Title: International trade and economic development: capturing or losing access to global demand and its effect on the investment function

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Abstract:

This article proposes an indicator that estimates the share of value-added that a sector of a country capture of the sector's total global demand, called Access to Global Demand (ADG). The indicator is later decomposed into Access to Domestic Demand (ADD) and Access to Foreign Demand (DFD). It uses the most recent ICIO matrixes of TiVA (OCDE) to calculate the indicators for 69 countries and 45 sectors of the economy from 2000 to 2018. Descriptive statistics are provided and analyzed. More specifically, we show the behavior of value-added shares of total global demand captured by different regions and according to different technological levels. Then, we use the new dataset to econometrically test the importance of the ADG to investment and economic growth. For that, a dynamic system GMM is applied. Results prove that being able and prepared to capture global demand fosters investment decisions for both developed and developing countries.

Keywords: Foreign Trade, Structural Change, Access to Demand

JEL Classifications: F14, F41

Áreas para submissão: 5. RELAÇÕES ECONÔMICAS INTERNACIONAIS

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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 (…)"[3].
>
> Charles Poor Kindleberger (1962)

World trade has changed sharply in the last three decades with the advent of globalization and the amount of goods and services traded between countries has increased considerably. Production processes have fragmented, and new global supply chains have evolved to change greatly the role of developing and developed countries in what is called global value chains. However, how these shifts have potentialized or have restricted the opportunities for economic catch-up by developing countries remains still a debate and a empirical question. Kindleberger (1962) has asserted that developing the capability to adapt to the change in trade patterns as a major necessary skill for maximizing gains from trade, and, as a consequence, to economic development. Analyzing how countries have performed in the world trade in the last two decades becomes essential to understand their performance in terms of economic development and to evaluate their development strategies.

There are multiple indicators and analysis of the international trade in the economic literature. For instance, one of the main sources of indicators of international trade and global value chains has been the Trade in Value Added (TiVA) database from OCDE. The TiVA database consist of multiple indicators very valuable for analyzing production diversification and the origin and destin of value added. However, most of the indicators are elaborated to capture trade patterns in absolute terms or has been targeted to analyze the role of foreign demand. However, looking at patterns only in absolute terms may hide relevant information. For instance, an increase in a country production and/or exports in a sector may be interpreted as a successful scenario whereas the country might have lost relative share in this sector demand if the rise in demand is greater than the rise in production/export. Moreover, one may miss important information from trade if one only pays attention to foreign demand and chose not to understand how trade have impacted domestic demand, or, more specifically, supply for the domestic demand. In fact, one important stylized fact of globalization period is the huge trade and financial openness of countries worldwide, impacting differently developing countries depending on the intensity of their transition (BRESSER-PEREIRA; ARAÚJO; COSTA PERES, 2020; PALMA, 2009).

The first contribution of this article is to elaborate an indicator based on the New Developmentalism Theory (ND) that uses the ICIO matrixes of TiVA OCDE to calculate the Access to Global Demand (AGD) and the Access to Domestic Demand (ADD) for 69

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

countries from 2000 to 2018. The AD indicators aims to measure how much a sector (*i)* of a country (*p)* is accessing the global demand (domestic demand) of this respective sector *i*. In other words, it is a relative index that captures how much the sector *i* of a country *p* is capturing (or not) from an increase (decrease) in the global demand (thus, both internal and external demand), considering as global demand both global final demand (F = C+I+G) and global intermediate consumption (Z). Descriptive statistics are provided and analysis of main trends of the indicator is provided, disaggregating by region and technological intensity of the sectors according to their R&D activities. A special section is developed to analyze the Brazilian Case.

The second contribution of the paper is to introduce the indicator as a major determinant of the investment decision. To do so, first a critical assessment of the post-keynesian investment function is provided, and letter it is proposed a small modification of Blecker (2016) accelerator model of the investment function to include a new insight from DN theory, in which, the access to demand is crucial for guarantying sufficient cash flows to make investment desirable. The model is tested by an econometric exercise using System GMM methodology. Indeed, access to demand seems to impact positively and significantly the investment function. As expected, while gdp growth rate impacts investment positively, interest rate differential impacts investment negatively. The model proved robust for different specifications and to all robustness checks recommended by the literature.

The article is devided into 5 sections. Apart from this brief introduction, Section one describes the methodology of the proposed indicators and present some descriptive statistics,. Section 3 critically accesses the wage led profit led determination of the investment function and proposes and small modification of Blecker (2016) acelerator model to include some of the ND theory. Section four describes the database and present the econometric methodology and estimations. Section fve concludes the paper.

2. Access to Global and Domestic Demand, methodology and descriptive statistics

In the construction of this indicator, calculating access to demand through the total production of the sectors may be unrealistic since it disregards the intermediate inputs used in the production process. This consideration becomes even more essential if there is interest in evaluating the access to foreign demand, which, in turn, has undergone profound changes in recent decades with the emergence of global value chains and the consequent fragmentation of production in which part of the value that is exported has been generated outside the exporting country. These 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 access the competitiveness of an industry or country. (LOS; TIMMER; DE VRIES, 2015, 2016; TIMMER; DE VRIES, 2015).

Thus, analyzing access to domestic and foreign demand in terms of value added becomes not only essential, but also a relevant contribution. In this context, the methodological reference 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. Thus, algebraic applications to global input-output matrices make it possible to construct this AD index for a considerable number of countries.

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

According to Miller & Blair (2009), if we denote by x_ip the total output of sector i of country p and by f_ip the total final demand for the product of sector i of country p, we can write the equation that represents how each sector i of country p distributes its product through sales to other sectors and countries and to final demand: $x_{ip} = \sum_{p=1}^{n}\sum_{i=1}^{n} z_{ijpc} + f_{ijpc}$,, where the term z_{ijpc}represents the intersectoral sales of sector i to all sectors j (including itself when *j* = *i*) and to all countries *c* (including itself when, *p*=*c*). The technical coefficient matrix, that indicates the ratio between inputs of sector *i* sold to sector *j* with respect to the total production of sector *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

The calculation starts from Leontief, where the *c*olumn vector of total production (X) is:

X = Ax + f (1)

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

$X = (I - A)^{-1}$f (2)

Where $(I - A)^{-1}$ is the leontief matrix.

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

$v = \frac{VALU_i}{x_i}$ (3)

Where v is a column vector of the value-added coefficient and $VALU_j$ is the total value-added of a country by a sector.

