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Capturing the gains from globalization: Assessing regional market share of value-added

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Abstract:

This article extends the indicators developed to capture trade in value added to consider how countries are gaining or losing industries' market share in domestic, regional, and global demand (the Access to Demand). It uses the most recent ICIO matrices of TiVA (OECD) to calculate the indicators for 69 countries and 16 manufacturing industries (+ modern services) from 2000 to 2018. Descriptive statistics are provided and analyzed for different regions of the globe. Countries that took advantage of trade globalization are those which have compensated for the loss of domestic market share by significantly increasing foreign and regional market share. Results also suggest the increasing importance of regional markets and South-South trade, as well as the need for considering industry heterogeneity to understand a country's trade performance.

Keywords: Trade in value-added, structural change, international trade, globalization.

JEL classification: F63

1. Introduction

> "(…) the world of foreign trade is one of change. It makes great difference to the trade of different countries, and to the impact of trade on them, whether they are capable of changing with the world (…)"[1].
>
> Charles Poor Kindleberger (1962)

World trade has changed sharply in the last three decades with the advent of globalization, and with it, the amount of goods and services traded between countries has increased considerably. Production processes have fragmented, and new global supply chains have evolved, greatly changing the role of developing and developed countries in what is called global value chains. However, how these shifts have potentialized or restricted the opportunities for economic catch-up by developing countries remains a theoretical debate and an empirical question.

The traditional view of economic literature is that openness to international trade leads to economic growth and potentially better well-being conditions except in some cases of distortions and market failure.[2] The starting point is the Ricardian theory of comparative advantages in which trade enables a more efficient use of a country's resources by enabling imports of goods that could be produced at home only at higher resource costs. The theory was later contextualized to the world with increasing international fragmentation of production in Baldwin and Evenett (2015), who argue that the new trade configuration of global value chains does not change the logic of the theory. This logic predicts that countries become more specialized in carrying out activities within stages of the production process based on their comparative advantage.

In contrast, non-mainstream authors have argued that catching-up and industrial upgrading requires exactly the opposite – the comparative advantage "defiance" (Ha-Joon, 2002a; Chang, 2007; Kozul-Wright and Rayment, 2007; Reinert, 2007) – and have reached more nuanced conclusions. Kindleberger (1962) groups the post-Keynesian and structuralist thought on trade and growth into three different categories that remain close to the actual debate: the export-led, the balance-of-payments (BP) constrained, and the skeptical view. In the first category, exports can generate a rise in demand for different products, can stimulate technical change and new investment opportunities by putting pressure on domestic capacity, and is considered the main component of demand just like in the export-led growth model built on the notion of cumulative causation developed by Kaldor (1970). Departing from the export-led model, the BP constrained view puts more emphasis on import behavior and asserts that growth depends on the relationship between the income elasticities for exports and imports, in a context in which relative prices are stationary[3] and the Marshall-Lerner condition holds (Thirlwall, 1979). Finally, there is the

[1] Phrase extracted from the book (page 10) 'Foreign trade and the national economy' by Charles Poor Kindleberger published at theYale University Press at New Haven in 1962.

[2] Jayme Jr (2001) traces the interrelations between the comparative advantage theory and the Hecksher-Ohlin-Samuelson (H-O-S) model with the neoclassical growth theory in great detail as well as illustrates the orthodox literature that points out possible ambiguities between trade and growth such as in Bhagwati (1958) and Rodrik (1999).

[3] This hypothesis has been questioned and relaxed in many studies that argue that a policy to maintain a competitive exchange rate could influence the income elasticities for exports and imports by fostering a process of

'skeptical' view, which was formulated by many structuralist authors who analyzed the diverse binding constraints of trade (Prebisch, 1950; Nurkse, 1953), especially for the infant industry. These authors show the importance of the domestic market in the process of economic development and, in turn, often advocate for import substitution policies. Nonetheless, even the last view highlights the importance of trade to acquire capital goods, inputs, and technology.[4]

Notably, all three groups have in common the understanding that what matters most is how countries are inserted in international trade, in other words, which products they export and import. This thinking has its roots in the structuralist literature, which emphasizes that moving the production structure toward manufacturing is a fundamental facet of the development process (Prebisch, 1950; Singer, 1950; Lewis, 1954; Furtado, 1961). As manufacturing presents a higher degree of increasing returns to scale than the primary sector (McCombie, Pugno and Soro, 2002) and higher elasticities of demand for exports (Gouvea and Lima, 2010), it can generate a cumulative causation growth process as indicated by Kaldor (1978) and more recently by Boggio and Barbieri (2017). These studies have evolved to include modern services (Evangelista, Lucchese and Meliciani, 2013; Pereira, Missio and Jayme Jr, 2020) and to focus on the importance of looking at the technology and knowledge embodied in different industries and the level of economic complexity related to each product. In this context, it has been argued that exporting more sophisticated and/or complex products that embody higher amounts of productive knowledge (Hausmann et al., 2011) is key to the convergence of productivity between different countries (Rodrik, 2013).

Those economic theories have shown to be appropriate for explaining income divergence among countries in a similar international context. The recent cases in which Latin American countries have faced a regressive specialization, while many Asian countries have shifted towards the production and export of sophisticated and complex goods and services serve as examples. Important research has thus focused on how countries have acted towards and have taken (or not) advantage of international trade (Bresser-Pereira, Araújo and Costa Peres, 2020; Bresser-Pereira, 2021) or how countries have developed their capabilities to adapt to changes in trade patterns as a necessary skill for maximizing gains from trade, and, as a consequence, for economic development (Kindleberger, 1962). Moreover, if international trade can be also understood as the mechanism by which countries can reach different markets, as important as understanding demand and consumption patterns, is to understand how countries are prepared and able to access this new demand. Being able to adapt to ever-changing demand patterns is crucial to understanding development dynamics (Palma, 2009), and understanding how countries are accessing existing demand is crucial to comprehend investment decisions (Bresser-Pereira, 2014, 2024).

Inspired by Palma (2009) and Bresser-Pereira (2014, 2024) this chapter develops and analyzes an original indicator to investigate how local producers are accessing different markets (domestic markets, foreign markets, and regional markets), which contributes to illuminating how regions are inserted in international trade, how trade is contributing to their development and which regions

structural change of the economy (Araujo and Lima, 2007; Missio, Araujo and Jayme, 2017; Caglayan and Demir, 2019; Marconi et al., 2021).

[4] The developmental state literature, famous for its analysis of the East Asian Miracles, also highlights the role of exports as a means of conditionality to industrial policy and market discipline (Wade, 1990; Amsden, 1992). Machado (2022) analyses conditionalities in industrial policies in great detail.

captured the gains from globalization[5]. The use of the recent Inter-Country Input-Output (ICIO) tables became crucial to incorporating and interconnecting new characteristics of trade to different indicators. Those that trace the origin and destiny of value added are particularly suitable for capturing trade fragmentation and, thus, for explicitly examining the origins of the intermediate inputs used in exports, the production process, and global value chains (GVCs). While most studies focus on intermediary trade, foreign demand, and export value added, we develop a method that incorporates the role played by final goods – something that has become increasingly important but is usually disregarded by the academic literature (Milberg and Winkler, 2013) – and the role played by domestic and regional markets in the indicators. To accomplish this, we propose indicators that measure countries' share of value added embodied in final demand – called Access to Demand. It is the countries' market share, in terms of value added, of industries' domestic, foreign, and/or regional markets. With the indicators proposed, we can analyze (a) the net effect of trade on the country's local producers, as, for example, the cases in which the increase in foreign market share did not compensate for the loss in domestic market share (demand leakages[6]); (b) the importance of South-South trade for catching-up; (c) the importance of the domestic or foreign market depending on the regions and the technological intensity of the industry analyzed; and (d) how accessing domestic and foreign markets contributed to the process of structural change of the regions. Understanding these dynamics has become very crucial to understanding current trade dynamics and the opportunities of catching up for developing countries (Milberg and Winkler, 2013; Kozul-Wright and Fortunato, 2019).

Apart from this brief introduction, section 2 discusses the theoretical development of the trade-in value added methodology, its limitations, and its recent empirical findings. Section 3 describes the methodology for building the indicator of "Access to Demand" and its possible decompositions. Section 4 presents the empirical findings aggregated at the regional level. Lastly, section 5 presents the main conclusion of the paper and the prospects for future research.

2. Theoretical and empirical background

The origins of the recent methodologies to analyze world trade in value added traces back to the work of Leontief (1936), in which he developed a structural analysis of the US economy using the input-output (I-O) method. Very valuable studies of industrial linkages and sectoral decomposition have been drawn from this approach, such as the famous indices of forward and backward linkages, of which, Hirschman (1958) extensively used to understand a country's development process and to advise which industries to stimulate.

Hummels, Ishii and Yi (2001:75) relied on this methodology developed by Leontief to capture new features in the production process that "increasingly involve a sequential, vertical trading chain stretching across many countries, with each country specializing in particular stages of a good's production sequence." The authors used the (I-O) matrices to measure what they have called *vertical specialization* – the value of imports required to produce one unit of exports – for 10 OECD countries and 4 emerging countries and have shown that this feature accounted for 21%

[5] The term Capturing the gains from globalization was inspired in a conversation with professor Willian Milberg in which he introduced to me the group "Capturing the Gains from Globalization" based at the University of Manchester, of which he has served on the steering committee.

[6] The case common to countries in which domestic demand has been captured by foreign producers though the substitution of domestic inputs for imported inputs (a common characteristic of GVC) and domestic production for imported final goods.

of the exports in the analyzed countries and that this value rose approximately 30% between 1970 and 1990.

Losa et al. (2012) have classified the studies of the production process and international trade focused on the origin and destiny of value added into two major groups: the Domestic Value-Added approach (DVA) and the Direct Trade Flow approach. The former refers to studies that have followed Hummels, Ishii and Yi (2001) and trace the link between trade and value added to measure the domestic value added content of gross export, or inversely, the foreign value added content of exports. The latter focuses on the value added content of trade flows originating from the demand of a particular country. In other words, the Direct Trade Flow approach traces the value added of different countries in the production stages to reach the final consumption of goods in a country. Thus, it is a measure of production sharing and of how the value of different factors of a country are embodied in the trade of intermediate and final goods (Johnson and Noguera, 2012).

Johnson (2014) uses the methodology developed by Johnson and Noguera (2012) to derive five major features in international trade: (a) there is a great and increasing difference between gross and value added exports, at that time around 25%; (b) services role in manufacturing trade is acquiring greater importance when one analyzes trade in value added terms; and (c) differences are very heterogeneous across countries and (d) across partners, and (e) are changing unevenly over time, with relative importance for countries reaching trade agreements (which tend to generate large declines in value added compared to gross exports).

All these major changes in the perception and accounting of trade and production also generated new evidence on how this new world setting benefits or harms income convergence across countries.[7] Pahl and Timmer (2019) use a panel of a large set of countries from 1970 to 2008 to evaluate the role of GVCs in increasing productivity and labor opportunities and concluded that while it has been beneficial to productivity growth in the manufacturing sector (the higher it is, the greater the technological gap), the GVCs have not significantly increased employment opportunities in the South. The same conclusion was reached by Pahl et al. (2019) in their analysis of African countries.

Using a panel of 125 countries from 1997 to 2013, Fagerberg, Lundvall and Srholec (2018) concluded that countries that increased their participation in GVCs did not perform better than others once the study was controlled for other relevant factors such as the size of the country and the level of technological capability. Along the same line, Rodrik (2018) argues that new technologies pose problems for less developed countries in the context of GVCs since these countries are normally less prepared in terms of capabilities and skills, and thus their comparative advantage in labor intensive manufacturing and other activities is reduced. Moreover, the author argues that GVCs make it harder for less developed countries to use their comparative advantage in cheaper labor resources to offset their disadvantage in technology. In fact, Buckley et al. (2020) have shown that GVCs impact differently on countries depending on the knowledge characteristics of the industry analyzed. On the one hand, the author has observed a catching-up by developing countries in income derived from manufacturing activities that handle the physical transformation

[7] Heimberger (2022) implemented a meta-analysis and a meta-regression of a dataset containing 5542 estimates on the relationship between trade and growth and has found evidence of selection bias in favor of positive growth effects of globalization.

process of goods. On the other hand, convergence in income derived from the knowledge intensive sector, normally carried out in a pre and/or post manufacturing stage, has been very weak.

