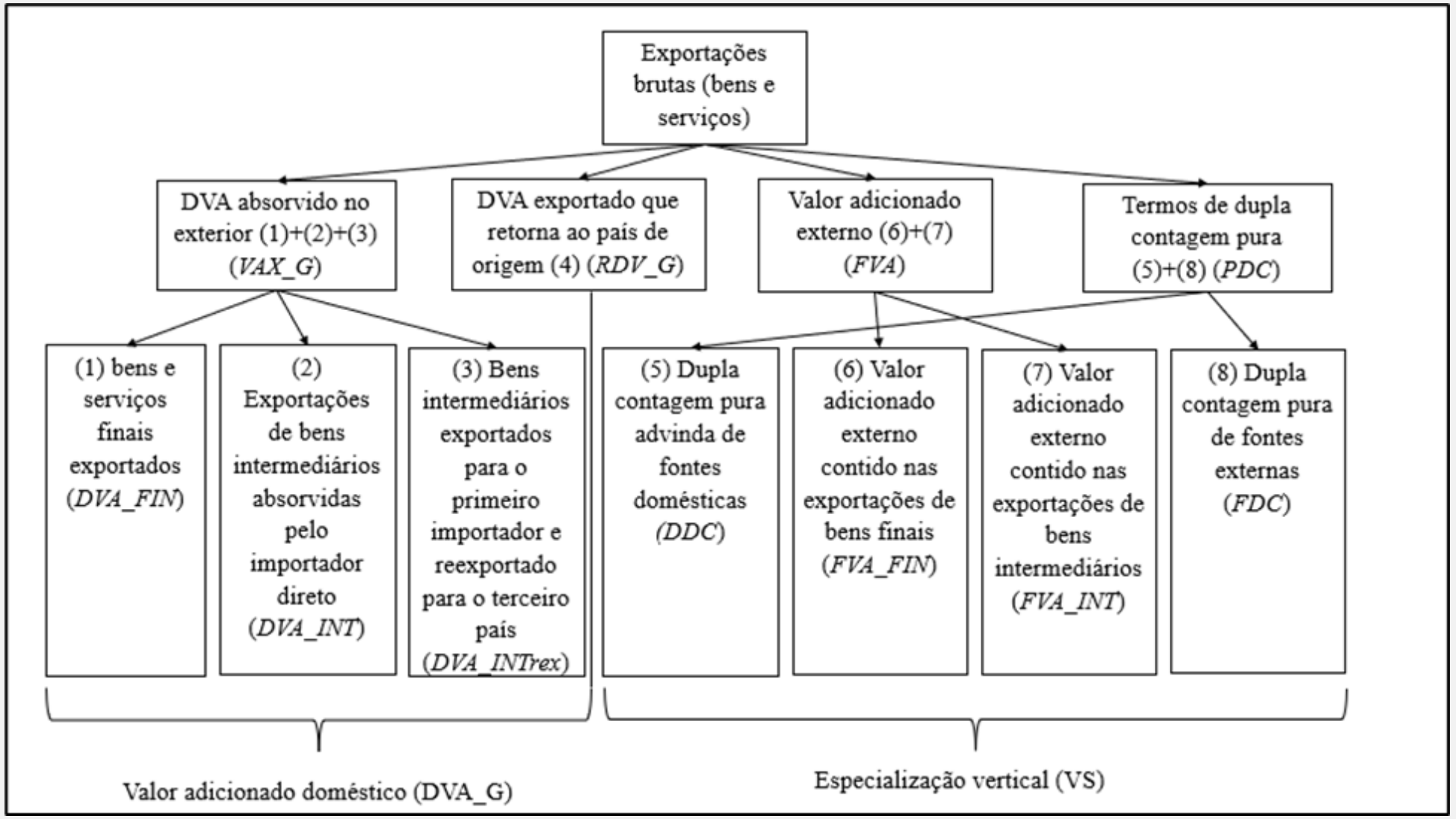
Betweenness: *quantifies the number of shortest paths that traverse a specific node or link*

Closeness : *evaluates the proximity of a given node to all other nodes based on their shortest paths*

Page rank centrality: *considers the importance of a country based on its most significant connections with other countries*

METHODOLOGY

Figure 1. Theoretical model of the conceptual structure of Wang, Wei, and Zhu's trade accounts