The domestic value-added embodied in the global final demand (DVF) and the domestic value-added embodied in global intermediate consumption (DVZ) are, respectively:

$DVFpi = v^{ID}(I - A)^{-1}F$ (4)

$DVZpi = v^{ID}(I - A)^{-1}Z$ (5)

Where $v^{ID} = I \odot (v \odot D)^{T}$(a matrix of zeros besides in the diagonal that is equal *v* in the dimension representing the sectors of country p, and zero elsewhere), I is the notation for the transformation of the vector v into a matrix of zeros in the off diagonals and the values of the vector in the diagonal, D is a dummy column vector of ones for the sectors *i* of country *p* and zero elsewhere, and $\odot$ denotes element wise multiplication, T is the transpose, F is the column vector of the global final demand and Z is a column vector of global intermediate consumption. DVF and DVZ are column vectors.

Domestic value added embodied in global total demand (DVG) is:

$DVG = DVF + DVZ$ (6)

We aim to measure the access (capacity to absorb) the increase in total final and intermediate demand, and thus, not to analyze in absolute terms but in relative terms, or, in other words, focus not on how much a sector of a country valued-added was absorbed but the share country p absorbed compared with the total value-added absorbed by all countries worldwide. Therefore, one must account for the global value-added absorbed by the global final demand (GVF), global intermediate consumption (GVZ) and Global total demand (GVG), respectively:

$GVFi = \sum_p [v^I (I - A)^{-1} F]$ (7)

$GVZpi = \sum_p [v^I (I - A)^{-1} Z]$(8)

$GVG = GVF + GVZ$(9)

Where $v^I = I \odot v^T$ and GVF, GVZ, GVFZ are column vectors of the global valued added embodied in the global final, intermediate and total demand. Thus, to measure the country's sector access to global demand:

$AGD = DVFZ_{pi} \oslash GVFZ$ *(10)*

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

2.1. Access to Domestic Demand (ADD) and Access to external demand (AED)

One may want to look to the capacity of a sector to access the domestic demand of its respective country, and thus, one may want to decompose the AGD index into AID index and the (AED) index.

Starting with the AID index, the first step would be to calculate the sector *i* value added of country *p* absorbed by its domestic final (DVDf) and intermediate (DVDz) demand:

$DVDfpi = v^{ID} (I - A)^{-1} f^D$ (11)

$DVDzpi = v^{ID} (I - A)^{-1} z^D$ (12)

$DVDfz = DVDf + DVDz$ (13)

Where $f^D = f \odot D$, $z^D = z \odot D$, f is the column vector of the domestic final demand and z is a column vector of domestic intermediate consumption. DVDf and DVDz are column vectors. Again, we want to measure the access to total domestic demand and thus we need to calculate total (global) value-added absorbed by the domestic demand, in other words, account for the imported value-added absorbed in final and intermediary domestic consumption:

$GVDfpi = \sum_p [v^I (I - A)^{-1} f^D]$ (14)

$GVDzpi = \sum_p [v^I (I - A)^{-1} z^D]$ (15)

$GVDfz = DVDf + DVDz$ (16)

Where GVDf, GVDz, GVDfz are column vectors of the global valued added embodied in the domestic final, intermediate and total demand. Thus, to measure the country's sector access to domestic demand is:

$ADD = DVDfz \oslash GVDfz$ *(17)*

Where ADD is a column vector.

*Finally, t*o measure for the AED, the first step would be to calculate the sector *i* value-added of country *p* absorbed by the **foreign** final and intermediary demand:

$DVEff_{pi} = v^{ID} (I - A)^{-1} f^f$ (18)

$DVEfz_{pi} = v^{ID} (I - A)^{-1} z^f$ (19)

$DVEfz = DVEf + DVEf$ (20)

Where $f^f = F \odot (1 - D)$, $z^f = Z \odot (1 - D)$, and DVEff and DVEfz are column vectors. Again, we want to measure the access to total foreign demand and thus we need to calculate global value-added absorbed by the foreign demand:

$GVEff_{pi} = \sum_p [v^I (I - A)^{-1} f^f]$ (21)

$GVEfz_{pi} = \sum_p [v^I (I - A)^{-1} z^f]$ (22)

$GVEffz = GVEff_{pi} + GVEfz_{pi}$ (23)

Where $GVEff_{pi}$, $GVEfz_{pi}$, $GVEffz$ are column vectors of the global valued-added embodied in the external final, intermediate and total demand. Thus, to measure the country's sector access to domestic demand:

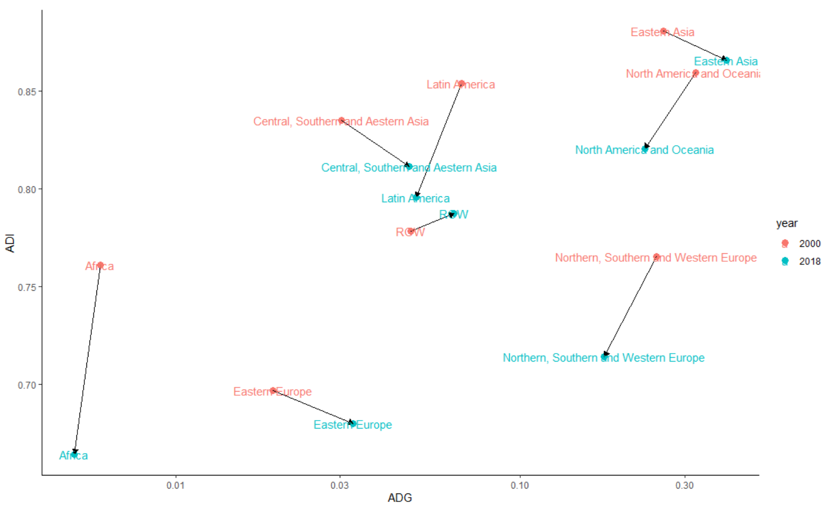
$AED = DVEfz \oslash GVEffz$ *(24)*

2.2. Descriptive Statistics

Analyzing and compering the indicators elaborated helps us visualize how countries and regions have performed in global and domestic trade. It is possible to visualize similar and contrast patterns and understand how countries and regions have inserted themselves in the global value chains. Moreover, it is possible to see if patters differ depending on the technological level of the sectors. For the purpose of better visualization and clarity, let us start analyzing more aggregated figures such as how regions have captured domestic and global demand, taking into consideration the industry as a hole.

Figure 1 contrast how much demand region have captured in the global market (x-axis) and in the domestic market (y-axis) in the years of 2000 and 2018. The arrows always are pointing to the dot representing the respective value of year 2018. At first sight, the downward slope of the arrows clearly illustrate that all countries have opened its domestic market to trade since the industry enterprises of all countries have captured less domestic demand in 2018 compared to 2000. The great difference appears to lie on whether the arrow is inclined to the left or to the right side of the chart. Clockwise rotation of Africa, Latin America, North America and Oceania, and Norther, Southern and western Europe indicate that those regions have lost capability to capture demand from both domestic and global demand. On the other hand, anti-clockwise rotation of Eastern Europe, Asia in general, indicates that these countries have opened their domestic market to foreign competitors at the same time that they have also expanded their share in in the global production.