The problem is that both the literature that proposes indicators to measure global value chain participation and upgrading and the literature that uses these indicators to econometrically investigate the role of GVCs in development and catching-up do not consider how these new features in trade and production integration have impacted the role played by the domestic market, by South-South trade and the regional markets, as well as the impact of the substitution between domestic and imported inputs. The few exceptions that deal with the role played by imports are Carballa Smichowski, Durand and Knauss (2021) and Magacho, Mccombie and Guilhoto (2018). The former proposes to measure GVC performance and domestic value-added exports over GDP, which would make imports represent a real cost that could offset some of a country's gains in terms of capturing value through GVC exports. The latter highlights the importance of analyzing the role played by the substitution between domestic and imported inputs, since a reduction in the former may be related to lower demand for other industries (as argued by Hirschman, 1958) or prejudicial to a country's system of innovation (Pisano and Shih, 2009, apud Magacho, Mccombie and Guilhoto (2018)). Focusing mainly on Brazil, they find that in many cases the positive impact of export growth on total output could have been offset by the increase in imported inputs, especially in highly technological industries.

In addition, the literature also pays little attention to the role of trade in final goods, which have become very important to understanding the new features of global value chains. Milberg and Winkler (2013) described this as the "manufacturers without factories" or "fab-less" that have chosen to focus on their core competence, which generally includes design, marketing, and finance, and thus with all manufacturing done abroad and mostly through arm's-length contracts. The best example is the large retailers like Wal-Mart, or companies such as Nike and Calvin Klein, in which the value added by the lead firms comes from marketing, design, retailing or financial activities. Moreover, Milberg and Winkler (2013) and later Kozul-Wright and Fortunato (2019) have stressed important new features of GVCs such as the increase in the reliance on domestic and emerging markets, the intensification of regional value chains and the role played by South-South trade.

Table 1: Main and proposed indicators of trade performance in the context of globalization and global value chains

Indicator	Formula	Sources	Strengths/Limitations
Domestic value-added share of exports	XDVA/X	Taglioni and Winkler (2016); UNCTAD (2013); Johnson and Nogueira (2012); Kowalski et al. (2015)	Considers DVA gains in relation to exports but not in relation to GVC trade
Domestic value added by industry	DVAi	Kummritz et al. (2017)	Very distant to GVC trade
Foreign VA in Exports	FVAX	Amador and Cabral (2017)	Traces production sharing
Domestic value added in GVC trade	XDVA/GDP or XDVA/(GVCX + GVCM)	Carballa, Durand, Knauss (2021)	Captures DVA gains in relation to total GVC- related trade. GVC import represents a real cost that could offset some of a country's gains in terms of capturing value through GVC exports.

Access to Global Demand	DVA_TD_ip/∑p(DVA_TD_i)	Authors Elaboration (01)	Captures countries' market share, in terms of VA, in a particular industry. It captures the net effect of trade in VA distribution, thus, both how countries absorbed foreign demand as well as how competitors absorbed their domestic demand. It incorporates intermediary and final demand.
Access to Foreign Demand	DVA_FD_ip/(∑p(DVA_i)-(DVA_DD_i+FVA_DD_i))	Authors Elaboration (02)	Measures countries' market share in value added incorporated in foreign demand.
Access to Domestic Demand	DVA_DD_i/(DVA_DD_i+FVA_DD_i)	Authors Elaboration (03)	Measures countries' market share in value added incorporated in domestic demand.
Access to Regional Demand	DVA_RG_i/∑p(DVA_RG_i)	Authors Elaboration (04)	Measures countries' market share in value added incorporated in regional demand.

Source: Authors own elaboration. dva = domestic value added, x=exports, xdva = domestic value-added exports, fvax = foreign value added embodied in exports, gdp = gross domestic product, dva_td = domestic value added embodied in total demand, dva_fd = domestic value added embodied in foreign demand, dva_dd = domestic value added embodied in domestic demand, dva_rd = domestic value added embodied in regional demand.

Table 1 summarizes the main indicators available in the literature and the proposed indicators developed in this chapter. The main difference lies in the fact that while traditional indicators divide value added by total exports or a country's GDP, in our proposed indicators the denominator is industries' total domestic, foreign, regional, or global demand. This gives us market shares in terms of value added and allows us to improve the analysis of important features of international trade in the context of globalization and global value chains such as (a) the role played by final goods; (b) the role played by domestic demand – or, in other words, the role played by the substitution of domestic for imported inputs and final goods; and (c) the role played by South-South trade and regional value chains. Moreover, the indicators are calculated at industry level, allowing for the investigation of divergent dynamics depending on the technological intensity of the economic activities, which have shown to be critical in the understanding of the deindustrialization of developed countries (Tregenna and Andreoni, 2020), as well explaining the regressive specialization of Latin America (Palma, 2014; Nassif and Castilho, 2020).

3. The indicator of Access to Demand: methodology

In the construction of the indicators, calculating market share through total production or exports of the industries may be unrealistic since it disregards the intermediate inputs used in the production process. This consideration becomes even more pertinent if there is interest in evaluating the access to foreign demand, which has itself undergone profound changes in recent decades with the emergence of global value chains and the consequent fragmentation of production in the value that is exported and has been generated outside the exporting country.[8] These

[8] Milberg and Winkler (2013, p.36) use the following example to illustrate this feature: "Apple imports the iPhone from Foxconn in China for $179 and sells it for $600 in the U.S. retail market. In 2007, China ran a $1.9 billion trade surplus with the United States in iPhones. The cost of assembly in China of all iPhones shipped to the United States was $73.5 million. U.S.-made parts that were included in the Chinese assembly process were valued at $121.5 million. Thus, in value terms, the Chinese actually ran a trade deficit with the United States in iPhones ($73.5 − $121.5 =−$48 million), despite the official statistics showing China's $1.9 billion surplus in iPhone trade with the United States."

transformations in the structure of international trade and production generate distortions in the analysis and empirical interpretation when using traditional indicators such as gross exports or global market share to assess the competitiveness of an industry or country. (Los; Timmer; De Vries, 2015, 2016; Timmer; De Vries, 2015).

In this context, the methodological approach of input-output is appropriate, since it makes it possible to capture this generation of value added, in a sectorial manner, and to consider its origin and destination. Therefore, algebraic applications to global input-output matrices make it possible to construct an index that measures the market share in value added, or the share that local producers are capturing from total global demand of the respective industry, which henceforward will be called Access to Global Demand (AGD = η).

The AGD aims to measure how much an industry (*i)* of a country (*p)* is capturing from the global demand of this respective industry *i*. In other words, it is a relative index that captures how much the industry *i* of a country *p* is capturing (or not) from an increase (decrease) in the global demand (thus, both internal and external demand), considering global demand as both global final demand and global intermediate consumption.

According to Miller & Blair (2009), if we denote by *x_i* the total output of industry *i* of a country, z_{ij} the production of industry *i* that is used as intermediary input for industry *j* and by *f_i* the total final demand for the product of industry *i*, we can write the equation that represents how each industry *i* of a country distributes its product through sales to other industries and to final demand[9] as:

$$x_i = \sum_{j=1}^{n} z_{ij} + f_i \quad (1)$$

The technical coefficient that indicates the ratio between inputs of industry *i* sold to industry *j* with respect to the total production of industry *i*, would be $a_{ij} = \frac{z_{ij}}{x_j}$ and, therefore, considering all sectors, we can, by matrix notation, describe the total production as:

$$X = Ax + f \quad (2)$$

where A is the technical coefficient matrix and *f* the column vector of final demand. Alternatively:

$$X = (I - A)^{-1} f \quad (3)$$

where $(I - A)^{-1}$ is the Leontief matrix.

Sectoral value added per unit of production (*v*) is:

$$v = \frac{VALU_i}{x_i} \quad (4)$$

where *v* is a column vector of the value-added coefficient and $VALU_j$ is the total value added of a country by industry.

The domestic value added embodied in the global demand (DG) is:

$$DG = v^{ID}(I - A)^{-1}F \quad (5)$$

[9] Final demand is composed by household domestic consumption, government domestic consumption, investment, and exports.

where

$$v^{ID} = (v \odot D) \text{ (6)}$$

D is a dummy diagonalized matrix of ones for the industry *i* of country *p* and zero elsewhere, and $\odot$ denotes element wise multiplication. F is the column vector of the global final demand. v^{ID} *is a* matrix of zeros beside the diagonal that is equal to *v* in the dimension representing the industry of country *p*, DG is a column vector.

We aim to measure the access to global demand – the market share of local producers of industry *i*, in terms of value added, of the global demand for industry *i*. Thus, we do not analyze in absolute terms but in relative terms, or, in other words, we focus not on the value-added amount that an industry of a country captured but the value-added share that they have captured from global demand for this industry. Therefore, one must account for the global value added embodied in the global final demand (GGf), which is:

$$GGf = \sum_{p=1}^{n} [v^{I}(I - A)^{-1}F] \text{(7)}$$

where

$$v^{I} = I \odot v^{T} \text{ (8)}$$

GGf, is a column vectors of the industries' global value added embodied in global demand. Thus, dividing equation 5 by equation 8, we could measure the country's industries' access to global demand, as outlined in equation 9:

$$AGD = DG \oslash GGf \text{ (9)}$$

Where $\oslash$ is the element wise division operator, and AGD is a column vector of the access to global demand of a country by a sector.

3.1 Access to domestic demand (AdD), access to foreign demand (AfD) and access to regional demand (ArD)

As we have highlighted in sections one and two, it is extremely important to look separately at the capacity of local producers to capture domestic demand. Or, in other words, to analyze the role of domestic demand leakages. Consequently, one may want to decompose the AGD index into the AdD index and the AfD index.

Starting with the AdD index, the first step would be to calculate the industry *i* value added of country *p* absorbed by its domestic demand:

$$DDf = v^{ID}(I - A)^{-1}f^{D} \text{ (14)}$$

where

$$f^{D} = f \odot D \text{ (15)}$$

f^{D} is the column vector of the domestic final demand. DDf is a column vector. Again, we want to measure the share of domestic demand captured by local producers. Hence, we need to calculate total (global) value added embodied in the domestic demand, in other words, account for the total (domestic + foreign) value added absorbed in final and intermediary domestic consumption:

$$\text{GDf} = \sum_{p=1}^{n} [v^{I}(I - A)^{-1}f^{D}] \text{ (16)}$$

Where GDf is a column vector of the global value added embodied in the domestic demand. And to measure the country's industries' access (share) to domestic demand is:

$$ADD = DD \oslash \text{GD} \quad (17)$$

Where ADD is a column vector.

To measure the AfD, the first step would be to calculate the industry *i* value added of country *p* absorbed by the **foreign** demand:

$$DFf = v^{ID}(I - A)^{-1} f^f \quad (18)$$

where

$$f^f = F \odot (1 - D) \quad (19)$$

DFf is a column vector. Again, we want to measure the access to total foreign demand and thus we need to calculate the global value added embodied in the foreign demand:

$$GFf = \sum_{p=1}^{n} [v^I (I - A)^{-1} f^f] \quad (20)$$

Where GFf is a column vector of the global valued added embodied in the foreign demand. Therefore, to measure the country's industries' access to foreign demand, one must divide equation 18 by equation 20, as formally written in equation 21 below:

$$AfD = DF \oslash GF \quad (21)$$

Finally, to measure regional market share of value added, or access to regional demand (ArD), the first step would be to calculate the industry *i* value added of country *p* absorbed by the regional demand (f^r) :

$$DRf = v^{ID}(I - A)^{-1} f^r \quad (22)$$

where

$$f^r = F \odot (D^r) \quad (23)$$

D^r is a dummy diagonalized matrix of ones for the industry *i* of countries *from the selected region (r)* and zero elsewhere. DRf is a column vector. Again, we want to measure the access to total regional demand and thus we need to calculate global value added embodied in the regional demand:

$$GRf = \sum_{p=1}^{n} [v^I (I - A)^{-1} f^r] \quad (24)$$

Where GRf is a column vector of the global valued added embodied in the regional demand. Therefore, to measure the country's industries' access to regional demand one must divide equation 22 by equation 24, as formally written in equation 21 below:

$$ArD = DF \oslash GF \quad (25)$$

Appendix D illustrates the construction of this methodology in a 3-country model. The methodology proposed above is applied to the Inter-Country Input-Output (ICIO) tables developed

by OECD,[10] meaning that the indicators proposed are calculated to 69 countries, 16 manufacturing industries (+ Modern Services) from 2000 to 2018. To facilitate visualization, we have combined countries by regions, adapting the classification of United Nations,[11] and industries, adapting the OECD taxonomy of economic activities based on their research and development intensity (Galindo-Rueda and Verger, 2016). The list of countries and the regional classification can be found in Appendix A. The list of industries and their classification can be found in Appendix B. The descriptive statistics of the indicators can be found in Appendix C.