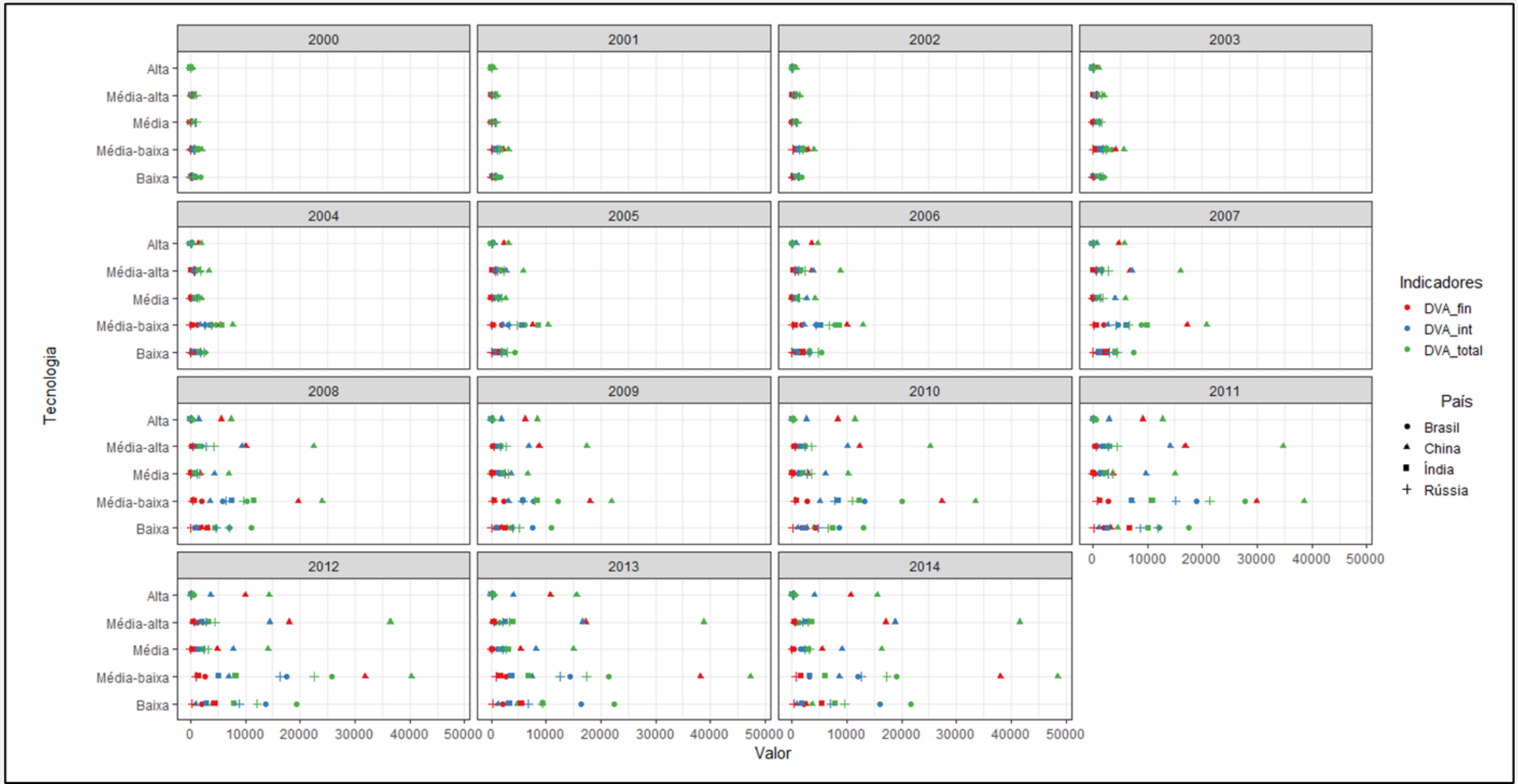


Country	2000				2014			
	Out-degree	Betweenness	Closeness	PageRank	Out-degree	Betweenness	Closeness	PageRank
Australia	0.77	0.00	0.78	0.02	0.81	0.00	0.93	0.02
Austria	0.95	0.01	0.93	0.03	1.00	0.00	1.00	0.02
Belgium	1.00	0.01	0.93	0.03	1.00	0.00	1.00	0.02
Bulgaria	0.23	0.00	0.70	0.02	0.95	0.00	0.96	0.02
Brazil	**0.86**	**0.00**	**0.78**	**0.02**	**0.98**	**0.00**	**0.90**	**0.02**
Canada	0.84	0.00	0.83	0.02	1.00	0.00	0.98	0.02
Switzerland	0.98	0.01	0.91	0.03	1.00	0.00	1.00	0.02
China	**0.93**	**0.00**	**0.84**	**0.02**	**1.00**	**0.00**	**0.98**	**0.02**
Cyprus	0.23	0.00	0.69	0.02	0.56	0.00	0.83	0.02
Czech Republic	0.93	0.00	0.83	0.02	1.00	0.00	1.00	0.02
Germany	1.00	0.02	1.00	0.03	1.00	0.00	1.00	0.02
Denmark	1.00	0.01	0.90	0.03	1.00	0.00	1.00	0.02
Spain	1.00	0.01	0.90	0.03	1.00	0.00	0.98	0.02
Estonia	0.30	0.00	0.63	0.01	0.84	0.00	0.90	0.02
Finland	0.95	0.01	0.86	0.02	0.98	0.00	0.98	0.02
France	1.00	0.02	1.00	0.03	1.00	0.00	1.00	0.02
United Kingdom	1.00	0.01	0.98	0.03	1.00	0.00	1.00	0.02
Greece	0.72	0.00	0.88	0.03	0.95	0.00	0.98	0.02
Croatia	0.44	0.00	0.75	0.02	0.81	0.00	0.83	0.02
Hungary	0.84	0.00	0.84	0.02	0.98	0.00	0.98	0.02
Indonesia	0.79	0.00	0.72	0.02	0.91	0.00	0.83	0.02
India	**0.77**	**0.00**	**0.77**	**0.02**	**0.98**	**0.00**	**0.90**	**0.02**
Ireland	0.91	0.00	0.84	0.02	1.00	0.00	1.00	0.02
Italy	1.00	0.01	0.96	0.03	1.00	0.00	1.00	0.02
Japan	0.93	0.00	0.84	0.02	0.95	0.00	0.98	0.02
South Korea	0.86	0.00	0.78	0.02	1.00	0.00	0.96	0.02