Figure 1: Clockwise Versus Anti-Clockwise Trajectories, total industry by region



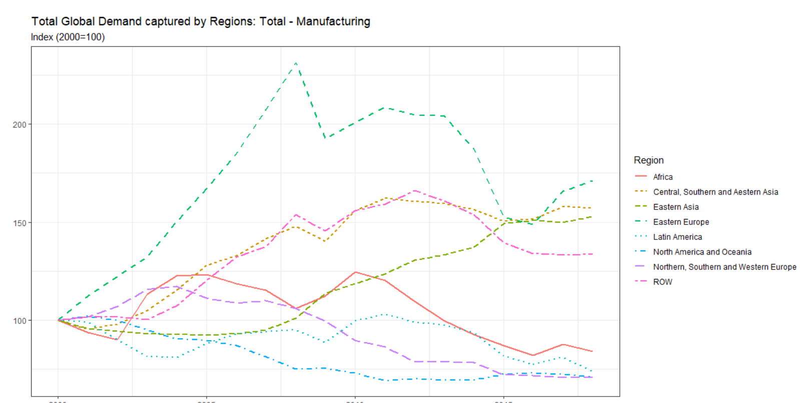
Source: Authors elaboration based on ICIO Matrixes, OCDE.

This figure is a first illustration of how globalization impacted similarly in all regions the access to the domestic demand, and, as a consequence, the competition of domestic producers with foreign producers in the domestic market. However, regions performed very differently in the international market. While Asian and Eastern Europe countries apparently took advantage of the globalization to expand and catch-up foreign demand, other regions producers lost their share in global demand. Exploit globalization opportunities seems to lie on open domestic demand in exchange of expanding access to foreign markets – the anti-clockwise scenario. This argument is similar to those elaborated by Marconi *et al.* (2020) in which, by analyzing the export and input import coefficients of Brazil have argued the country manufacturing sector openness to trade have remained substantially within imports rather than stimulating export, especially in the high and medium high technological subsectors.

But since figure 1 only shows the first and the last datapoint of our series, it is important to also look at the evolution of the access to global and domestic demand of the regions, as showed in graph 3 and 4, respectively. Figure 3 shows that apart from eastern Asia, most trends have change after the global financial crisis of 2018. The most drastic shift seems to have happened in Eastern Europe. The 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 in the risk spreads of the members that composed it (OCAMPO; ARTEAGA, 2017). This period seems to have stimulated eastern Europe countries production structure to expand and catch-up on global manufacturing market in the first decade of the century. However, the 2008 crisis have imposed a sharp contraction of the capital flows that imposed eastern Europe countries to have strong adjustments in the balance of payments. As a consequence, the region has reduced its capacity to capture demand after crisis, a trend that has been reverted only after 2015.

All regions of Asia have improved its share of global demand during the years analyzed. However, eastern Asia has improved continuously during the period, while Central, Southern, and Western Asia has increased its access to global demand robustly until 2011 and has maintained its position since then. On the other hand, North America and Oceania, and Northern, Southern and Western Europe have lost their share in global demand mainly in the first decade of the century. On the one hand, North America and Oceania have maintained their position relatively similar in the second decade of the century. On the other hand, Northern, Southern and Western Europe have attenuated the growth rate of the decline in access to global demand. Finally, Latin America and Africa have improved slightly in the first decade of the century, but that improvement has been followed by a sharp contrast in access to demand in the second decade.

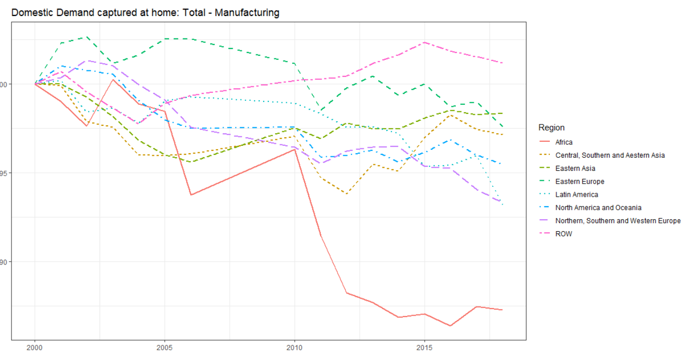
Figure 3: Total Global Demand Captured by region, total industry



Source: Authors elaboration based on ICIO Matrixes, OCDE.

Regarding the domestic demand captured at home, Figure 3 shows that most regions (except eastern Europe that this indicator remained stable) have opened domestic market to foreign competition, mainly in the first decade of the century. That resulted in the reduction of the share of the domestic demand captured by production at home. In the second decade of the century, foreign producers have captured considerable share of Latin American and African domestic demand for manufacturing. European countries have performed similarly, but the decline has been less pronounced. On the contrary, Asia countries have started to reduce trade openness and re-capture domestic demand.

Figure 3: Domestic demand Captured at Home, total industry by region

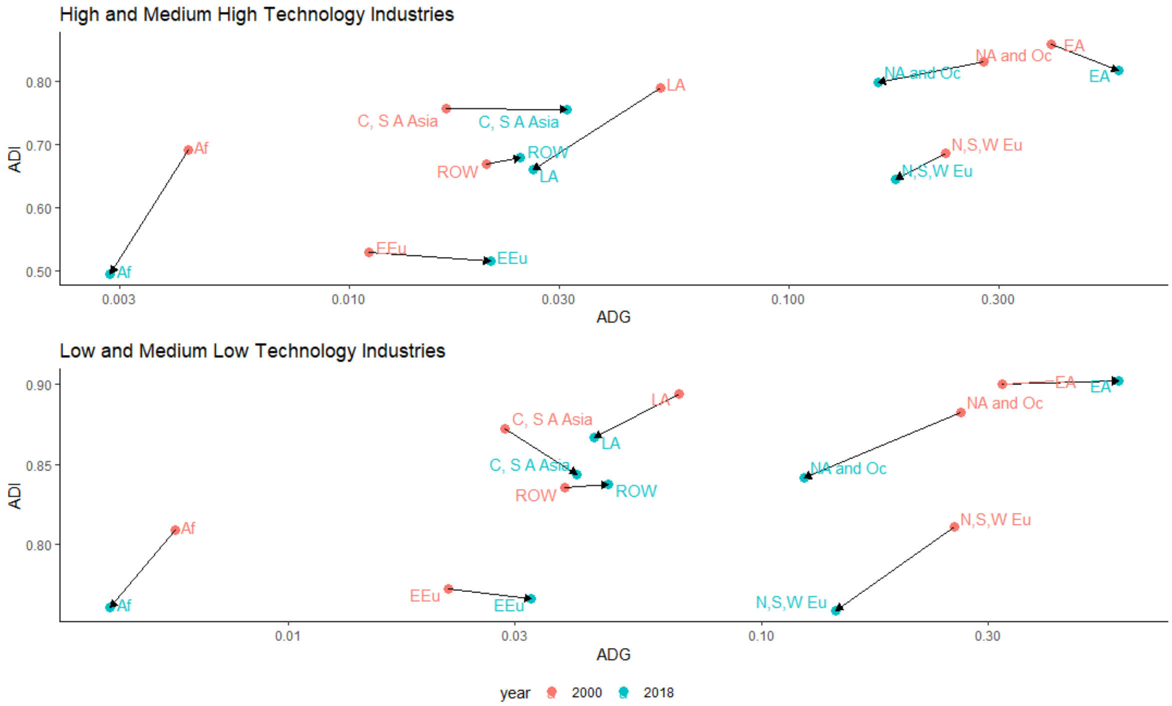


Source: Authors elaboration based on ICIO Matrixes, OCDE.