4. Capturing or losing Access to Demand: market share in value added distribution of domestic, foreign and regional markets

Let us start by looking at the regional market share of value added in the domestic (AdD) and international markets (AfD) according to the subgroups of activities based on research and development (R&D) intensity (Galindo-Rueda and Verger, 2016). For illustration purposes, we have combined high and medium-high technological subsectors and medium and medium-low technological subsectors. We also included modern services since the world trade in services has expanded sharply in the period analyzed (representing around 20% of international trade in 2014 (Loungani et al., 2017)), has become an important driver for catching-up in some regions (Porto, Lee and Mani, 2021), is very interlinked with manufacturing (Nordås and Kim, 2013), and has reached a dominant position in value chain architecture (Milberg and Winkler, 2013).

In Figures 1 and 2, we compare the market share from the first year available, 2000, and the last year of the series, 2018. The arrows in the figure always originate in the year 2000 and end in the year 2018. The y-axis is Access to Domestic Demand, so if the arrow is tending to the bottom of the figure – as indeed most arrows do – it means that the producers in the region are losing market share in their domestic markets. The x-axis is Access to Foreign Demand, so if the arrow tends to the right (left) of the figure, it means that the region is increasing (decreasing) its market share in foreign markets. Clockwise rotation means the region lost market share both in the domestic as well as the foreign market. Counter-clockwise rotation suggests that the loss in the domestic market is compensated (at least partially) by the increase in market share in the foreign market.

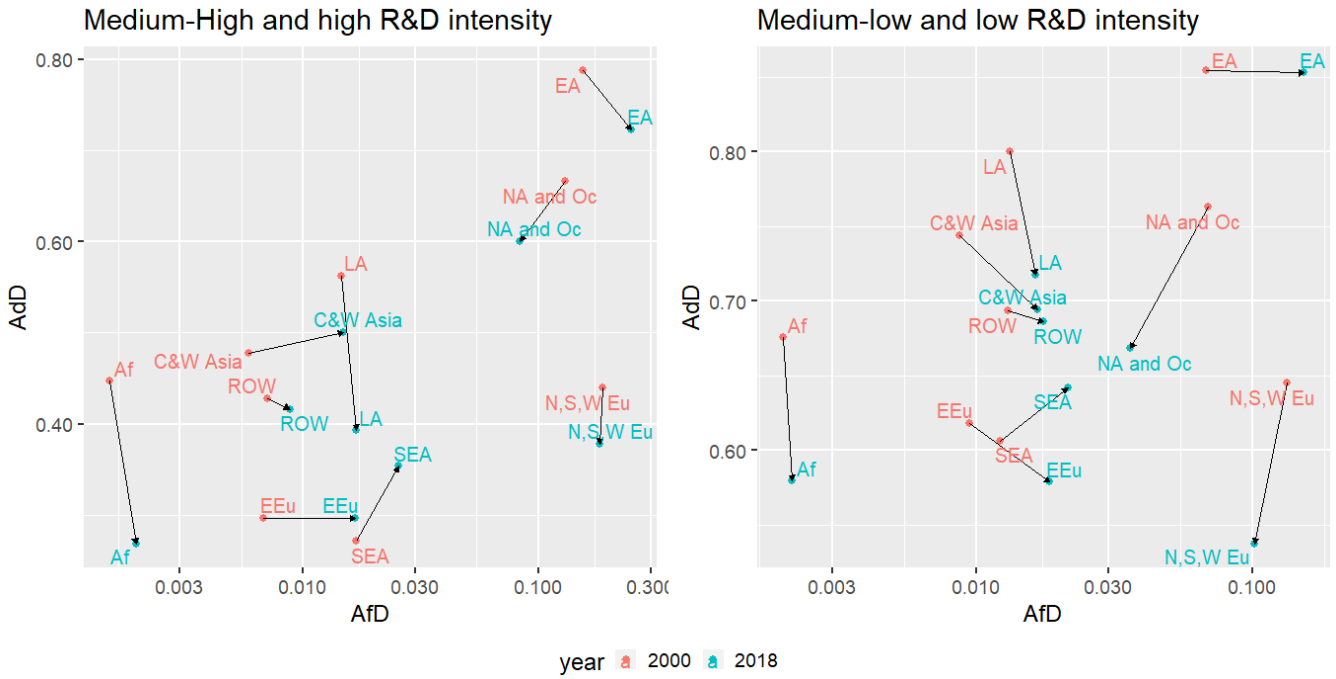
The figures show some common patterns for all regions but also great divergence. As for the former, we can see how globalization impacted similarly all regions regarding the local producers' market share of their domestic demand: all regions (besides South-eastern Asia in manufacturing activities and Eastern Europe in services) have lost market share of value added embodied in domestic demand. This means that there was an increase in competition between domestic producers and foreign competitors for accessing the domestic markets. At first glance, the loss of domestic market should not be interpreted as a negative sign since openness to competition might be very valuable for a firm's specialty during the catch-up process (Lee, 2018; Wong, Sheu and Lee, 2022) and may enhance upgrading prospects of domestic firms (Brandt and Thun, 2010).

The access to foreign demand has more nuanced patterns. We can group regions into three subgroups. Developed countries, such as North America and Oceania, and Central, Southern, and Western Europe have lost their market share considerably, but more intensely in the low and medium-low technology industries. North America and Oceania apparently compensated this loss

[10] OECD (2021), OECD Inter-Country Input-Output Database, http://oe.cd/icio, 2021 edition.
[11] For detailed methodology please access https://unstats.un.org/unsd/methodology/m49/.

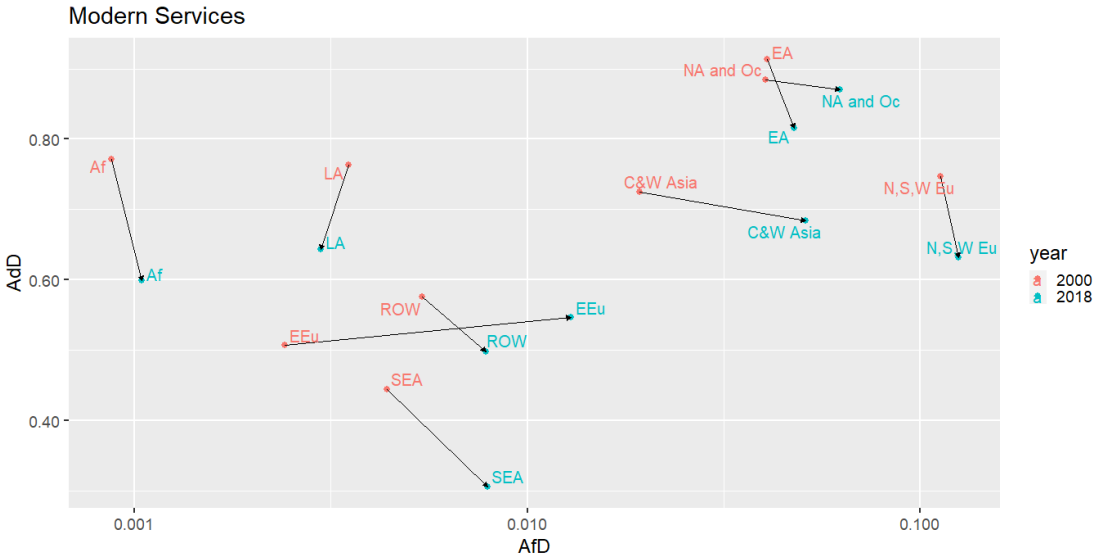
by substantially increasing market access in modern services. Africa and Latin America have gained market share modestly and mainly in the medium-low and low technology industries. Latin America reduced market share in modern services. Asian and Eastern European countries have gained market share in both modern services and in high, medium, and low technology industries.

Figure 1: Clockwise Versus Counter-Clockwise Trajectories by Region and Technology



Note: Authors' elaboration based on ICIO-OECD. Af = Africa; LA = Latin America; EEu = Eastern Europe; CSAAsia = Central, South and Western Asia; NA and Oc = North America and Oceania; NSWEu = North, South and Western Europe; EA = Eastern Europe; ROW = Rest of the World.

Figure 2: Clockwise Versus Counter-Clockwise Trajectories by Region and Technology



Note: Authors' elaboration based on ICIO-OECD. Af = Africa; LA = Latin America; EEu = Eastern Europe; CSAAsia = Central, South and Western Asia; NA and Oc = North America and Oceania; NSWEu = North, South and Western Europe; EA = Eastern Europe; ROW = Rest of the World.

The information revealed by this figure is in line with recent studies that emphasize the importance of analyzing whether patterns occurred analogously or differently across sectors, depending on their technological content. Tregenna and Andreoni (2020) have demonstrated the high degree of heterogeneity of deindustrialization depending on technological characteristics of the sector. The authors have shown that for developed countries, the greater the technological intensity of a manufacturing activity, the less concave is its pattern of development (deindustrialization).[12] In our figure this appears in the size of the arrow, which, taking the example of Central, Southern, and Western Europe, is much greater in the low and medium-low sector than the high and medium-high sector. Contrarily, the results are also in line with the analyses that have asserted that premature deindustrialization in Latin American countries have shown that deindustrialization has been more severe in high technology sectors (Palma, 2009; Nassif and Castilho, 2020; Dosi, Riccio and Virgillito, 2021).

Exploiting globalization opportunities seems to lie in opening the domestic market in exchange for expanding access to foreign markets – the counter-clockwise scenario – as losing local producers capacity to capture foreign demand might be a constraint to their capacity to innovate, and thus to escape the middle income trap (Lee, Szapiro and Mao, 2018).[13] This has been pointed out by Cimoli, Porcile and Rovira (2010) as a major difference between Asian and Latin American (LA) countries. This argument is also similar to those elaborated by Marconi et al. (2020) who, by analyzing the export and import input coefficients of Brazil, have argued that the country's manufacturing sector's openness to trade has remained substantially within imports rather than exports, especially in the high and medium high technological subsectors.

Even though most countries have shown a counter-clockwise pattern, the size of the arrows is very heterogeneous, meaning there may be cases in which the gain of foreign markets has more than compensated for the loss in the domestic market and cases in which this does not happen.

Figure 3: The Net Effect: Market Share of Global Demand by Region and Technology.

[12] They have shown that for some high-tech subsectors, there is no deindustrialization, and the pattern of development becomes a monotonically increasing line and even a convex curve. Since we aggregate many countries and subsectors, we cannot see this in Figure 1. A more detailed comment on heterogeneity within regions will be done later in this section.