Country	2000				2014			
	Out-degree	Betweenness	Closeness	PageRank	Out-degree	Betweenness	Closeness	PageRank
Lithuania	0.40	0.00	0.66	0.02	0.81	0.00	0.93	0.02
Luxembourg	0.63	0.00	0.68	0.02	0.95	0.00	0.91	0.02
Latvia	0.33	0.00	0.65	0.01	0.72	0.00	0.83	0.02
Mexico	0.72	0.00	0.83	0.02	0.84	0.00	0.91	0.02
Malta	0.28	0.00	0.66	0.02	0.79	0.00	0.78	0.02
Netherlands	1.00	0.01	0.98	0.03	1.00	0.00	1.00	0.02
Norway	0.91	0.01	0.88	0.02	0.95	0.00	0.98	0.02
Poland	0.93	0.01	0.88	0.02	1.00	0.00	1.00	0.02
Portugal	0.65	0.00	0.83	0.02	0.93	0.00	0.91	0.02
Romania	0.70	0.00	0.80	0.02	0.95	0.00	0.96	0.02
Rest of the world	1.00	0.02	1.00	0.03	1.00	0.00	1.00	0.02
Russia	**0.91**	**0.01**	**0.90**	**0.03**	**1.00**	**0.00**	**1.00**	**0.02**
Slovakia	0.51	0.00	0.69	0.02	0.95	0.00	1.00	0.02
Slovenia	0.49	0.00	0.77	0.02	0.91	0.00	0.90	0.02
Sweden	0.98	0.01	0.93	0.03	1.00	0.00	1.00	0.02
Türkiye	0.93	0.01	0.91	0.03	0.98	0.00	0.98	0.02
Taiwan	0.86	0.00	0.81	0.02	0.98	0.00	0.84	0.02
United States	1.00	0.02	1.00	0.03	1.00	0.00	1.00	0.02

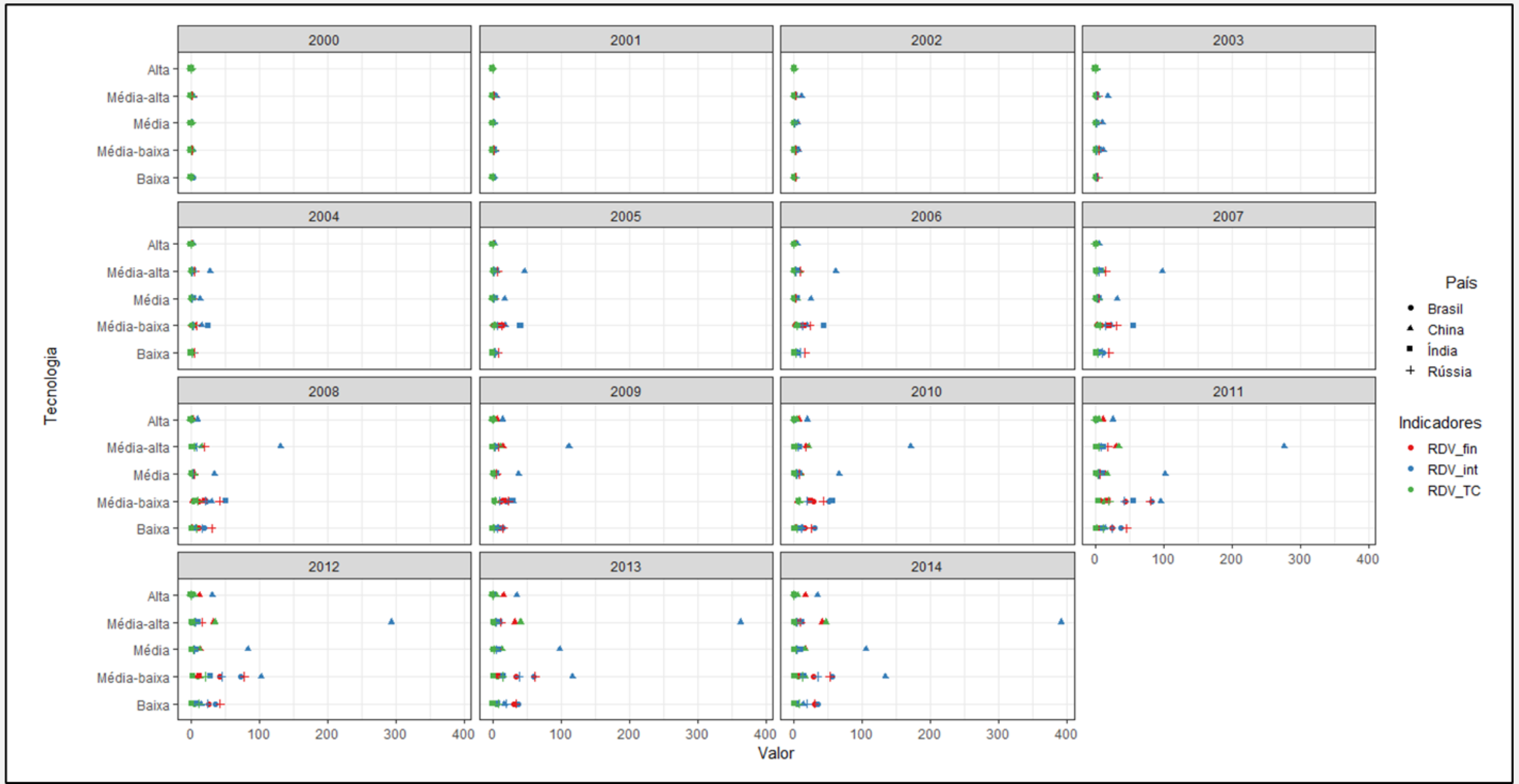
RESULTS

Figure 2 . Indicators of domestic value added in trade between the BRICs from 2000 to 2014