Looking at very aggregate series can assist our view of the general trends but can also hide important dynamics. For instance, it is important to understand and investigate if the shifts and trends in access to global and domestic demand have occurred analogously across sectors, depending on their technological content. Sectoral analysis have been always implemented, but became crucial for understanding manufacturing trade especially after the important work of Tregenna and Andreoni (2020) that have showed 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), and in fact, for the most high-tech subsectors, the pattern becomes a monotonically increasing line and even a convex curve.

For illustration purpose, we adapted the OCDE taxonomy for technologic activities based on R&D intensity (GALINDO-RUEDA; VERGER, 2016). We have combined High and medium High technological subsectors and low and medium low technological subsectors. This small adjustment does not change the interpretation of the results. Figure 4, if compared with figure 1, shows that the general movement of the arrows have not changed substantially but their size did so, and thus the intensity of the patterns analyzed so far varies considerably if we take into account technological characteristics of manufacturing subsector.

Figure 4: Clockwise Versus Anti-Clockwise Trajectories, by region and technology



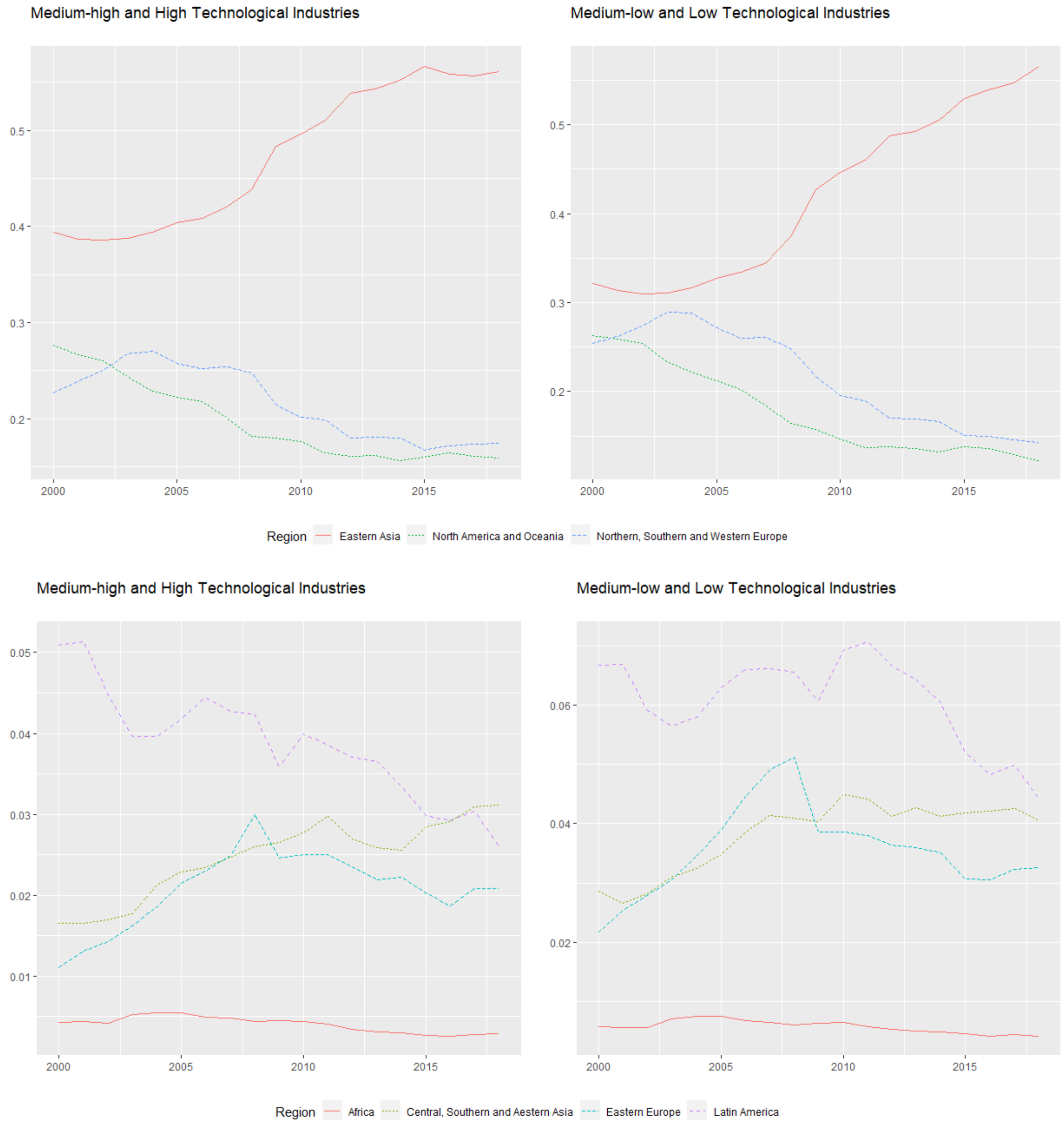
Source: Authors elaboration based on ICIO Matrixes, OCDE.

The loss of access to global demand of the regions varies greatly for low and medium low subsectors if compared with high and medium high subsector. On the one hand, the loss of global demand of developed countries such as North America and Oceania, and Central, Southern and Western Europe have been much more profound on low and medium low technological sectors. On the other hand, the loss of global demand captured by Africa and Latin American countries have been more intensive on medium high and high technological subsectors. Moreover, this contrast is similar but more rigorous for the domestic demand compared with global demand.

Let us now look at the evolution of the total global demand captured by region and technology. Differently from figure 2 and 3, this time it is showed the evolution in absolute terms and not as an index. This enables us to avoid misinterpretation of looking only at growth rates instead of the absolute catch-up. For example, if one analyzes only in terms of growth rate one may conclude that the region that captured most global demand has been eastern Europe, however, if we see figure 5 we see that the share captured by eastern Asia represents the sharpest increase. This increase happened in both low and medium low subsector as well as in the high and medium high subsector but has been more pronounced in the former.