[13] Moreover, Cirera et al. *(*2023, p.1), using firm-level data survey from Brazilian enterprises, have shown that "exporting has a positive effect on firms' likelihood of adopting advanced technologies in business functions related to business administration, production planning, supply chain management, and quality control, which are important for managing tasks associated with export activities"

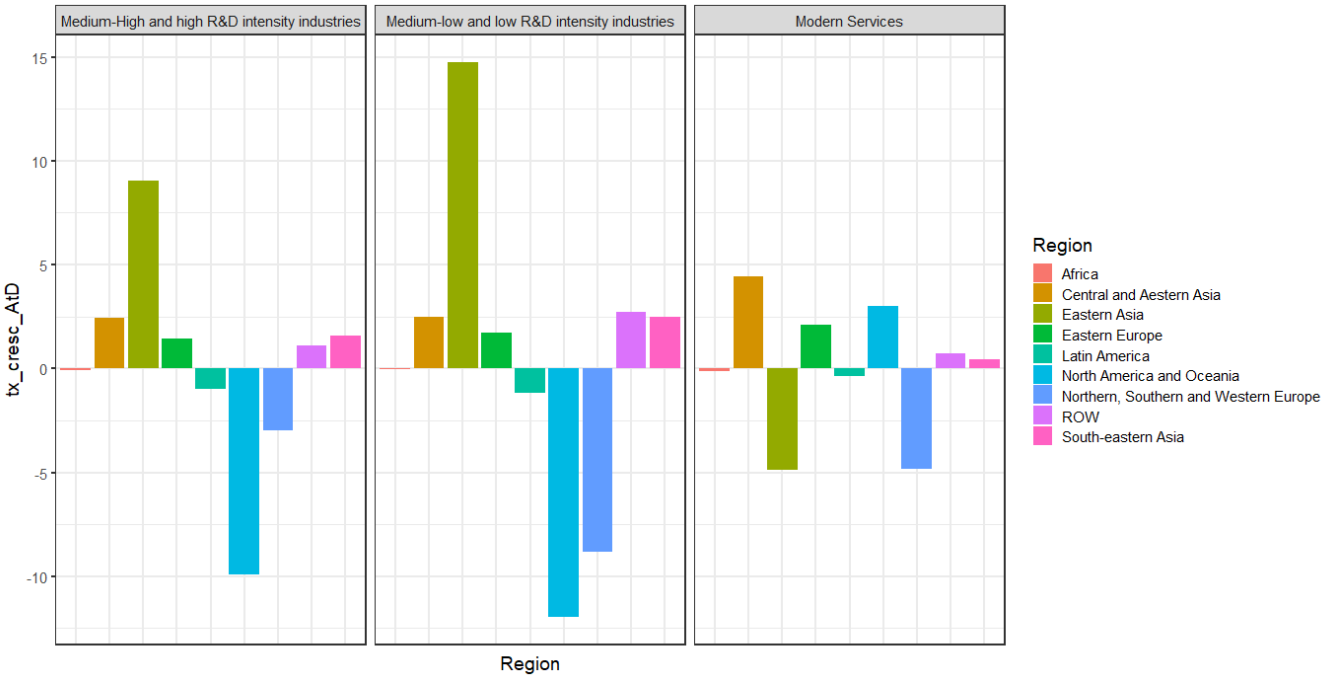


Figure 3 captures this net effect by showing (in percentage points) the market share of global (domestic and foreign) demand by region and technological intensity. Starting with developed countries, we can see that North America and Oceania, and Central, Southern, and Western Europe have lost market share in manufacturing from high to low technological intensities. However, we can see two main differences between these two regions: (a) the loss of market share in high-tech industries is much lower in Central, Southern, and Western Europe, both comparing to the medium and medium-low technological sectors and to the loss in North America and Oceania; and (b) the loss of North America and Oceania in manufacturing industries has been compensated by an increase in market share of the modern services' global market. This represents what Milberg and Winkler (2013) described as the new feature of global value chains – the "manufacturers without factories" or "fab-less" that have chosen to focus on their core competence, which generally includes design, marketing, and finance, and thus all manufacturing is done abroad and mostly through arm's length contracts. The best example is the large retailers such as Wal-Mart, or companies such as Nike and Calvin Klein in which the value added by the lead firms comes from marketing, design, retailing, or financial activities.[14] Our indicator does not include financial services, so the increase in market share or this type of service is probably much higher than what our indicator is suggesting.

Figure 3 better illustrates the divergent pattern of Africa and Latin America, on the one hand, and Asian and Eastern European countries, on the other. As for the former, it shows that despite having increased modestly access to demand in foreign markets (as shown in Figure 1), the loss of access to demand in the domestic market has been much greater, and the net effect was negative. Eastern

[14] For example, Milberg and Winkler (2013, p.34) illustrate that "Wal-Mart accounted for 9.3 percent of U.S. imports from China between 2001 and 2006, some $26 billion of imports in 2006 alone (Scott, 2007). But this feature can be seen across multiple sectors from clothing (The Gap) to toys (Mattel), electronics and computers (Apple, Dell, or Japan's Toshiba) to servers (Cisco Systems), even to semiconductors (Xilinx)"

Asia has increased its Access to Demand sharply in all manufacturing, but more profoundly in low and medium-low technological industries. However, it has lost global market share in modern services, mainly because of bad performance of Japan. In fact, in all subsectors, there is a sharp switch in the position of Japan to China as the country with substantial market share in the regional and global markets. Inversely, the rest of Asia increased its market share sharply in modern services (mainly because of India), and also increased market share in high, medium and low industries. Finally, Eastern Europe also gained market share in all economic sectors analyzed.

Let us now look at the evolution of the Access to Demand, by region and technological intensity. This enables us to understand the dynamics that played within the period analyzed. In the top of Figure 4a, we see the Access to Demand in foreign markets, and at the bottom of the figure, we see the Access to Demand in the domestic market. On the left, we see the medium and medium-high technology industries, and on the right, we see the medium and medium-low technological industries. For Eastern Asia, we see a sharp and continuous increase in the access to foreign demand, while the access to the domestic market reduced until the financial crisis of 2008 and then started to more or less stabilize. As for Central, Southern, and Western Europe, we can see that their loss in foreign market share started mainly around the financial crisis of 2008. Inversely, in North America and Oceania, we can see that the loss of market share of domestic and foreign markets more or less stabilized after the financial crisis.

Figure 4a: Evolution of Access to Demand in Foreign Demand (FD) and Domestic Demand (DD) by Region and Technology

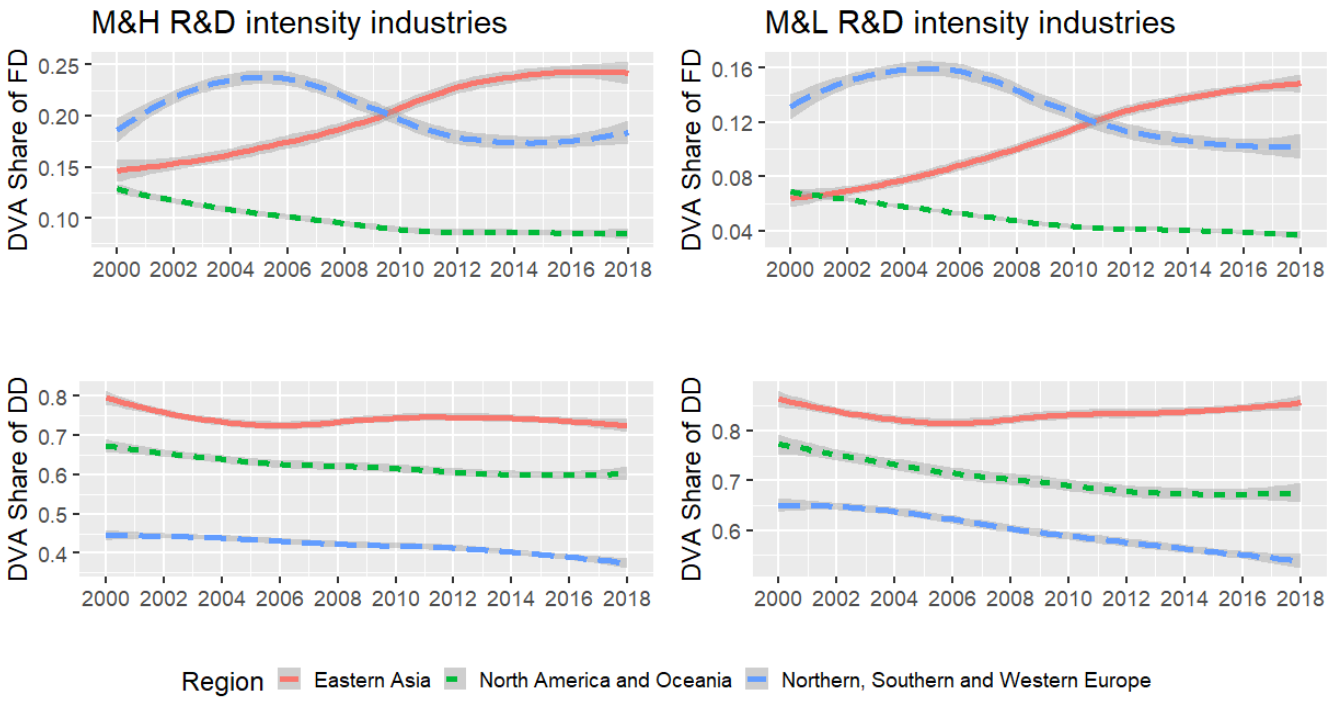
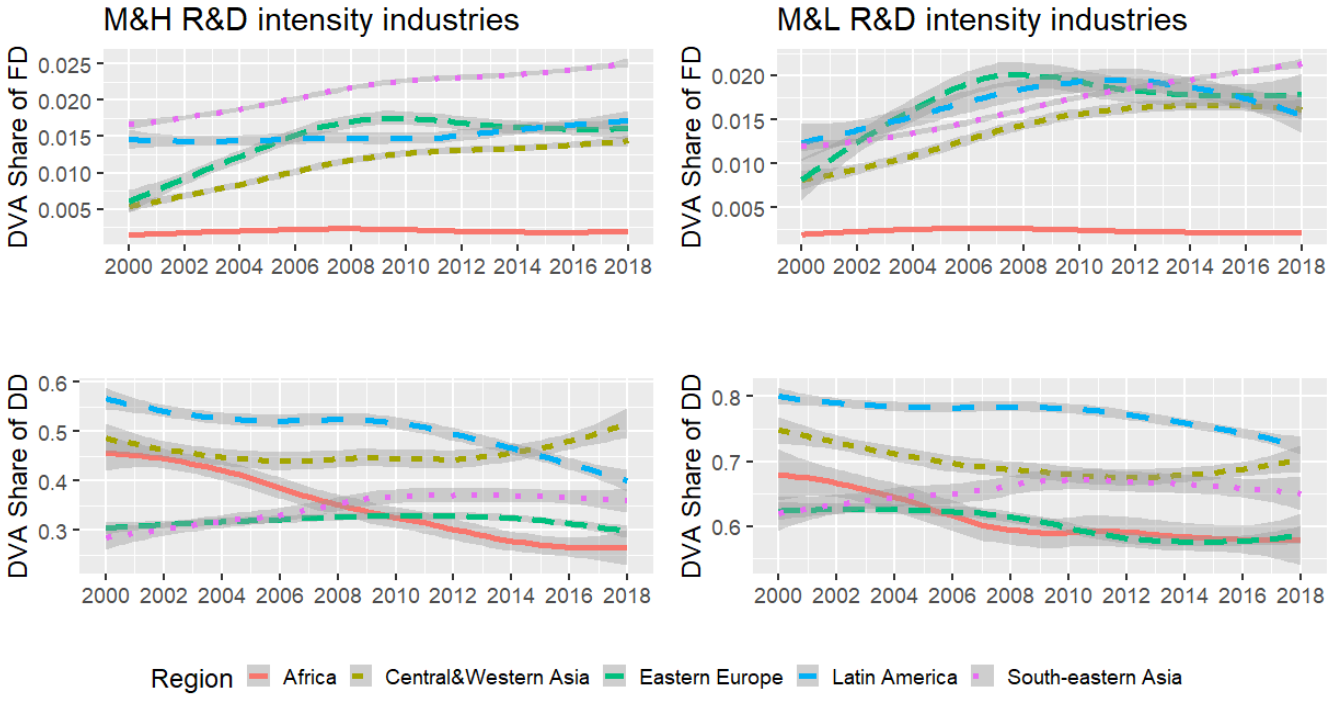


Figure 4b also shows that most trends changed after the global financial crisis of 2008 for the other regions. The most drastic shift seems to have happened in Eastern Europe. This region had experienced a striking upsurge in European cross-border flows of capital, a boom that followed the launch of the euro in 1999 and the convergence of the risk spreads of its members (Ocampo

and Arteaga, 2017). This period seems to have stimulated Eastern European countries' production structure to expand and catch-up with the global (especially EU) manufacturing market in the first decade of this century. However, the 2008 crisis generated a sharp contraction of the capital flows that forced Eastern Europe countries to make strong adjustments in the balance of payments. As a consequence, the region reduced its capacity to capture demand after the crisis, a trend that has been reversing only after 2015.