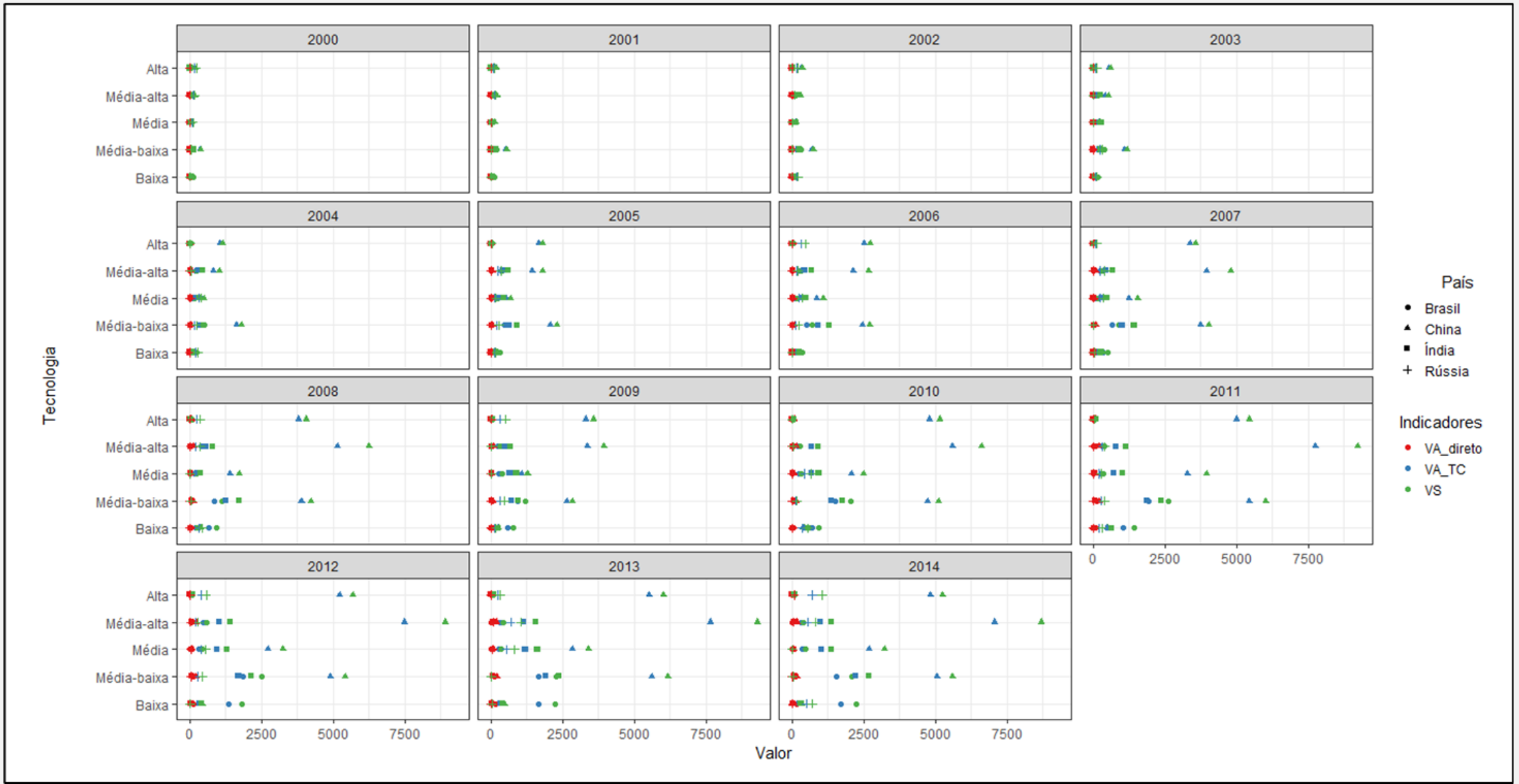
RESULTS

Figure 3 . Indicators of domestic value added returning home in trade between BRICs from 2000 to 2014