Latin America has reduced sharply its share of captured global demand in high and medium high technological sectors, while have performed well in the medium low and low technologic subsectors in the first decade of the century. Eastern Europe countries more performed extremely well in both subsectors (but better at high and medium low subsectors) until the financial crisis of 2008. Central, Southern and Western Asia rose its share of captured global demand in medium high and high technological subsectors continuously, but the slope is greater in the first decade of the century. As for the medium low and low subsectors the region improved its position until 2010 and then maintained its relatively constant.

Figure 5: Total Global Demand Captured by region and technology

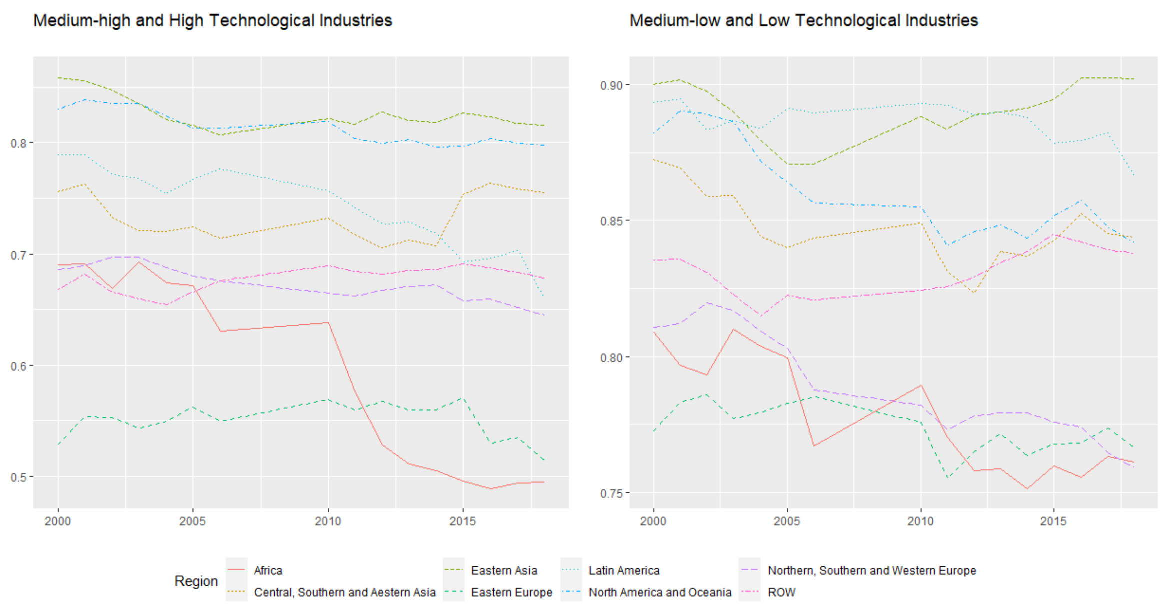


Source: Authors elaboration based on ICIO Matrixes, OCDE.

As for the domestic demand, LA and Africa are the two regions that reduced the most the share of domestic demand captured at home in the high and medium high technological subsectors, while Africa, North America and Oceania, and Southern, Central and Western

Europe reduced the most the share of domestic demand captured at home in the low and medium low technological subsectors.

Figure 6: Domestic Demand Captured at home, by region and technology



Source: Authors elaboration based on ICIO Matrixes, OCDE.

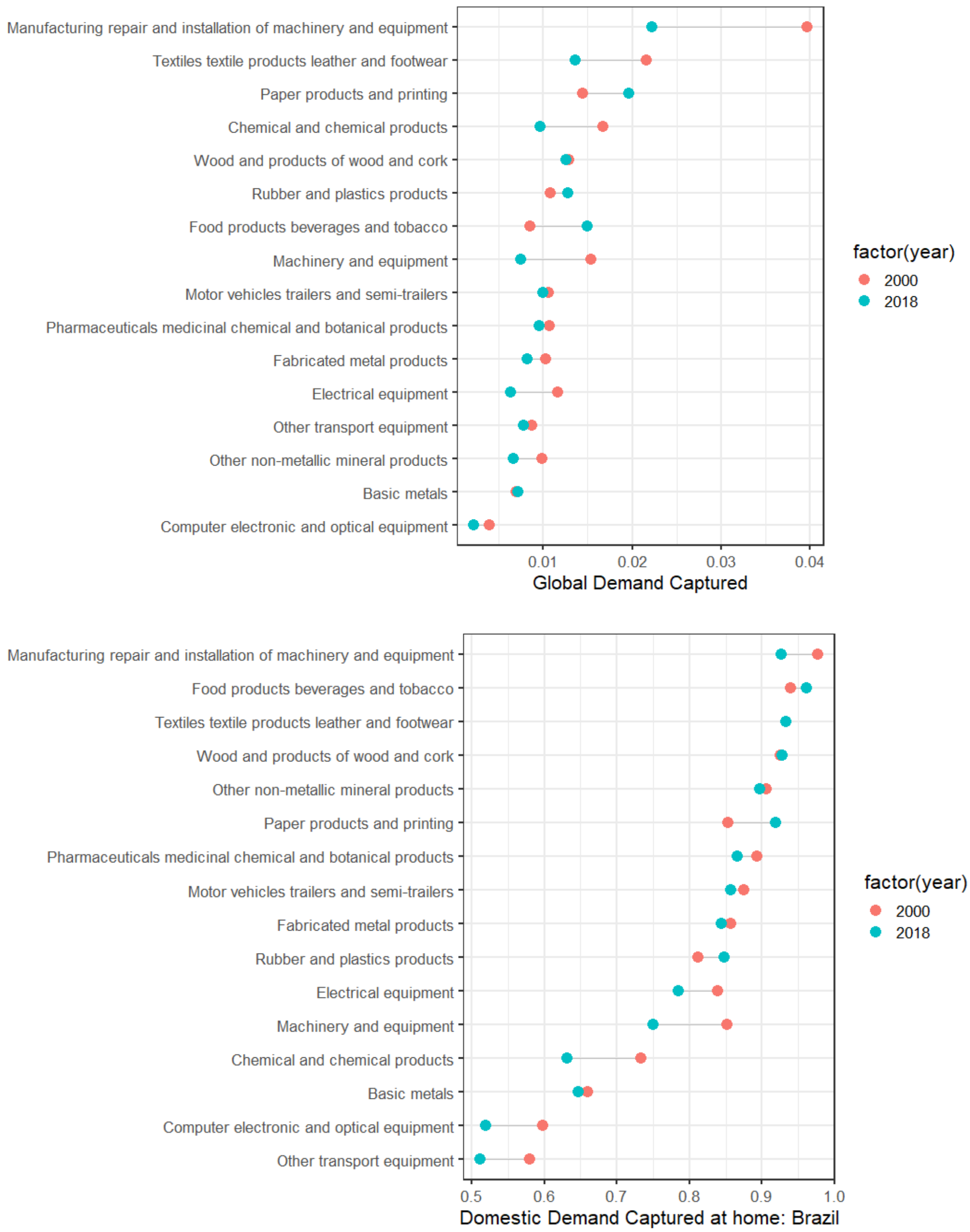
All in all, the indicators of AGD and ADD proved very helpful to analyze and understand the patterns in international trade in the first two decades of the century.

