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Institute of Economics
Scuola Superiore Sant'Anna

Piazza Martiri della Libertà, 33 - 56127 Pisa, Italy
ph. +39 050 88.33.43
institute.economics@sssup.it

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Trapped in bad specialization: premature deindustrialization and unstable growth in LACs

Maria Celeste Gomez [a]
Giovanni Dosi [b]
Federico Riccio [b]
Maria Enrica Virgillito [b]

[a] Consejo Nacional de Investigaciones Cientificas y Técnicas (CONICET), Argentina
[b] Centro de Investigaciones en Ciencias Económicas, Universidad Nacional de Córdoba, Argentina
[a] Institute of Economics, Scuola Superiore Sant'Anna, Pisa, Italy

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Trapped in bad specialization: premature deindustrialization and unstable growth in LACs

Gómez, M. C.[(a)(b)(*)]; Dosi, G.[(c)]; Riccio, F.[(c)]; Virgillito, M. E.[(c)]

Abstract

Over the last forty years, Latin American countries (LACs) have experienced a variety of specialization trajectories, while sharing a common pattern of weak and unstable growth. Given the accelerated premature deindustrialization path and the loss of productive capacity, manufacturing has represented a missed opportunity for development. The result has been a stable landing into a middle-income trap and economic stagnation. Accordingly, this paper addresses the relationship between sectoral productive composition, growth performance and its variability. Using the UN-COMTRADE and the Penn World Table 10.1 databases between 1962 and 2017, we account for the specialization strategies of LACs, linking aggregate output, export products, and sectoral composition. In a nutshell, we examine the extent to which revealed comparative advantages, at the country or the technological (Pavitt) class level, and the relative composition of the export baskets exert any significant role in explaining output growth and volatility. According to our findings, specializing in factor endowments and natural resources has brought LACs into a trap of halted catching up.

Keywords: Structural Change, sectoral composition, Latin America.

JEL Classification: F41, O11, O14, N16.

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[a] Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET). Argentina

[b] Centro de Investigaciones en Ciencias Económicas (Universidad Nacional de Córdoba and CONICET). Gómez, M.C. Email: mcelestegomez@unc.edu.ar ORCID: 0000-0002-5974-8473. (*) Corresponding author.

[c] Institute of Economics, Scuola Superiore Sant'Anna, Pisa, Italy. Dosi, G. Email: giovanni.dosi@santannapisa.it, ORCID: 0000-0002-0126-9349; Riccio, F. Email: federico.riccio@santannapisa.it, ORCID: 0000-0002-4674-3999; Virgillito, M. E. Email: mariaenrica.virgillito@santannapisa.it, ORCID: 0000-0001-5958-9647.

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1. **Introduction**

Over the last forty years, Latin American economies have experienced alternate trajectories of development, however the most recent decades have been commonly characterized by the lack of a sustained growth pattern. Latin American growth trajectories represent an intriguing puzzle, as these countries show a prolonged growth period until the end of the seventies, and then an accelerated slowdown in activity levels, with implication for their growth and prosperity. To give an example, the average per capita growth in the region is recorded at 2.3% in the 21st century, against 3.3% and 5.2% for European and Asian countries, respectively. Until the mid-seventies LACs and Europe share quite similar growth patterns. At the beginning of the 1960 period, LACs report an average per capita growth of 2.5%, like European countries (2.7%), not far away from Asia (3.7%). In addition, growth volatility of the region has reached 10.2%, versus 5.4% in Europe, and 10.1% in Asian countries during the period 2000-2019, according to estimates on the Penn World Tables.

¿What are the underlying structural motives behind? LACs have shown stagnation in labour productivity and growing internal structural heterogeneity (Cimoli, 2005). These conditions have historically expressed in internal and external gaps both in terms of productivity and technological content (Abeles & Amar, 2017; Gómez & Borrastero, 2018). The identified asymmetries have been however accompanied by a common premature deindustrialization path (Santarcángelo, 2019; Ormaechea & Fernández, 2020) with deep social costs as rising poverty and social exclusion (Katz, 2023).

Although manufacturing specialization has represented a possibility of catching-up until the mid-seventies[1], Latin America still displays an internal structure of production mostly dependent on over-exploitation of natural resources and abundance of low productivity manufacturing industries (Chena & Caldentey, 2020; Gómez & Borrastero, 2023; McMillan, 2011; Viganó & Gómez, 2023).