Central and Western Asia increased market share in foreign markets robustly until 2011 and have maintained their position since then. South-eastern Asia has substantially and continuously improved its access to foreign markets. As argued before, Latin America had a slight and continuous increase in access to foreign market, but Figure 3b shows that after around 2009 the region substantially lost access to domestic market (especially in the high and medium-high technological industries). The case of Africa is similar, but the decline in domestic market share started even earlier, at around 2004.

Figure 4b: Evolution of Access to Foreign Demand (AfD) and Domestic Demand (AdD) by Region and Technology

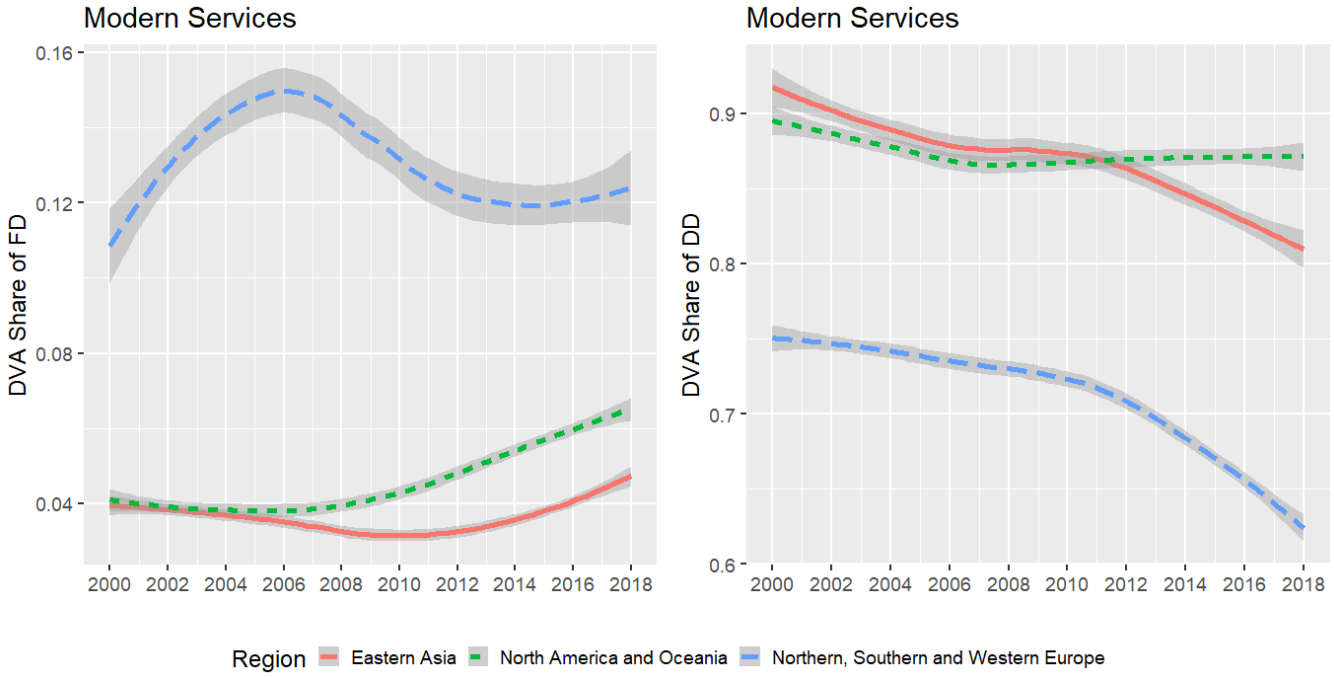


Source: Authors elaboration based on ICIO (OECD).

Let us now look at the evolution of Access to Demand in modern services. Like in Figures 4a and 4b, Figure 5a and 5b shows regional market share in the domestic and foreign markets. Central, Southern, and Western Europe started to lose substantial market share in modern services activities in both domestic and foreign markets after the financial crisis. North America and Oceania have increased their foreign market shares while maintaining their domestic market shares. Eastern Asia has also increased its foreign market share of modern services; however, it has lost domestic market share considerably. Central and Western Asia have sharply and continuously increased their foreign market shares. Eastern Europe and Southeastern Asia have also increased their market

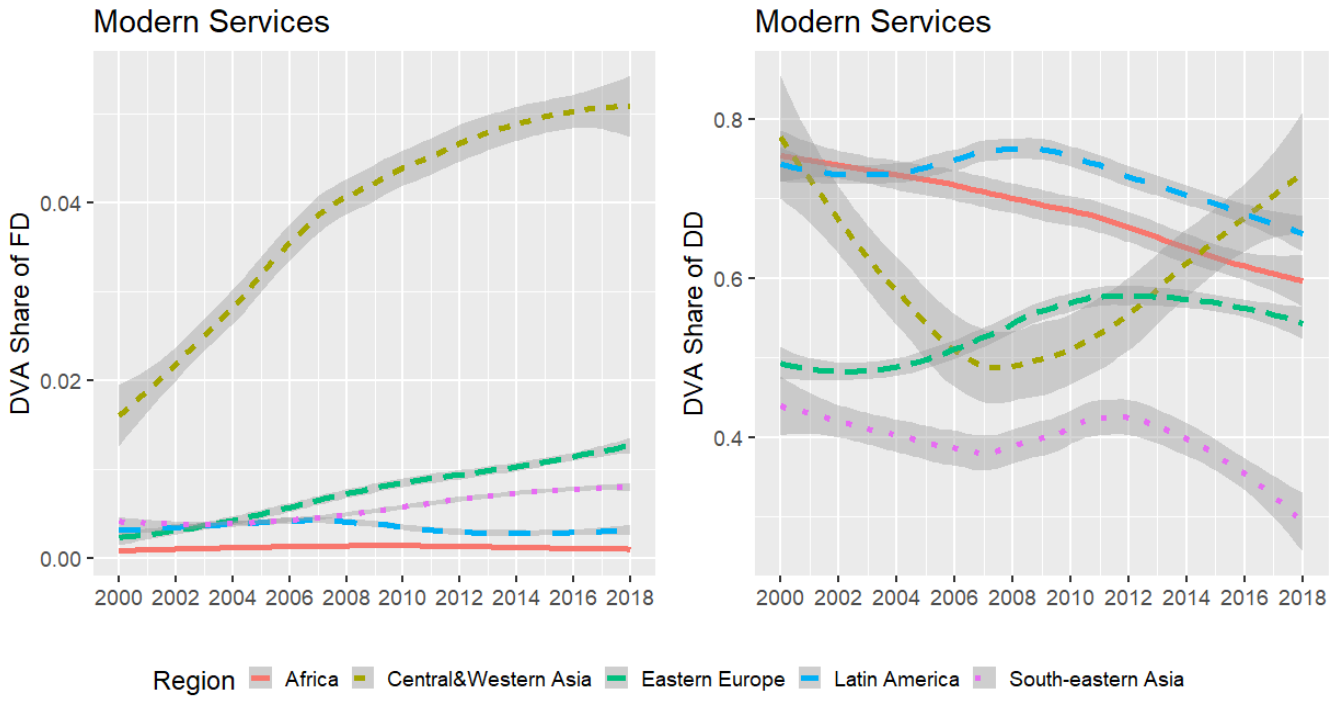
shares, but much more modestly. Latin America and Africa maintained their position in the foreign market but significantly lost their market share of their domestic markets.

Figure 5a: Evolution of Access to Foreign Demand (AfD) and Domestic Demand (AdD) of Modern Services



Source: Authors elaboration based on ICIO (OECD)

Figure 5b: Evolution of Access to Foreign Demand (AfD) and Domestic Demand (AdD) of Modern Services



Source: Authors elaboration based on ICIO (OECD)

4.1 Regional sources of demand: the role of regional markets

Recent literature has stressed the importance of carefully analyzing regional dynamics and South-South trade since they have become important vectors of catching-up and development (Milberg and Winkler, 2013; Kozul-Wright and Fortunato, 2019). As we will show, disaggregating the analyses to investigate Access to regional markets has shown to be extremely important for understanding different patterns and strategies from regions that succeed in catching-up in their market share of global value added. Figure 6 shows access to demnd of developing and developed countries' in the manufacturing sector. It is striking to see how Eastern Asia's catch-up in market share has mainly been acquired by capturing the markets of developing countries. This is mainly due to China's sharp catch-up in the market share of developing countries (though it also increased market share in developed countries' markets), and Japan's sharp loss in developed countries' markets. This corroborates the argument about the importance of regional value chains, and regional and South-South trade. Inversely, Eastern European countries have concentrated their catching-up on accessing demand of developed countries' markets, mainly in the European Union. South-eastern Asia, and Central and Western Asia have a more nuanced performance, increasing thei access to both developed and developing countries' markets. On the contrary, Latin America and Africa have maintained a stable position in developed countries' markets but have lost considerable market share in developing countries' markets.

Figure 6: Market Access in Developed and Developing Countries' Markets.

Figure 7a and 7b show regional performance in OECD and Asian markets, and in Latin American and African markets, respectively, and by technological intensity. The figures show that the great catch-up of market share in medium and high technology of Eastern Asia is concentrated in Latin American and African markets. Asian markets were also very important for China and Korea. However, it was the region in which Japan lost market share the most. Eastern Europe, on the other hand, has substantially captured OECD markets, especially the markets of the European Union countries, in medium, medium-low and high technological industries. Southern, Central and Western Asia have gained market access across all regional markets.

Africa and Latin America have lost market share mainly in their regional markets. This loss is substantially greater in medium-high and high technological industries than in medium-low and low technology industries. North America and Oceania have lost market share across all regions and industries, and Northern, Southern and Western Europe have gained in medium-high and high technological industries but lost in medium-low and low technology industries, similarly across all regions.