2.3.The case of Brazil

Let us now look more closely to a particular country – Brazil – as so as to analyze the trends in a disaggregated level. Let us start with the comparison between the first and last year of available data, but now analyzing at the sectoral level. In figure 7, when the red dot is on the left side of the blue dot means that the country captured more demand in 2018 than in 2000. The opposite holds the inverse interpretation. As is possible to see, for most sectors the red dot is at the right side of the blue dot, meaning that the country lost share in the demand captured by domestic producers. For global demand, the sectors that increased the capturing of global demand are only paper products and printing, food products, beverage and tobacco. For domestic demand captured at home, the only sectors that increased their share are food products, beverage and tobacco, paper products and printing, rubber and plastic products.

Actually, it is clearly seen in graph of domestic demand captured at home that the more technological sectors are situated at the bottom at the graph, meaning that the share of the domestic market captured by domestic producers is lower if compared with low and medium low technologic intensive sectors. This trend is not bad per se, but besides that, the more technologic sectors have been the ones that lost share the most. The main exception is Pharmaceutical, medical, chemical and botanical products that lost only a small part of its market share. The sectors that the domestic producers lost more profoundly access to domestic demand are machinery and equipment, chemical and chemical products, computer, electronic and optical equipment, other transport equipment and manufacturing repair and installation of machinery and equipment. This are all medium and medium high technological sectors.

Figure 7: Capturing global and domestic demand: The case of Brazil



Source: Authors elaboration based on ICIO Matrixes, OCDE.

If one calculates annual average growth rate of the global and domestic demand captured by domestic production, you can see that the interpretation varies only slightly. Figure 8 splits sectors by subsectors that have increased (decreased) on average their demand share within the period. Growing sectors are painted in green while shrinking sectors are colored with gray. The sectors have been organized in decreasing order. It is possible to see that the sectors that have increase access to the demand the most, are low and medium low products as food processing beverages and tobacco, paper products and rubber and plastics while shirking sectors are often high technological sectors such as machinery, computer, electronic and optical equipment, chemicals and etc.

Figure 8: Capturing Global Demand: The case of Brazil

Source: Authors elaboration based on ICIO Matrixes, OCDE.

As we have argued before, it is also very important to look at the evolution and to the absolute values of the shares of global and domestic demand captures by domestic production. Figure 8 illustrate this evolution separating Brazilian manufacturing in low and medium low subsectors and high and medium high subsectors. The blue doted lines represents the former and the red line represents the latter. The graph in the left side is the evolution of the access to global demand, while the right-hand side graph is the evolution of the domestic demand captured at home. The graphs shows that the domestic producers of low and medium low manufacturing products have increased their share in global market until approximately 2011 while have maintained constant its share in the domestic market. As for the high and medium high technologic subsectors, the graph shows that the fall starts much earlier, around 2007 for the global demand and 2006 for the domestic demand.

Figure 8: Capturing Global and Domestic Demand: The case of Brazil, by technology

Source: Authors elaboration based on ICIO Matrixes, OCDE.

The descriptive statistic described so far for the case of Brazil corroborates with previous literature on the topic. Nassif and Castilho (2020) have illustrated Brazil regressive specialization by showing that there has been a very marked trend of Brazilian exports concentration on primary products while imports have been composed of high technologically sophisticated manufactured goods. In the same line Marconi *et al.* (2020) shows that Brazilian exports now represent a relatively low share of total output, while imported inputs are a much more relevant part of total costs. Our analysis corroborates with previous findings by showing that domestic producers have lost their share both domestic and global demand for high and medium high technological products.

3. The investment Function: The role of Caching the Demand

Keynes profoundly changed economists' views on the investment function and the role of investment in macroeconomics, either by having re-established the role of the rate of profit at the center of the investment function and by bringing in the concept of 'animal spirits' and for arguing for a reverse causality between savings and investment.

Based mainly on Keynes' theoretical contribution, it is possible to observe an extensive debate among post-Keynesians over time on how best to represent the investment function, which came to be considered autonomous, since investment decisions by entrepreneurs are made independently of household saving decisions. Foley and Michl (1999)) and Basu and Das (2017, 2018) explain the evolution of this debate in great detail. The first recognized Keynesian mathematical formulation for the investment function was devised by Robinson (1962). For Robinson, an increase in the rate of accumulation requires an increase in the rate of profit, either by bringing about a greater probability of investment itself or by ensuring greater available financing.

In this way, the author formalized Keynes' 'animal spirits' theory by proposing that the growth of the capital stock was determined by expectations about the rate of profit, as shown in equation 25 below:

$$:\frac{I}{K} = f(r) = \alpha + \beta_1 r \quad (25)$$

Where I is current investment, k is the capital stock, r is the expected rate of return. However, as Basu and Das (2017) point out, the function proposed by Robinson carries an important limitation by not considering that the rate of capacity utilization influences firms' investment decisions.

A first attempt to solve this problem was made by Dutt (1984) who included the capacity utilization rate (u) in the Keynes-Robinson function, as in equation 26 below:

$$: \frac{I}{K} = g(r, u) = \alpha + \beta_1 r + \beta_2 u \quad (26)$$

Although it was considered an important advance, the function proposed by Dutt ended up restricting what came to be called profit-driven expansion, that is, an increase in the growth rate of output (or capacity utilization) when the share of profit increases (BASU; DAS, 2017). According to Lavoie, Rodríguez, and Seccareccia (2004), Badhuri and Marglin (1990) highlighted the restriction by showing that the capacity utilization rate was being double counted in the equation, since the profit rate also depends on capacity utilization. Since there was no a priori reason to rule out a profit-driven expansion, Bhaduri and Marglin (1990) argued that Dutt's proposed function was theoretically unsatisfactory and proposed that investment decisions are determined by the profit share rather than the profit rate, arguing that in this way one explicitly separates the two influences, and thus avoids double counting.

$$\frac{I}{K} = f(h, u) = \alpha + \beta_4 h + \beta_5 u \quad (27)$$

The Bhaduri-Marglin investment function has been widely used in the post-Keynesian literature (LAVOIE, 2014), especially in the wage-led/profit-led discussion (ONARAN; GALLANIS, 2012). However, Blecker (2016) have critically assessed the literature on wage-led and profit led growth regimes and have pointed that there is a great heterogeneity of the empirical findings, that combined with the new descriptive statistics that have been showing a long-term trend disconnection of profit and investment rate due to financialization and the econometric limitations of the previous studies, indicates that the investment function of equation 27 might be mis specified.