The structural composition and the patterns of specialization of countries deeply influence the prospect of growth and its stability. Given the heterogeneous distribution of learning opportunities, skill accumulation and the generation of increasing returns across industries, it is not equivalent to produce microchips or potato chips (Dosi et al., 2021). Therefore, the composition and nature of the product baskets affect development trajectories (Hidalgo et al., 2007). That is, patterns of specialization/diversification have a crucial role in influencing countries' growth path (Dosi et al., 2022). Accordingly, in this paper we address the relationship between sectoral productive composition, growth performance and its variability in LACs.

We analyze 14 countries of the region and employ data from the World Development Indicators (WDI), constructing a harmonized panel from the United Nations COMTRADE database (UN-COMTRADE) and the Penn World Table 10.1 databases for the period 1962-2017. We analyse long-term series of output, product export, and manufacturing production. We construct revealed comparative advantage (RCA) indicators, at the country or at the technological class level (Pavitt, 1984; Lall, 2010), and the relative specialization of the export baskets via Theil entropy indicators (Theil, 1972). We finally estimate the relationship

[1] The average manufacturing share in LACs rose since 1971 (first available data). In 1977, it peaked at an unprecedented 22.3% (Source: World Development indicators).

between output per capita growth and its volatility vis-à-vis product composition, using non-parametric analysis and panel data models.

Our findings document that premature deindustrialization coexists with repeated episodes of negative growth, especially after the globalization phase started in 1991. According to our estimates, RCA does not affect growth patterns, contrasting the benefits of specialization deriving from comparative advantage. The result is confirmed when using an alternative indicator, the Theil index. In addition, RCA in natural resources and agricultural products have a negative relationship with growth volatility. Inflation appears a strong driver of weak growth performance, with a negative effect on average growth and an amplifier effect on growth volatility.

This paper is organized as follows: in the following section, we present the theoretical framework. In the third section, we focus on the data description and the empirical strategy. In section 4, we present a long-term analysis of output growth, manufacturing shares, and export composition, ending with a non-parametric analysis and the econometric results. Finally, the concluding remarks.

2. Latin American development traps

Latin American countries have historically faced significant and persistent obstacles in developing autonomous techno-productive capabilities, able to generate sustained development (Abeles & Amar, 2017; Araujo et al. 2016; CEPAL, 2010). According to Aravena & Fuentes Knight (2013), productivity stagnation and structural heterogeneity represent the most relevant obstacles for growth in the recent decades (1980-2010).

Less attention has been devoted to the nexus of product composition, specialization and growth prospects. The literature on the evolutionary theory of economic change has put forward the notion of Keynesian and Schumpeterian efficiency to define patterns of specialization. The two concepts are not far from the prediction of the Prebisch-Singer hypothesis in terms of development path for South countries. The former is based on products with high demand-income elasticity, and the latter on products with high technological intensity and productivity levels, strong production linkages, and increasing returns (Barletta et al., 2014). Specifically, this theory contrasts the traditional comparative advantage approach --based on relative factor efficiency-- with the Keynesian and Schumpeterian efficiency perspectives. The premise is that the technological content of products exerts an important influence on countries' patterns of economic development (Bernat, 2020; Dosi et al., 2021). The extent to which Lacs' specialization paths have lost terrain in terms of international competitiveness in complex and demanded productions remains an open question.

The specialization trap has been accompanied by a process of premature deindustrialization (Tregenna, 2014), with developing countries reducing opportunities of catching up (Dosi et al., 2021) and recording accelerated deindustrialization vis-à-vis advanced countries (Cassini at al., 2017; Rodrik, 2016). Accelerated deindustrialization slows down the possibilities of taking the benefit from manufacturing, making the transition to high-income levels difficult or unattainable (Kharas & Kohli, 2011; Paus, 2018), with social consequences such as the persistence of high poverty levels, stagnation, and social insecurity (Aiginger & Rodrik, 2020; Cervantes Martínez & Villaseñor Becerra, 2021; Katz, 2023; Liu & An, 2023; Schteingart, 2017). The latter problem is known as middle-income trap.

Based on the view that production patterns have an impact on development trajectories, and adopting a Pavitt's technological framework (Pavitt, 1984), Dosi et al. (2021) find that the chances of 'early deindustrialisation' depend inversely on specialization in science-based and specialized suppliers' industries. Hidalgo et al. (2007) find that not every product mix allows a country to grow sustainably.