Figure 7a: OECD and Asian Markets

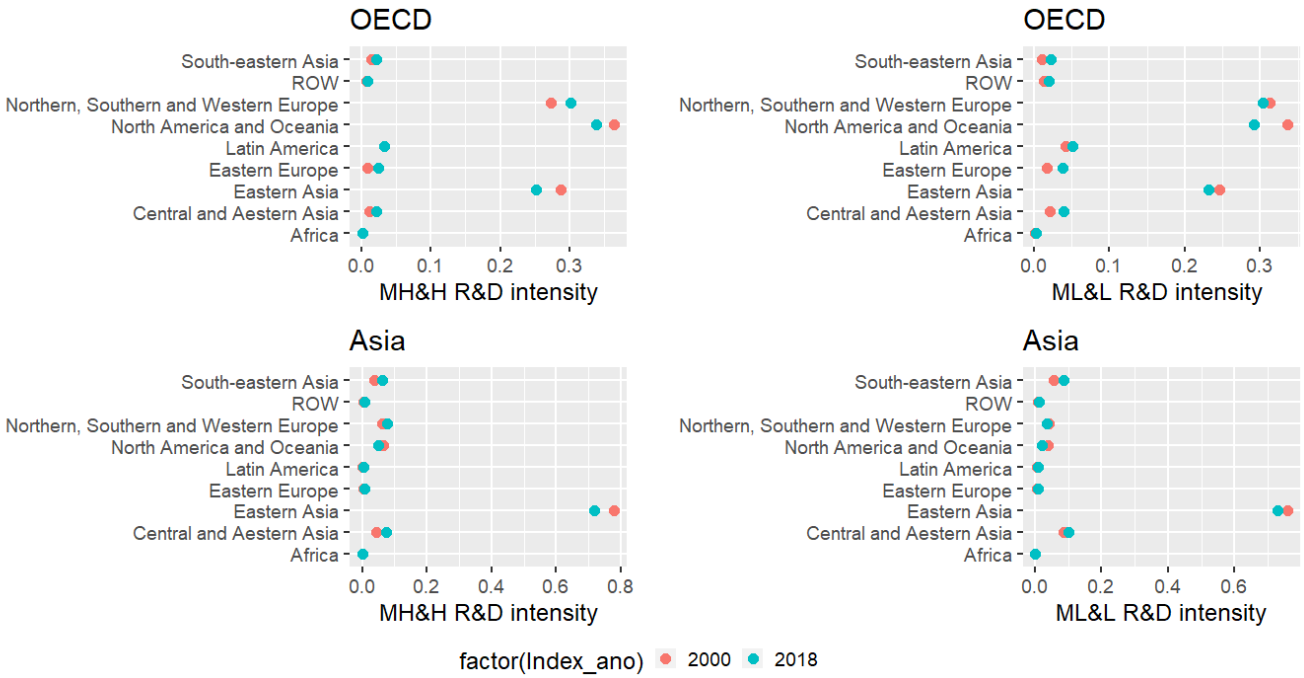
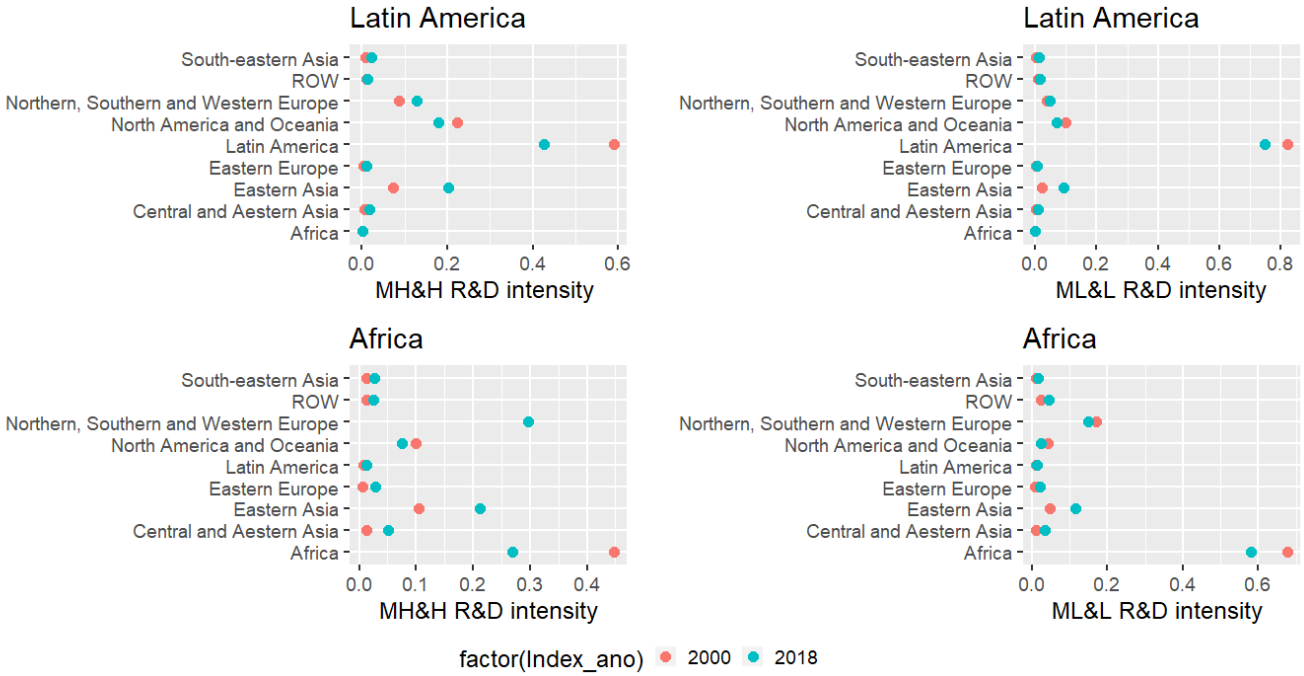


Figure 7b: Latin American and African Markets.



The analysis performed brings new evidence to the literature that highlights the importance of regional markets and South-South trade as developing strategies (Milberg and Winkler, 2013; Kozul-Wright and Fortunato, 2019). For instance, the capture of market share in developing countries' market, such as Latin America and Africa, appeared to be very important for Eastern

Asia's catching-up, especially in medium-high and high technology industries. This corroborates with recent evidence of the impact of the rise of China to local producers of other developing countries. For example, the rising exposure to Chinese imports have significantly impacted sales, employment growth and firms' survival in African countries (Torreggiani and Andreoni 2023) and the market share of Brazilian firms (Cunha et al., 2023). African and Latin American countries inserted GVCs in a subordinate way and did not construct solid regional value chains, which has resulted in a very precarious situation in which the loss of domestic and regional market share is not compensated by a substantial increase in the market share of foreign markets.

4.2 Contribution of Accessing Demand for the structural change of regions

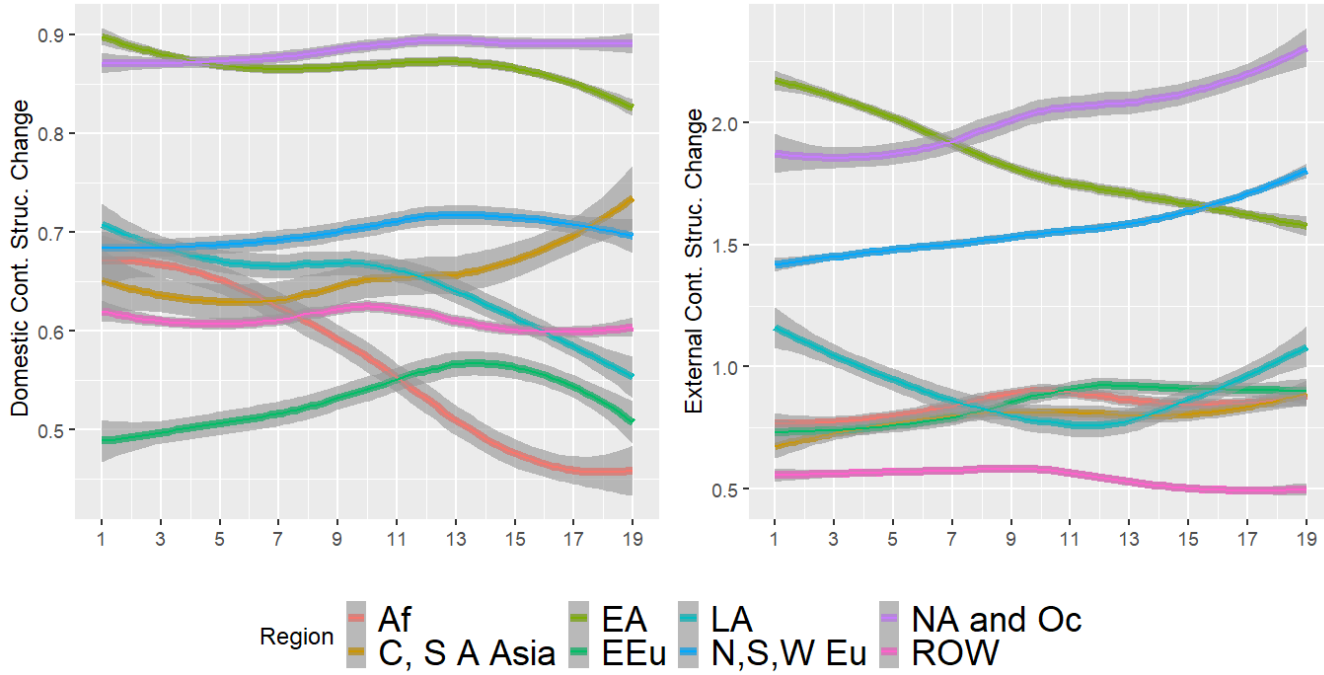
Accessing domestic and foreign markets can contribute to the process of structural change. On the one hand, the access to the domestic market can be a valuable source of demand in the first stages of the development leader (Ha-Joon, 2002b). On the other hand, accessing foreign markets can represent a crucial step to overcome the middle-income trap and leapfrog (Lee, 2018). Moreover, comparing performances between industries by technological intensity can help to understand to which degree there was a deindustrialization process in the developed world as important literature suggests this is mainly centered in medium and medium-low technological industries (Tregenna and Andreoni, 2020) and that developed countries have focused in the very high tasks of the production process (Milberg and Winkler, 2013). Therefore we have created an indicator to measure how access to the domestic and foreign markets contributes to the process of structural change. The indicator is calculated by comparing the evolution of the access to medium high and high technological industries and the medium and medium low technological industries, in the domestic and foreign markets, as:

$$Domestic\ Cont.Strucchange = \frac{AdD_{mh\&h}}{AdD_{ml\&l}} \quad (26)$$

$$External\ Cont.Strucchange = \frac{AfD_{mh\&h}}{AfD_{ml\&l}} \quad (27)$$

Where $mh\&h$ are the medium-high and high technological industries and $ml\&l$ are the medium-low and low technological industries. This indicator is similar to the indicator of Demand Adaptability proposed by Palma (2009), but while he proposes to look mainly to the OECD markets, and here we look to domestic and global markets. Figure 8 shows the results. An increasing trend means the increase (loss) of the Access to Demand of medium-high and high technological industries is greater (smaller) than the increase (loss) of the Access to Demand of medium-low and medium technological industries. Figure 8 illustrates important dynamics of trade and development of regions in the years analyzed. First, it shows how the developed countries, represented by the blue line (Europe) and purple line (north America and Oceania) have centered its activities in medium-high and high technological industries. Despite losing market share in most industries, this loss is substantially higher in medium and medium-low technological industries. Alternatively, Eastern Asia (green line), despite increasing access to foreign demand in all industries, the rise is much more pronounced in medium and low technological industries. This is not to say that these countries are not upgrading, but that the catch-up process may be a difficult and long route of scaling up the leader from low to high technological industries, in which countries incrementally increase the value added of share of the production process. It also shows that it is easier to catch up and access the higher technological industries in the domestic market compared to the foreign markets.

Figure 8: The contribution of accessing the domestic and foreign markets to the process of structural change



The rise in the Access to domestic and foreign Demand of Eastern Europe (green line) and Central, South, and Western Asia also contributed to their process of structural change. Contrary to what the successful histories of economic catch up have shown, the loss of Access to Demand in the domestic market in Africa and Latin America has been substantially concentrated in high and medium high technological industries. In Addition, the modest increase in the access to foreign markets by Latin American Countries has been concentrated in medium and medium-low technological industries, contributing to the process of regressive structural change in the region.

4.3 Countries heterogeneity within regions

Obviously, countries can perform very differently in comparison with their neighboring countries, and so only looking at regions may give us a very limited interpretation in terms of country level performance. Indeed, the demand captured by local producers both at home and in the global market varies considerably within regions.

For Northern, Southern and Western Europe, the United Kingdom and France are the countries that have lost a greater share in demand for both services and low and high technological industries. Ireland, however, performed very well in all economic activities, and Germany and Switzerland performed quite well in high and medium-high industries. Within Eastern Europe, all countries performed well but it was Russia which had the greatest performance in all economic activities. For North America and Oceania, Canada lost modestly in all economic activities, while the USA lost considerably in low and medium-low industries, modestly in high and medium-high industries, and increased market share considerably in modern services mainly in OECD markets.

For Latin American countries, Chile and Peru have increased their share modestly in both low and high technology industries, while Argentina, Brazil, and Mexico have performed very badly –

Mexico and Brazil in high and medium-high technology industries, and Argentina and Mexico in low and medium-low industries. In the case of Mexico, famous for its 'maquila,' the ICIO matrix permits us to decompose the local producers according to their participation in GVCs. What can be said is that apparently the part of the producers connected to the global market have performed well but only in the low and medium-low technology industries, whereas the part of the producers not connected to GVCs performed very badly in both low and high technology sectors. Furthermore, there is evidence of very low feedback and linkages between firms connected to global value chains and firms directed at local markets. For the African countries analyzed, Morocco has modestly increased its share in manufacturing markets, and South Africa has modestly lost market share. Tunisia has remained in a neutral position.