The author ends up concluding that investment is actually determined by different factors depending on diverse circumstances, but moreover, have different determination elements depending on the time horizon of the investigation. In fact, investment and exports are determined by profits in the short term, but the former is more likely determined by consumption (wage-led) in the long term. This argument is very aligned with empirical findings that there is very large cyclical correlation between investment and profits, but that the trend of the two variables are going in opposite direction since the 1990s (the former having a declining trend while the latter showing an upward trend). Hence, Blecker shows that the Bhaduri and Marglin (1990) investment function, that is a function of the profit share and the capacity utilization, implies that the level of output or utilization impact investment, while in reality, is the change in output that determines investment.

Adding to the misspecification problems, the author also list different econometric issues of previous studies, and assert thar previous findings are very sensitive to various aspects of their specifications such as data frequency and lag lengths, functional forms (linear or non-linear), transformation of the variables, control variables included and methodology to control for endogeneity in the models.

Blecker (2016) then propose the accelerator model, in which investment is determined (by distributed lags of) by changing in output, user cost (cost of capital, i), and the cash flows (representing profit in the equation). "The accelerator approach also implies that longer-term trends in capital accumulation are driven mainly by output growth, while profitability only affects the short-run timing of investment and plays no independent role in the long run" (p.383). He adapted the modern version of the accelerator model of Chirinko; Fazzari; Meyer (1999), to arrive at equation 28, below:

$$\frac{I}{K} = \beta_6 \dot{y} + \beta_7 i + \beta_7 CF \quad (29)$$

where investment (I), output (Y), and capital (K) are measured in 'real' (deflated) terms, *i* is the 'user cost' of capital and CF is cash flow (also in real terms), the dot above the variable indicate we are considering its first difference, and the βi are coefficients.

The ND theory argues that an important variable in determining investment is Access to Demand (AD) by firms, because having a satisfactory effective demand does not guarantee that competent entrepreneurs will be able to access this demand, which may be absorbed by foreign competitors. AD is strictly associated with the components of the investment function discussed within the post-Keynesian field, for example, since both profit share and capacity utilization depend on observed (or expected) sales, and it is to be expected that the expectation of access to this demand is a determining indicator in the investment decision. Moreover, as cash flow is determined by sales, increasing or decreasing access to domestic and global demand influence considerable the possibilities of sale by firms. We propose then a small modification of Blecker (2016) proposed investment function to incorporate the new developmentalism theory of access to demand. The final investment function becomes then:

$$\frac{I}{K} = \beta_8 \dot{y} + \beta_9 i + \beta_{10} A\dot{D}G \quad (30)$$

Where AGD is the access to global demand that influences the cash flows and thus, the profit rate.

4. Empirical exercise

To test our theoretical model we have elaborated a database combining the indicators of access to demand calculated through ICIO (TiVA OCDE) with the remaining variables of equation 30, such as countries growth rate (WDI-WB) and interest rate (IFS) and several control variables (several sources)[4]. Due to the limited data availability for creating the indicators of the access to demand, the database developed comprises data from 2000 to 2018 for 69 countries and 16 manufacturing sectors.[5] To econometrically investigate our hypothesis, a dynamic panel data methodology is used. The empirical analysis is based on the System GMM estimator developed from Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998), because this model is efficient in the presence of endogeneity bias, which occurs when the explanatory variables simultaneously determine and are determined by the explained variable.

Roodman (2009) explains that such estimators are appropriate in the use of panel data when we have the following issues: (a) explanatory variables that are not strictly exogenous, i.e., predetermined and/or endogenous; (b) a linear functional relationship; (c) a lagged dependent variable, i.e., one influenced by its past values; (d) a smaller number of periods than the number of individuals; (e) individual fixed effects; (f) heteroscedasticity and autocorrelation within groups of individuals; and (g) the possibility of internal instruments based on their own lagged variables or external instruments. The methodology consists of estimating a system that comprises a first differentiated equation to eliminate fixed effects of the sector and an additional equation in level. Appropriate lagged values of levels and first differences can be used as instruments in these equations to address the problem of endogeneity.

The transformed version of equation 30 to econometrically test our proposed investment function becomes:

$$\frac{I}{K} = \alpha + \beta_{11}\frac{I}{K}i(t-1) + \beta_{12}\frac{I}{K}i(t-2) + \beta_{13}\dot{y}it + \beta_{14}\dot{\iota}it + \beta_{15}A\dot{D}Git + Xit + uit \quad (30)$$

Where α is the constant, Xit the control variables and uit the error term, I represents the individual and t the time period. Control variables used follow evidence suggested in the literature.

[4] For the variables used in the empirical exercise, their calculation methodology and their sources, please see Appendix X.

[5] For more information of countries and sectors used please see appendix X and XX.

Table 1: The Blecker-ND investment function

VARIABLES	(1) ltx_invest	(2) ltx_invest	(3) ltx_invest	(4) ltx_invest	(5) ltx_invest	(6) ltx_invest	(7) ltx_invest	(8) ltx_invest
L.ltx_invest	1.050***	0.939***	0.978***	0.998***	0.961***	0.986***	0.981***	0.998***
	(0.054)	(0.056)	(0.066)	(0.063)	(0.065)	(0.065)	(0.084)	(0.088)
L2.ltx_invest	-0.179***	-0.144**	-0.186*	-0.188*	-0.175*	-0.223***	-0.148*	-0.184**
	(0.056)	(0.068)	(0.103)	(0.098)	(0.090)	(0.081)	(0.086)	(0.090)
LD.ladg	0.351***	0.116*	0.138*	0.156*	0.172**	0.153*	-0.003	0.135*
	(0.081)	(0.070)	(0.077)	(0.080)	(0.080)	(0.085)	(0.101)	(0.076)
L.lgdp_g		0.031***	0.017**	0.018**	0.016***	0.020***	0.017**	0.020*
		(0.009)	(0.008)	(0.008)	(0.005)	(0.007)	(0.008)	(0.012)
LD.Interest_Rates_Differential_BIS			-0.004**	-0.004**	-0.004***	-0.003**	-0.005***	-0.005***
			(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Patentapplicationsresidents				0.000***				
				(0.000)				
D.Hightechnologyexportsofma					0.001**			
					(0.001)			
lmis_underval						-0.039		
						(0.029)		
L3.RER							0.015*	
							(0.009)	
LD.Manufacturesexportsofmerch								0.001*
								(0.001)
Constant	-0.221***	-0.371***	-0.359***	-0.333***	-0.372***	-0.194	-0.319***	-0.330***
	(0.066)	(0.106)	(0.120)	(0.107)	(0.100)	(0.151)	(0.073)	(0.074)
Observations	1,122	982	771	771	771	771	724	771
Number of Country_index	66	65	52	52	52	52	52	52