When looking at Latin American countries, endowments represent a challenge. In particular, the possibilities of vicious structural changes depend on natural resources and endowment structures (Agosin, 2009; Agosin et al., 2012; Dosi & Tranchero, 2021). McMillan & Rodrik (2011) comparing LACs vis-à-vis Asian countries, find that in the former structural change drove labour from high to low-productivity sectors. In sum, manufacturing plays a key role in LACs poor economic performance (Pagés-Serra, 2010), because of its low productivity and scarce or null technological diffusion (Abeles & Amar, 2017).

Experiences of sustained growth are more the exception than the norm, and volatility in the level of economic activity (Ramey & Ramey, 1995) is a phenomenon that particularly affects developing countries (Cárcamo Díaz & Pineda-Zalazar, 2014). Few studies combine micro, meso, and macroeconomic analyses of growth to examine how changes in the productive structure are related to the synchronization of business cycles (Imbs, 2004), growth slowdowns, and growth volatility (Aiyar et al., 2013). Under the complexity framework, countries' development trajectories are connected to the nature of the product-baskets, both in terms of sophistication (Calzada, & Spinola, 2022; Hidalgo et al., 2007) and of quality of specialization/diversification (Cadot, Carrère, & Strauss-Kahn, 2011; Dosi et al., 2022; Mania & Rieber, 2019).

In short, since economies grow when they improve the basket of goods they produce and export, the link between the composition of production, trade and countries' growth performance is worth studying. By focusing on LACs (Agramont-Lechín, 2024; Bielschowsky et al., 2022; Fontana & Gontijo, 2024; Hallak, 2023; Lanzilotta et al., 2023; Oviedo & Fernandez, 2024; Katz & Yeyati, 2024), we examine countries that reveal a production structure associated with a less sophisticated product baskets and a poor specialization pattern, based on the hypothesis that they are more likely to experience weaker performance in terms of growth sustainability.

3. Methodology

3.1. Data description

The study is focused on 14 Latin American countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Mexico, Panama, Peru, Venezuela, and Uruguay. We selected these, as they are the biggest countries in the region – considering their GDP in 2019[2]-, except for Uruguay and Venezuela.

Firstly, we study production and employment trends in manufacturing with data from the WDI-World Bank yearly database. In particular, we use the manufacturing value-added and GDP series to estimate the manufacturing share in GDP, and employment share in manufacturing according to the available data from 1965-2019 and 1991-2019, respectively. We apply this analysis to the manufacturing shares by country, as well as to the Latin American average.

Secondly, we evaluate the product composition and the trade patterns for the period 1962-2017. We employ data from the United Nations International Trade Statistics Database (UN-COMTRADE), which includes trade statistics by product and trading partner at 4-digit Standard International Trade Classification (SITC) codes level. The information in this database consists of the yearly value of trade from each of the selected Latin American countries (as countries of origin) and the rest of the world (the approximately 200 countries considered as destinations).

We adapt the conversion method between the SITC codes and the International Standard Industrial Classification (ISIC) codes from Affendy, Sim Yee, & Satoru (2010) to relate the series with the pattern of specialization according to industrial classifications. Then, we combine Lall (2010) and Pavitt (1984) to define an extended version of Pavitt's technological classes: natural resources, supplier dominated, scale intensive, and science-based products. From this taxonomy, we define the categories related to good or bad specialization profiles, including natural resources and supplier-dominated industries in the former and scale intensive, specialized suppliers and science-based industries in the latter. We measure export values at 2-year moving averages (to lessen annual volatility)

[2] GDP PPP (constant 2017 international $). World Development Indicators (WDI-World Bank).

3.2. Empirical strategy

Revealed comparative advantages and concentration index

1. From the COMTRADE database, we estimate revealed comparative advantages (RCA) at 3-digit SITC code level. We adopt the following measure based on Balassa (1965). We calculate RCA referring to the rest of the world (results over Latin American average do not substantially differ).

$$RCA_{ikt} = \frac{x_{ikt}}{\sum_k x_{ikt}} \frac{\sum_k xX_{ikt}}{\sum_i \sum_k x_{ikt}} \qquad (1)$$

where x_{ikt} equals the export value in product k for the country i to the rest of the world, in year t. This measure allows identifying, for each product, each country, and each year, the comparative advantages of producing and exporting it. From these measures of efficiency at product level (RCA_{ikt}), we construct the RCA intensity. This indicator synthesizes RCA measures by country, weighting by countries' export shares:

$$RCA_{int_{it}} = \sum_k \frac{x_{ikt}}{\sum_k x_{ikt}} ln(1 + RCA_{ikt}) \qquad (2)$$