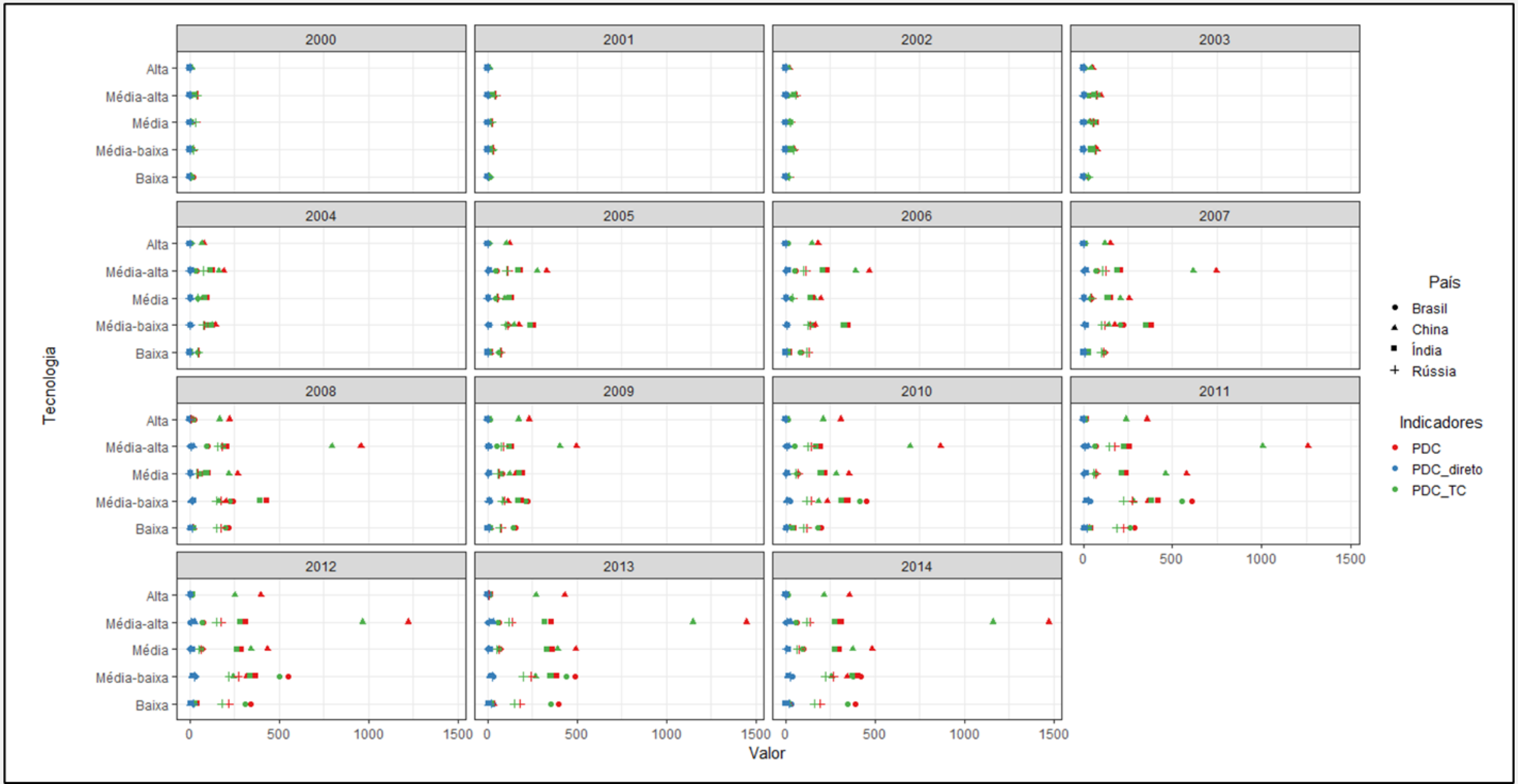
RESULTS

Figure 4 . External value added indicators based on trade relations between direct importers and third countries in trade and vertical specialization of production between the BRICs from 2000 to 2014



RESULTS

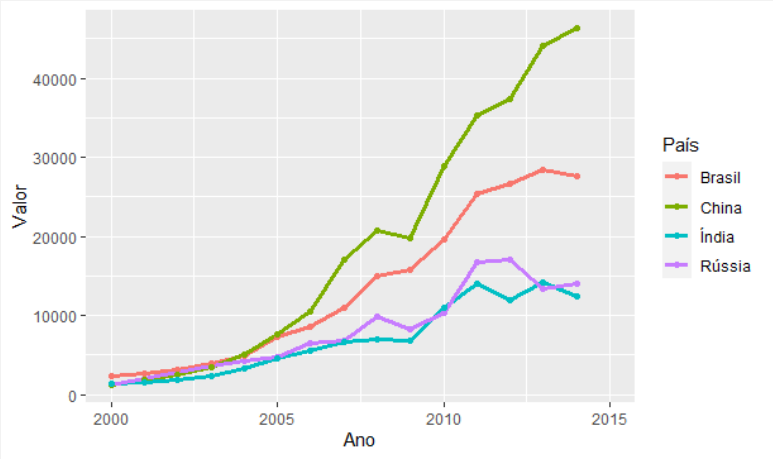
Figure 5. Indicators of domestic value added in terms of double counting in trade between the BRICs from 2000 to 2014