AR(1)	1.83e-05	0.000407	0.000514	0.000474	0.000226	0.000104	0.000387	0.000339
AR(2)	0.860	0.143	0.388	0.382	0.403	0.306	0.459	0.437
Hansen	0.115	0.225	0.211	0.302	0.471	0.221	0.102	0.250
Number of Instruments	43	42	35	38	38	38	30	41

Notes: Standard errors in parenthesis below the coefficients; ***: $p < 0.01$, **: $p < 0.05$; two-step standard errors are robust to the Windmeijer (2005) heteroscedasticity correction; Hansen test: the null hypothesis is that the instruments are not correlated with the residuals; Arellano-Bond test for AR(2) in first difference: the null hypothesis is that the errors in the first difference regression has no second-order serial correlation. All estimations include time dummies;

The results of table 1 suggests that the model proposed captured by Blecker (2016) and adpted here seems robust for endogeneity and different specifications. Our proposed variable to capture cash flow and profit, the access to global demand proposed by the ND theory proved very to be positive and significative associated with investment. The coefficient remained stable to different specifications. As expected, while GDP growth rate is also positively and significant, interest rate differential is negative and significatively associated with investment. As for control variables: (i) an increase in patent applications by resident, our proxy for innovation, is significant and positively associated with an increase in the investment; (ii) exporting manufacture and/or high technologic manufacture is significant and positively associated with an increase in the investment; (iii) our proxies for currency misalignment is not significant and the real exchange rate is significant and positive only on the third lad[6].

The validity of the instruments and the robustness of the model can be tested by the Arellano-Bond test for AR (2) which checks second-order serial correlation in the error term and the Hansen test statistics that checks the exogeneity of instruments. Both tests have been implemented and can be seen in the bottom of table 1. The model passes in all robustness tests.

5. conclusion

The article aims to contribute to the understanding of the recent trends in the international trade and its relation to the investment function and thus, to economic development. To do so, first it is proposed an indicator of Access to Demand, decomposed between Global Demand and Domestic Demand, and estimated it for 69 countries from 2000 to 2018 based on ICIO tables of TiVA OCDE. Descriptive statistics are provided and analysis of main trends of the indicator is provided, disaggregating by region and technological intensity of the sectors according to their R&D activities. A special section is developed to analyze the Brazilian Case. Later, it is proposed a small modification of Blecker (2016) accelerator model to include a new insight from DN theory, in which, the access to demand is crucial for guarantying sufficient cash flows to make investment desirable. The model is tested by an econometric exercise using System GMM methodology. Indeed, access to demand seems to impact positively and significantly the investment function. As expected, while gdp growth rate impacts investment positively, interest rate differential impacts investment negatively. The model proved robust for different specifications and to all robustness checks recommended by the literature.

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[6] There is robust evidence supporting the role of the exchange rate and exchange rate misalignment to stimulate investment (BLECKER, 2007; CAGLAYAN; MUÑOZ TORRES, 2011; CAMPA, J.; GOLDBERG, 1995; CAMPA, J. M.; GOLDBERG, 1999; MARCONI *et al.*, 2021; MISSIO *et al.*, 2015; NUCCI; POZZOLO, 2001). But as suggested by the ND theory, the exchange rate is one of the main variables that determine the access to the demand, and then both variables are very correlated which might be impacting the results. Moreover, taking time for the exchange rate policy to have effect in investment is also common in literature, as pointed out by (MARCONI; PORTO; ARAUJO, 2022)

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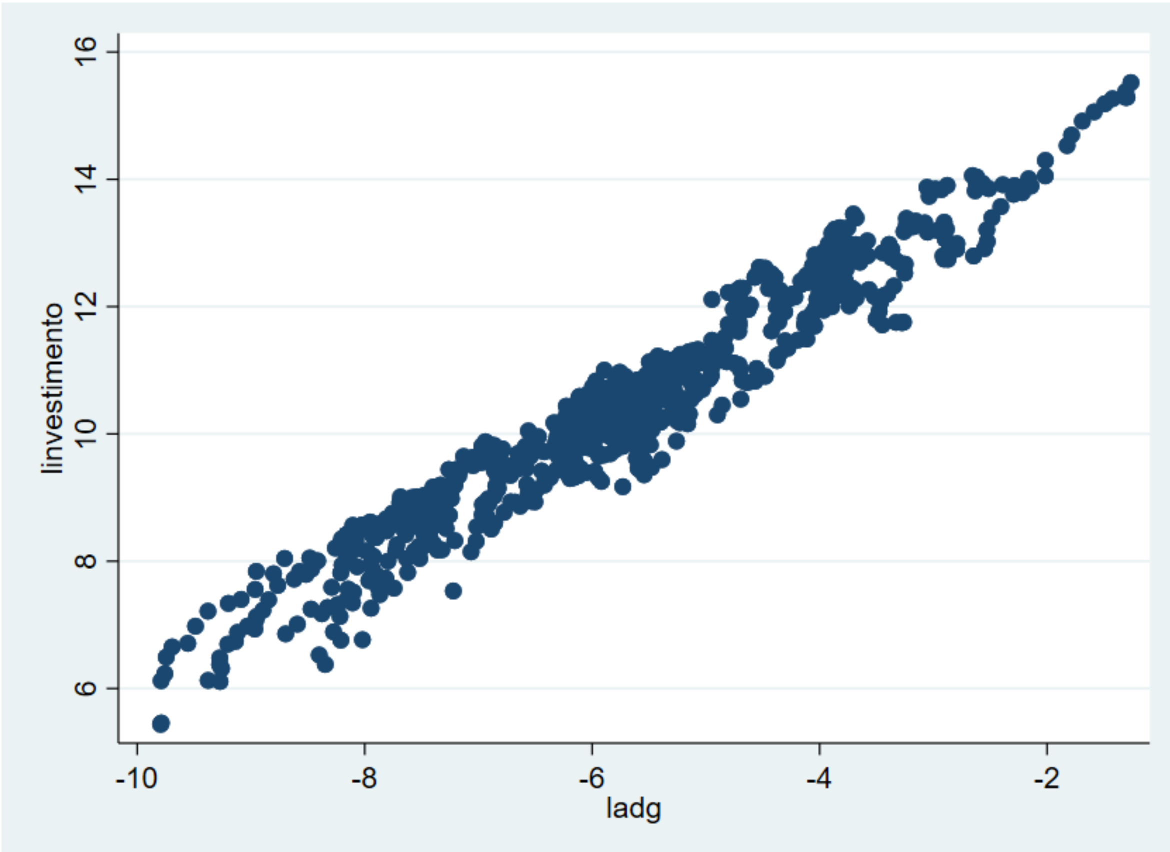

Econometric Exercise

Conclusion