For Central and Western Asia, Israel is the only country that has lost market share, and it happened in all economic activities analyzed. On the contrary, India has performed very well, but especially in modern services. As for Eastern Asia, Japan is the main loser in all economic activities and China the main winner. They have switched positions in global market share. South Korea has performed well in high and medium-high technology industries. In the case of South-eastern Asian countries, they have all performed well, but mainly in manufacturing activities, and Indonesia stands out for the highest value-added market share catch-up.

Overall, the indicators of domestic, foreign and regional market share have proven very helpful to analyze and understand the patterns in production and international trade in the first two decades of the current century. It has been shown that only some regions (Asia, Eastern Europe) have opened their domestic market and at the same time gained access to foreign demand, though Asia performed much better in the first decade of this century. For Eastern Asia, the performance in the regional market and South-South trade explains this pattern the most, while for Eastern Europe, regional trade within the OECD (especially the EU) was the main source of market catch-up. Similarly, as indicated by the literature reviewed, not disaggregating the analysis by technology may generate very problematic interpretations. For instance, even though most developed countries have lost their share in global demand, this trend has been much more pronounced in low and medium-low technology sectors compared with the high and medium-high technology sectors. The opposite can be stated of Latin American and African countries. For the latter two, they have lost market share mainly at the domestic and regional level, and in medium-high and high technological industries.

5. Conclusion:

This article has developed a methodology capable of measuring local producers' capacity to capture domestic, foreign, and regional demand, in terms of value added. It represents countries' and industries' market share of value added embodied in Final Demand. It contributes to recent methodologies that aim to better capture the role of international trade for the production process in the era of globalization and production fragmentation. Therefore, the methodology developed strengthens the analysis of whether engaging in international trade and global value chains have improved or impeded convergence between developed and developing countries. A database has been developed using the ICIO tables of the OECD to calculate the proposed indicators for 69 countries and 16 manufacturing sectors, plus modern services.

The findings corroborate with studies that have pointed out that profiting from globalization can be achieved in cases where a country has opened domestic markets to foreign competition, as long

as the loss in domestic market share has been more than compensated by improving local producers' capacity to capture foreign demand. This scenario is observed mainly in countries of Eastern Europe and Asia. Nevertheless, these regions showed different dynamics and strategies regarding which foreign market to access: While Eastern Europe based their catching-up on increasing the access to demand in developed countries markets – mainly in the European Union –, Eastern Asian countries focused on regional and South-South trade as they (especially China) sharply increased their market share in Asia but also in Latin American and African regions, especially in medium-high and high technology sectors. Meanwhile, the rest of Asia underwent a wider strategy and increased its market share modestly in most regions.

In many regions, however, reducing local producers' access to the domestic market has not been compensated by an increase in their access to foreign markets. This situation also varied across regions and depended on the R&D intensity of the industries analyzed. The loss of domestic market share was particularly high in Africa and Latin America, especially in high and medium-high technology industries, so the net effect of trade on production and value-added share in these countries has been negative. As for developed countries, while Central, Southern, and Western Europe have lost market share mainly in medium-low and low technology industries, North America and Oceania have lost in all industrial sectors but have compensated for this loss, at least partially, by substantially increasing the global market share in modern services – results that are in line with the strategy of global retailers that have concentrated their business in branding, marketing and financing, as explained by Milberg and Winkler (2013).

Results indicate that openness to trade is not a sufficient condition to promote economic growth, structural change, and value-added capture, so countries must strategically act through economic and trade policies in order to guarantee competitiveness for local producers in both the domestic, regional and foreign markets. This might have become a harder target in the era of globalization and GVCs due to their oligopolistic characteristics that push producers in developing countries (normally suppliers) to lower their margins to the point of making it very hard for them to innovate (Milberg and Winkler, 2013). Our results corroborate findings that state that exploring regional and South-South trade opportunities appears to have become an important strategy for catching-up (Milberg and Winkler, 2013; Kozul-Wright and Fortunato, 2019). This is because guaranteeing competitiveness for local producers is essential for catching-up by latecomers due to the importance of local knowledge creation and innovation (Lee, 2018; Lee and Lee, 2021), and guaranteeing competitiveness in the domestic and foreign markets is far from automatic and requires developing countries to coordinate efforts on macroeconomic policies and economic policies for product sophistication (Rodrik, 2006; Bresser-Pereira and Rugitsky, 2018; Guzman, Ocampo and Stiglitz, 2018; Nassif, Bresser-Pereira and Feijo, 2018; Cimoli et al., 2020; Ocampo, 2020).

This article has several limitations that must be taken into account and may stimulate future research. The first is that due to the scope of the analysis, many generalizations had to be made, and so using the indicators proposed to analyze countries (and their manufacturing industries) more profoundly within the regions may produce more nuanced conclusions. Second, most of the analysis is descriptive statistics and thus it is useful for illustrating trends in global trade but has very limited utility for investigating causality between the indicator and economic growth and development, on the one hand, and the economic policies that might explain the differences in countries' performance in catching-up with market share, on the other hand. Therefore, beyond improving the indicators, the avenues for research are twofold. First, using advanced statistical

methodologies to analyze whether improving access to domestic, regional and foreign demand is important to economic growth and economic development. Second, investigate which economic policies might be implemented in order to make developing countries more capable of adapting to the global demand and, thus, to use international trade to foster structural change and local production towards sectors with greater R&D intensity.

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Appendix A: List of countries and regional classification

Northern, Southern and Western Europe			
	Austria		Lithuania
	Belgium		Luxembourg
	Denmark		Netherlands
	Estonia		Norway
	Finland		Portugal
	France		Slovenia
	Germany		Spain
	Greece		Sweden
	Iceland		Switzerland
	Ireland		United Kingdom
	Italy		Croatia
	Latvia		Malta
Eastern Europe		**Africa**	
	Czech Republic - Czechia		Morocco
	Hungary		South Africa
	Poland		Tunisia
	Slovak Republic		
	Bulgaria		
	Romania		
	Russian Federation		
Latin America (LA)		**Central Western Asia**	
	Chile		Israel
	Colombia		Turkey
	Costa Rica		Cyprus
	Mexico		India
	Argentina		Kazakhstan
	Brazil		Saudi Arabia
	Peru		
	Mexico		
Eastern Asia			**South East Asia**
	Japan		Malaysia
	Korea		Myanmar
	Chinese Taipei		Philippines
	China (People's Republic of)		Singapore
	Hong Kong, China		Indonesia
			Thailand
			Viet Nam
			Brunei Darussalam
			Cambodia
			Lao People's Democratic Republic
North America and Oceania			
	Australia		
	Canada		

	New Zealand
	United States

Source: Authors elaboration based on United Nations Regional Classification (https://unstats.un.org/unsd/methodology/m49/).

Appendix B: Sector classification according to R&D intensity, based on OECD taxonomy.

Low and medium-low technology sectors
Food products beverages and tobacco
Textiles textile products leather and footwear
Wood and products of wood and cork
Paper products and printing
Rubber and plastics products
Other non-metallic mineral products
Basic metals
Fabricated metal products
Manufacturing repair and installation of machinery and equipment
High and medium-high technology sectors
Chemical and chemical products
Pharmaceuticals medicinal chemical and botanical products
Computer electronic and optical equipment
Electrical equipment
Machinery and equipment
Motor vehicles trailers and semi-trailers
Other transport equipment
Modern Services
IT and the information services

Source: *Authors adaptation from OECD* (Galindo-Rueda and Verger, 2016). *OECD classification has four subgroups for manufacturing activities: High R&D intensity industries, Medium-high R&D intensity industries, Medium R&D intensity industries and Medium-low R&D intensity industries. We have combined the first two subgroups and called them High and medium-high technology sectors and combined the latter two subgroups and called them Low and medium-low technology sectors.*

Appendix C: Descriptive Statistics

Table 1:

Variable	N	Mean	Std. Dev.	Min	Pctl. 25	Pctl. 75	Max
AtD	20364	0.015592	0.043157	0	0.000589	0.010855	0.907423
AdD	20361	0.420194	0.249859	0	0.211348	0.621196	0.9829
AfD	20364	0.006229	0.018061	0	0.000234	0.004788	0.580247
AD_Developing	20368	0.014925	0.046769	-6.8E-05	0.000382	0.009376	0.684611
AD_Developed	20368	0.014925	0.04266	-0.00027	0.000296	0.009284	0.508719
AD_OCDE	20368	0.014925	0.042309	-0.00027	0.000349	0.009689	0.523065
AD_LA	20368	0.014925	0.049442	-8.7E-05	8.09E-05	0.005096	0.729865
AD_Africa	20368	0.014925	0.04678	-0.00023	0.000193	0.007803	0.606343
AD_Asia	20368	0.014925	0.060059	-5E-05	0.000144	0.004935	0.756511