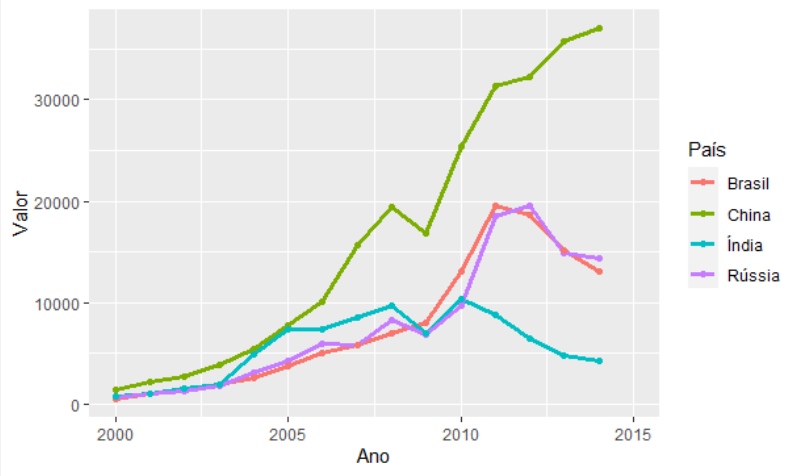
RESULTS

Figure 6. Level of commercial expansion based on *forward linkages*

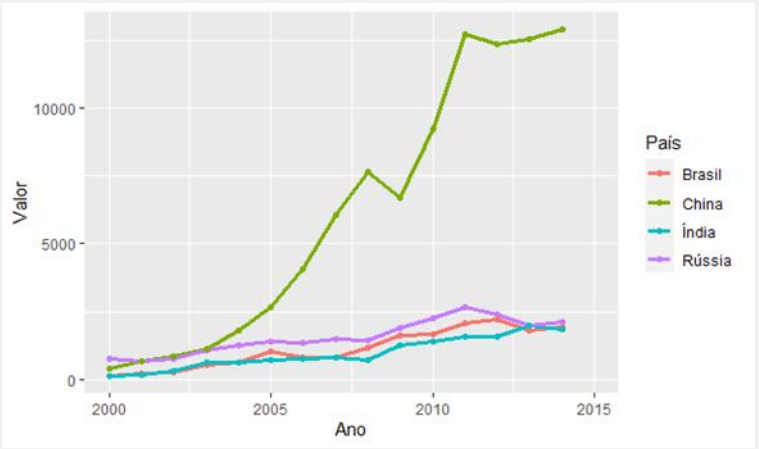
(a) Low technology industries



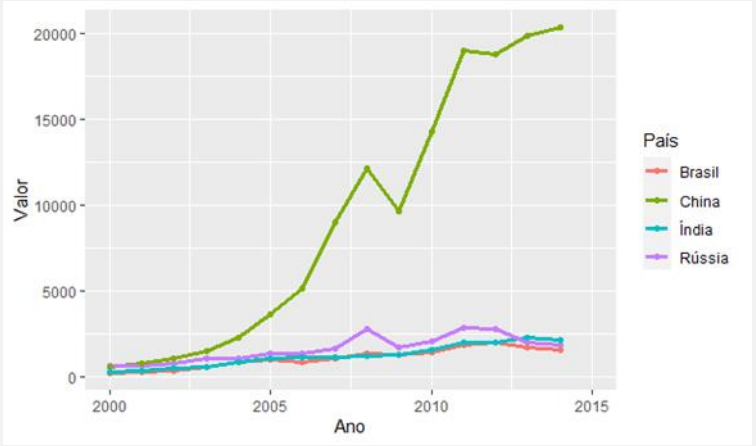
(b) Medium-low technology industries



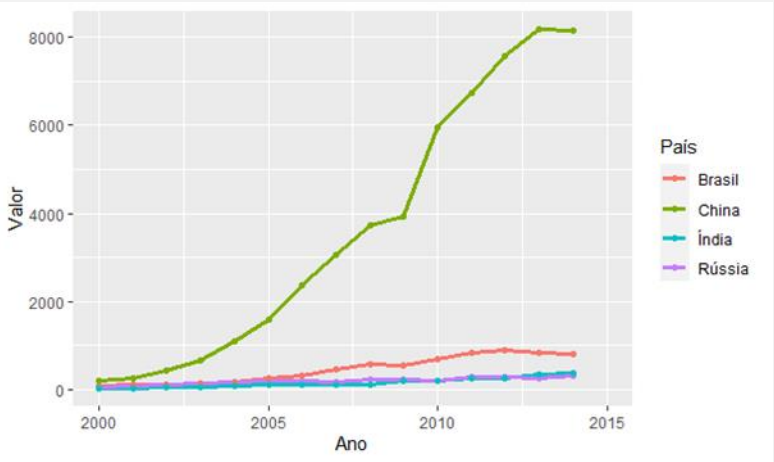
(c) Medium technology industries



(d) Medium-high technology industries



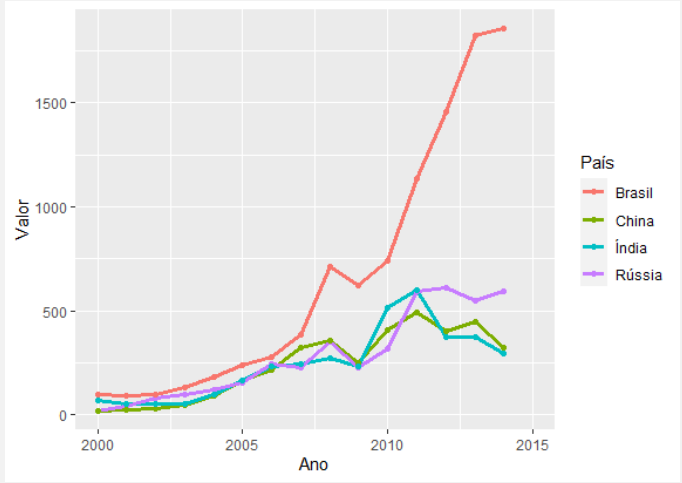
(e) High technology industries



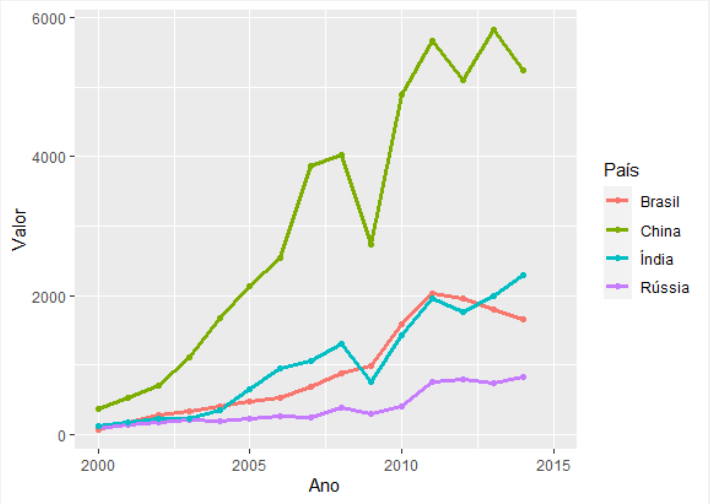
RESULTS

Figure 7. Level of commercial expansion based on *backward linkages*

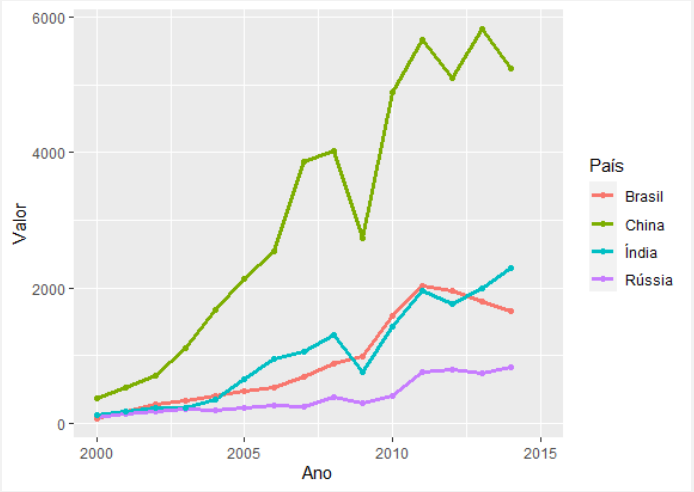
(a) Low technology industries



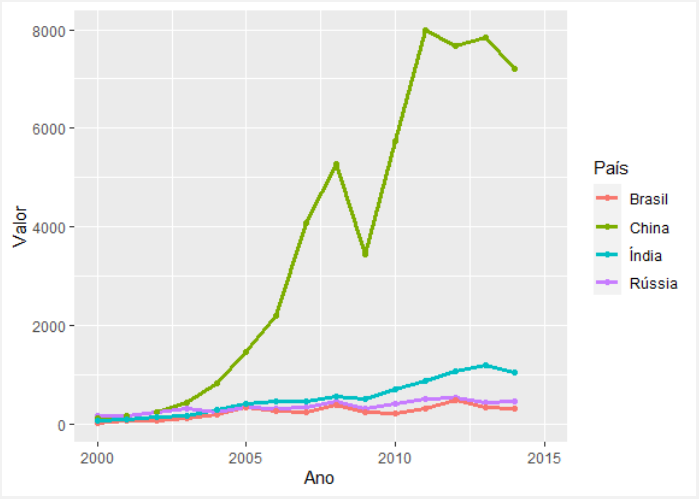
(b) Medium-low technology industries



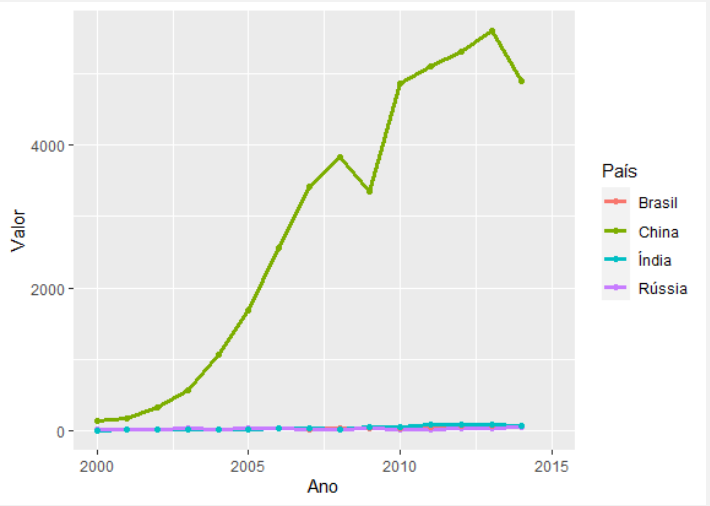
(c) Medium technology industries



(d) Medium-high technology industries

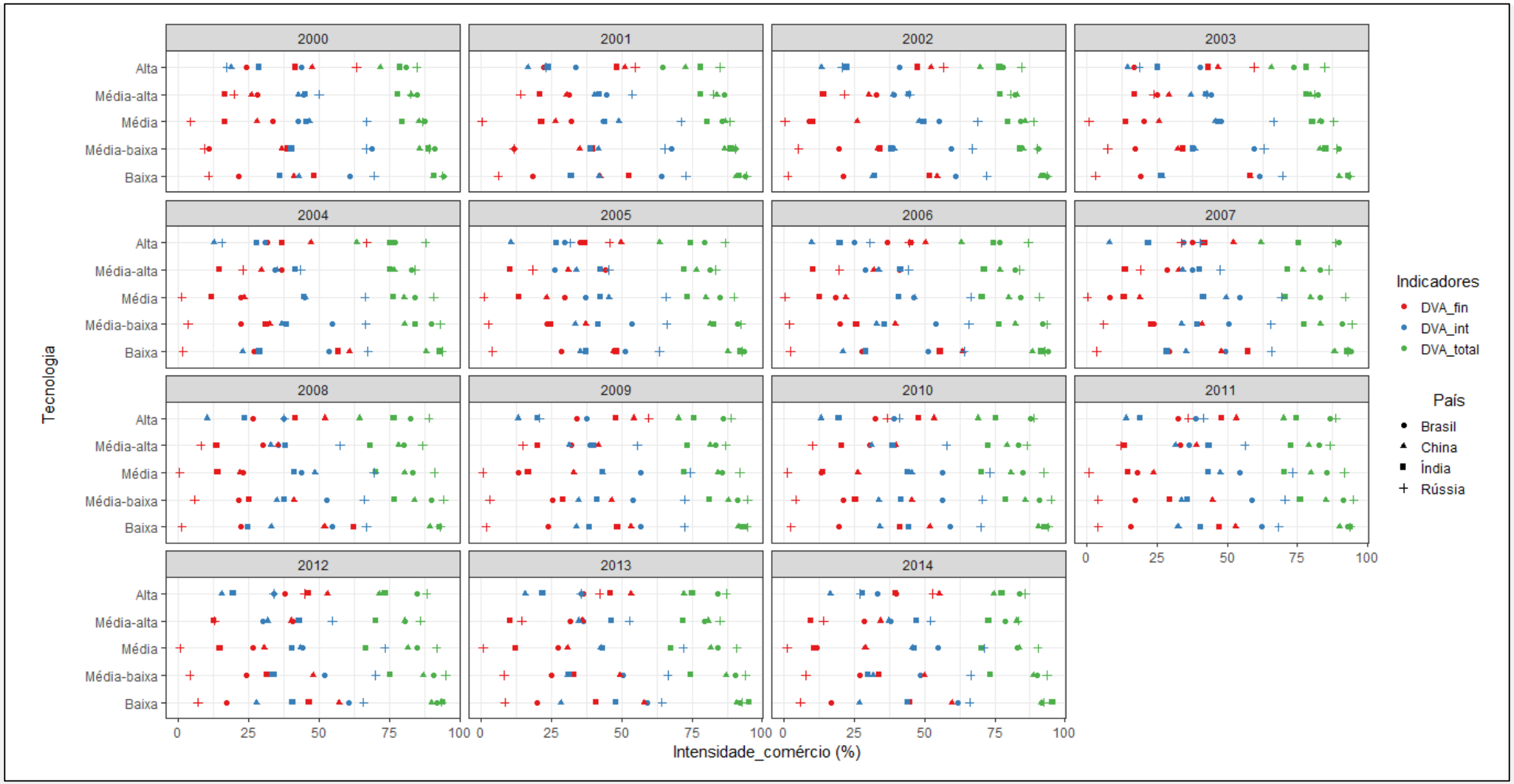


(e) High technology industries



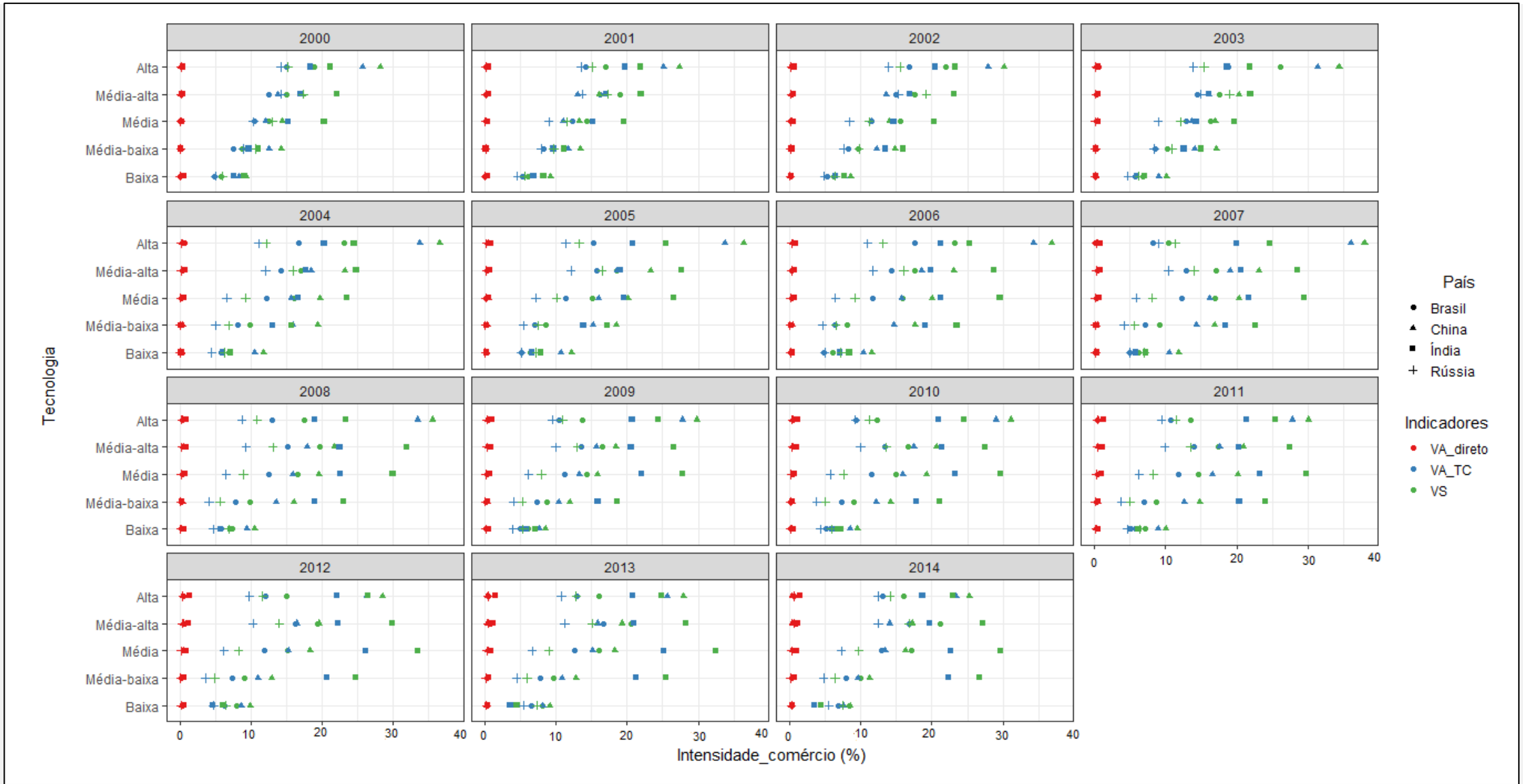
RESULTS

Figure 8 . Trade intensity terms based on domestic value added in trade between BRICs from 2000 to 2014



RESULTS

Figure 9 . Trade intensity terms based on the external value added of trade relations between direct importer and third country, and vertical specialization of intra-BRIC production from 2000 to 2014



CONCLUSIONS

- The approach used in this article offered a basis for analyzing trade between BRIC countries in more depth.
- The intensity of trade relations between these bloc countries is expected to increase, mainly through the elimination of non-tariff barriers.
- The new political and trade agreements between the BRICs will be important for cooperation and play a more relevant and efficient role in future trade relations between these emerging markets and other developing economies.
- The BRIC economies moved closer to global markets after their respective trade liberalization processes. However, intra-BRIC trade has not evolved as expected since the acronym was created.
- Among the reasons for this, we can mention the differences in each country's technological levels, resource endowments, and political conditions.
- The purpose of cooperation between the BRICs must go beyond commercial issues; expanding participation in economic and political decision-making processes is essential for broad representation of emerging and developing economies.

THANK YOU

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