Source: Authors own elaboration

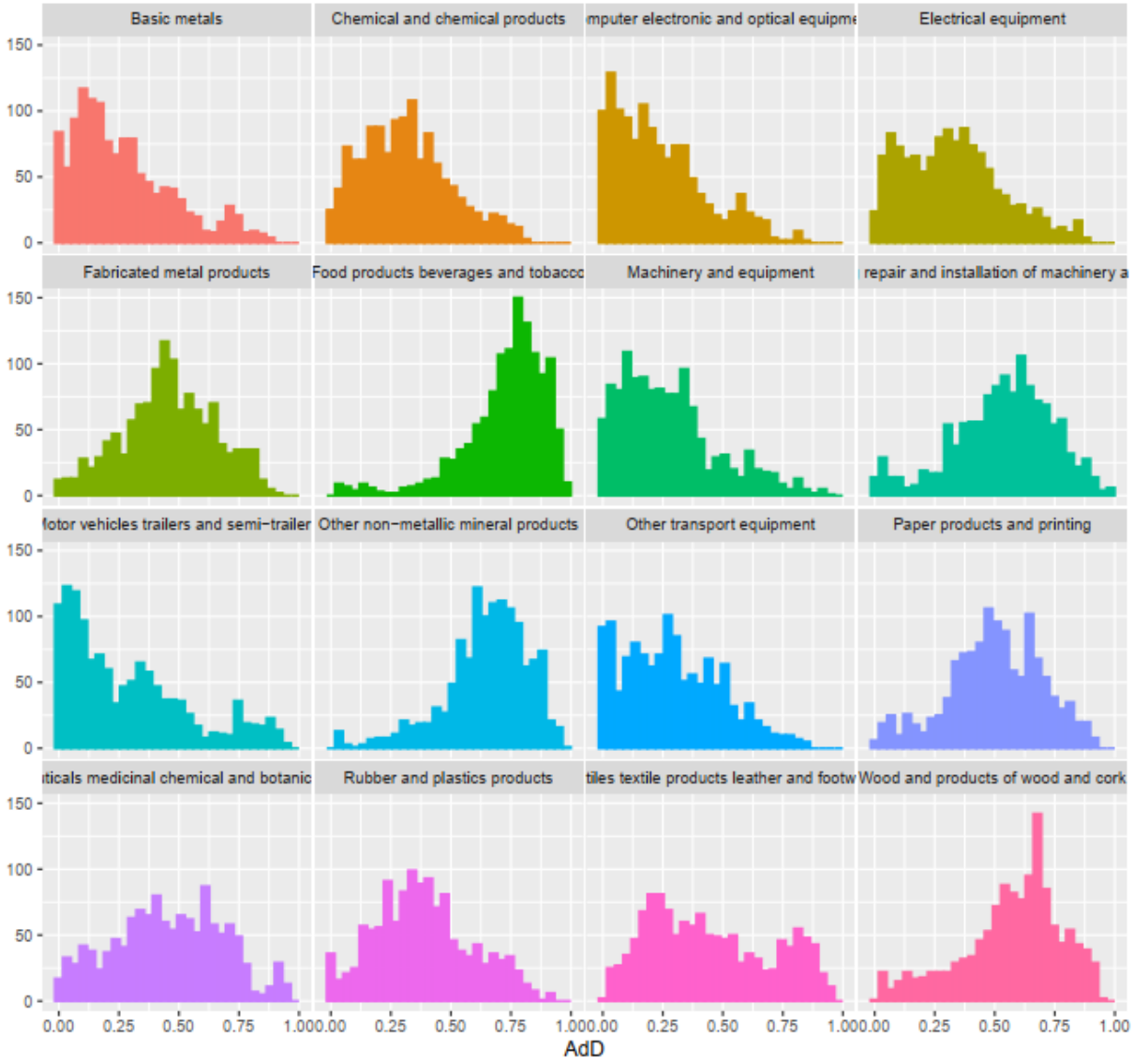

Figure 1:Access to Domestic Demand by Industry

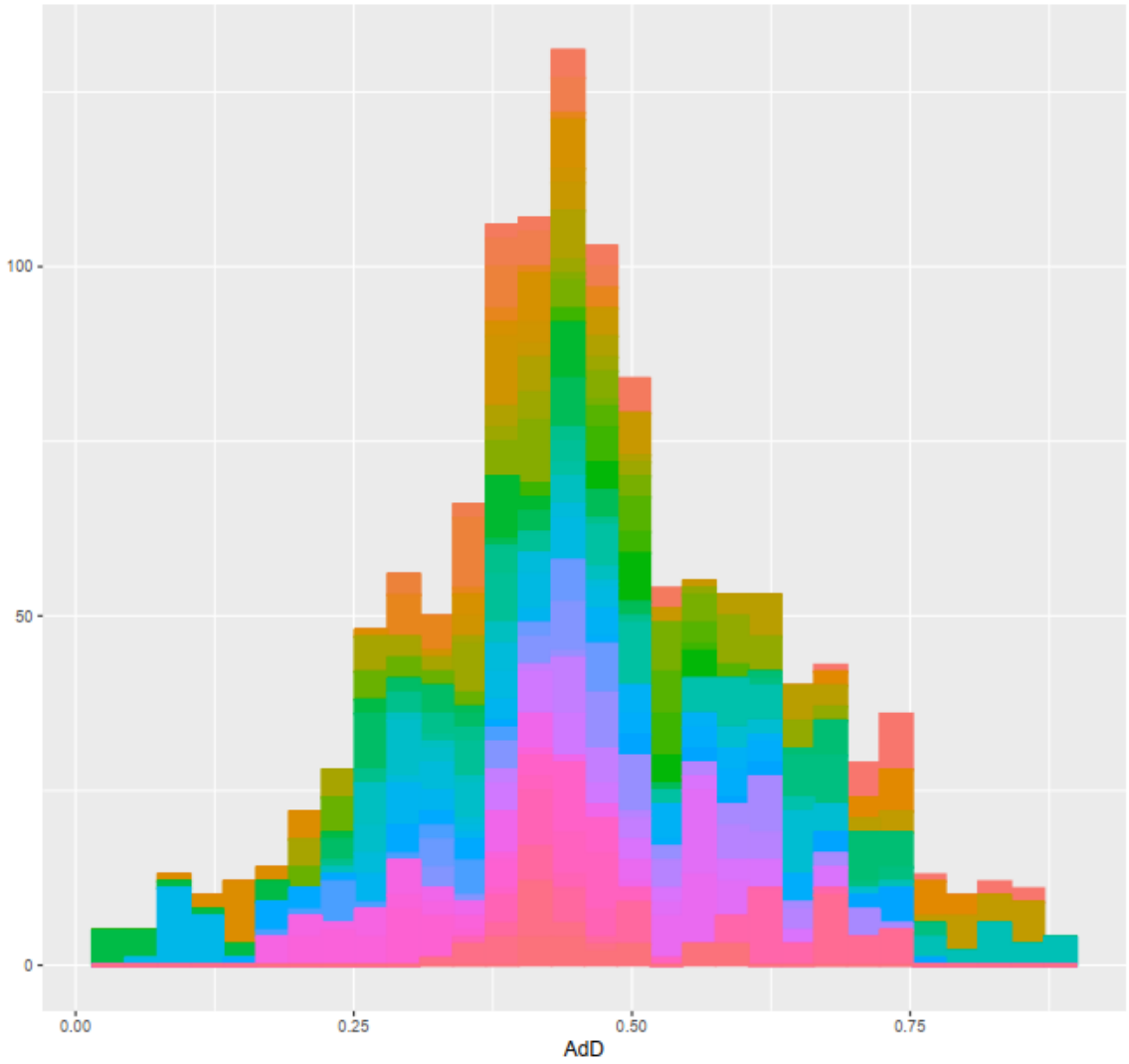

Figure 2: Histogram Access to Domestic Demand

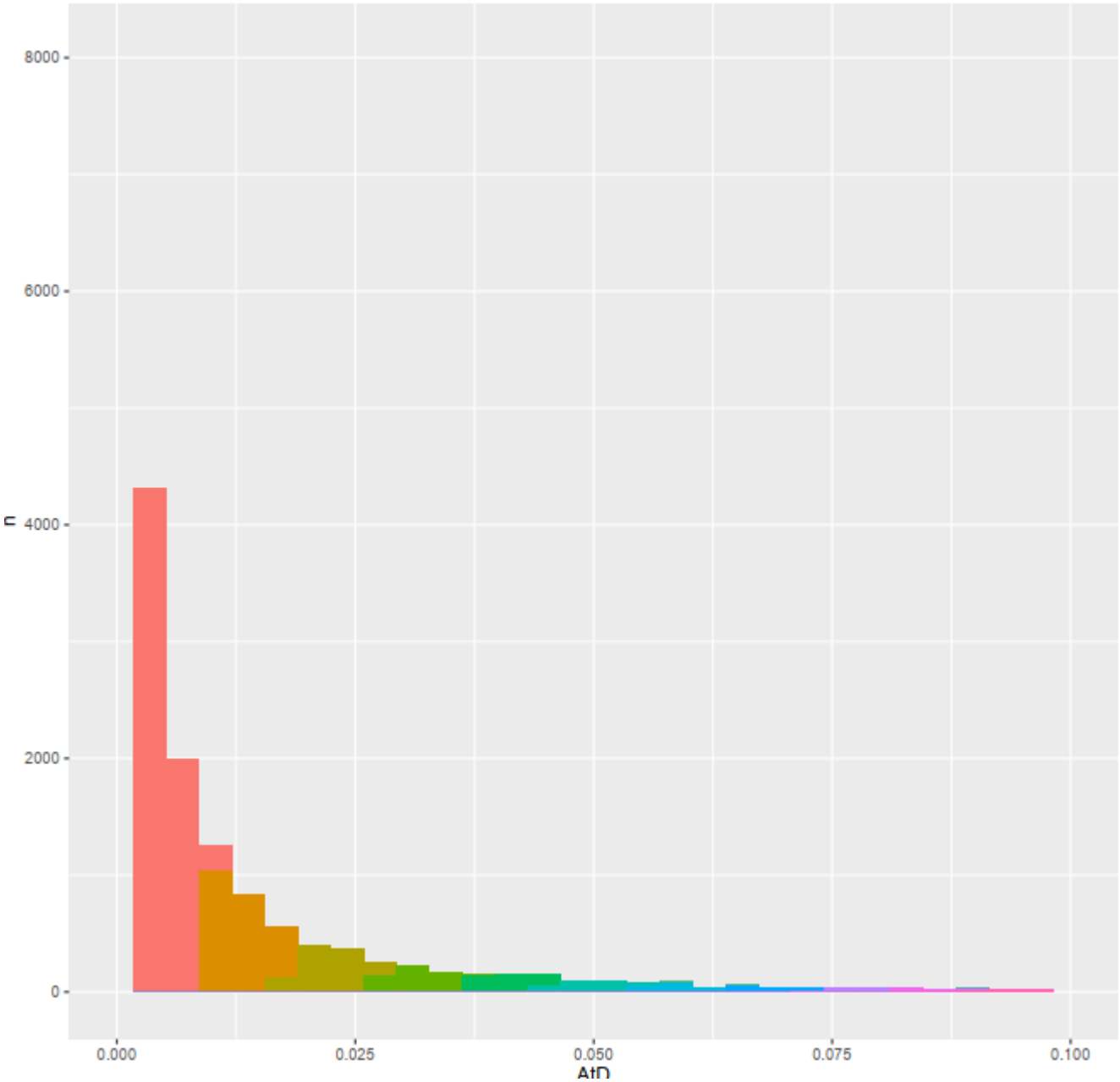

Figure 3:Histogram - Access to total demand

Appendix D: 3 country ICIO model for calculating Market Shares of Value Added.

If we consider (a) country a, b and c; (b) v̇= value added to output ration; (c) B= the Leontief inverse ($B=(I-A)^{-1}$ and F the final demand (F = C + I + G), we can calculate the domestic value added embodied in final demand (VAF) by multiplying the valued added coefficient matrix by the inter-country Leontief inverse and then post-multiply it by a matrix of final demand, as we can see in the VAF matrix below:

$$VAF = \begin{bmatrix} \dot{v}_a & 0 & 0 \\ 0 & \dot{v}_b & 0 \\ 0 & 0 & \dot{v}_c \end{bmatrix} \begin{bmatrix} B_{aa} & B_{ab} & B_{ac} \\ B_{ba} & B_{bb} & B_{bc} \\ B_{ca} & B_{cb} & B_{cc} \end{bmatrix} \begin{bmatrix} F_{aa} & F_{ab} & F_{ac} \\ F_{ba} & F_{bb} & F_{bc} \\ F_{ca} & F_{cb} & F_{cc} \end{bmatrix} \quad (1)$$

Which is equal to:

$$VAF = \begin{bmatrix} v_a(B_{aa}F_{aa} + B_{ab}F_{ba} + B_{ac}F_{ca}) & v_a(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb}) & v_a(B_{aa}F_{ac} + B_{ab}F_{bc} + B_{ac}F_{cc}) \\ v_b(B_{aa}F_{aa} + B_{ab}F_{ba} + B_{ac}F_{ca}) & v_b(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb}) & v_b(B_{aa}F_{ac} + B_{ab}F_{bc} + B_{ac}F_{cc}) \\ v_c(B_{aa}F_{aa} + B_{ab}F_{ba} + B_{ac}F_{ca}) & v_c(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb}) & v_c(B_{aa}F_{ac} + B_{ab}F_{bc} + B_{ac}F_{cc}) \end{bmatrix} \quad (2)$$

By algebraically manipulating the VAF matrix, one can calculate the proposed indicators. For example, in terms of country a, the market share, in terms of value added, of the domestic market (the Access to Domestic Demand (AdD)) can be calculated as:

$$AdD_a = \left(\frac{v_a(B_{aa}F_{aa} + B_{ab}F_{ba} + B_{ac}F_{ca})}{v_a(B_{aa}F_{aa} + B_{ab}F_{ba} + B_{ac}F_{ca}) + v_b(B_{aa}F_{aa} + B_{ab}F_{ba} + B_{ac}F_{ca}) + v_c(B_{aa}F_{aa} + B_{ab}F_{ba} + B_{ac}F_{ca})}\right) \quad (3)$$

The market share, in terms of value added, of the foreign market (the Access to Foreign Demand (AfD)) can be calculated as:

$$AfD_a = \frac{v_a(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb}) + v_a(B_{aa}F_{ac} + B_{ab}F_{bc} + B_{ac}F_{cc})}{v_b(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb}) + v_b(B_{aa}F_{ac} + B_{ab}F_{bc} + B_{ac}F_{cc}) + v_c(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb}) + v_c(B_{aa}F_{ac} + B_{ab}F_{bc} + B_{ac}F_{cc})} \quad (4)$$

The market share, in terms of value added, of the regional market (the Access to Regional Demand (A*r*D)) can be calculated as:

$$ArD_a =$$

$$\frac{v_a(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb})}{v_a(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb}) + v_b(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb}) + v_c(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb})} \quad (5)$$

The market share, in terms of value added, of the global market (The Access to Global Demand), can be calculated as:

$$AtD = \frac{(v_a(B_{aa}F_{aa} + B_{ab}F_{ba} + B_{ac}F_{ca}) + v_a(B_{aa}F_{ab} + B_{ab}F_{bb} + B_{ac}F_{cb}) + v_a(B_{aa}F_{ac} + B_{ab}F_{bc} + B_{ac}F_{cc}))}{VAF} \quad (6)$$