We compute three alternative levels of aggregation for RCA intensity. The first one delivers one aggregate annual RCA for each selected country. The second level considers technological classes. In particular, we adapt the classification from Pavitt (1984) and Lall (2010) to produce six sector-specific RCA measures for the 14 countries under consideration. These consist of primary products (commodities), natural resources (NR)-based manufactures, supplier-dominated, scale-intensive, specialized suppliers', and science-based manufactures. The third distinguishes the quality of specialization strategies for manufactured products (Dosi, Riccio & Virgillito, 2022). In Table 1 we display the manufacturing taxonomies by adapting the ISIC codes.

Pavitt - Lall Taxonomy

Bad specialization		ISIC	Good specialization		ISIC
Classes	Sector	Code	Classes	Sector	Code
Natural Resources (NR)	Prepared meats/fruits, dairy products, prepared fish, prepared vegetable and fruits, sugar, beverages, manufactured tobacco, wood products, pulp and paper products, animal and vegetable oils, coke, carbon, petroleum products.	15 16 20 21 25 23	Scale Intensive (SI)	Printing and publishing	22
				Rubber and plastic products	25
				Other non-metallic mineral products	26
				Basic Metals	27
				Trailers and automobile parts	34
			Specialised suppliers (SS)	Machinery and equipment	29
Supplier dominated (SD)	Textile fabrics and products	17		Other transport equipment	35
	Wearing apparel and footwear	18			
	Leather products	19	Science-based (SB)	Chemical products	24
	Fabricated metal products	28		Radio, TV, and communication equipment	32
	Furniture	36		Medical precision and optical instruments	33

Table 1. Combined taxonomy to aggregate product composition. Source: own elaboration on Pavitt (1984) and Lall (2010).

2. We estimate the Theil Entropy Index (Theil, 1972), an entropy measure that captures the dispersion of export shares in terms of products in the total exports, following Mania & Rieber (2019):

$$T_{it} = \frac{1}{n}\sum_{k}\left(\frac{x_{ikt}}{\mu}\right) ln\left(\frac{x_{ikt}}{\mu}\right) \qquad with\ \mu = \frac{1}{n}\sum_{k} x_k \qquad (3)$$

where, for each period and country, x_k is the export value of product k. The higher the level of the index, the higher the export concentration.

Econometric strategy

We focus the econometric strategy on the connection between RCA and Theil entropy measures, on the one hand, and the output per capita growth patterns in Latin American countries, on the other hand. Specifically, we examine the effects of these trade structure measures over average growth and growth volatility, using a panel structure of 14 selected countries and circa 28 periods, as we consider 2-year (non-overlapping) time spans between

1962 and 2017 (to smooth annual fluctuations). We estimate the next equations using a fixed (FE) effects model[3] [4]:

$$Y_{it} = \beta_0 + \beta_1\, PCM_{it} + \beta_2\, Y_{it-1} + \beta_3\, X_{it} + \propto_i + \delta_t + e_{it} \qquad (4)$$

where Y_{it} indicates, alternatively, the response variables that we use to measure growth patterns: average output per capita growth rate and standard deviation of the output per capita growth rate for country i. The main covariables of interest are represented in the product composition measure, PCM_{it}. That is, a set of indicators associated with each country's trade structure. In the results section, we discuss five models, which differ according to the expression of PCM, in other words:

- Models 1-3 include RCA intensity: (1) by country; (2) by technological class (Pavitt and NR based manufacturing classes); (3) by quality of specialization profile.

- Models 4-5 include entropy indexes of product export concentration: (4) Theil index; (5) trimmed Theil index for values above the yearly median.

In addition, Y_{it-1}controls for the persistency in the response variables, and X_{it} includes other controls and the initial value for the output per capita, trade openness, inflation volatility, and exchange rate volatility (calculated both as the standard deviation of these indicators at country level). The $\propto_i$ and δ_t terms capture the country and periods fixed effects. We calculated the control variables for 2-year' time spans from the Penn World Table Database (10.1) for the same period (1962-2017).

4. Results

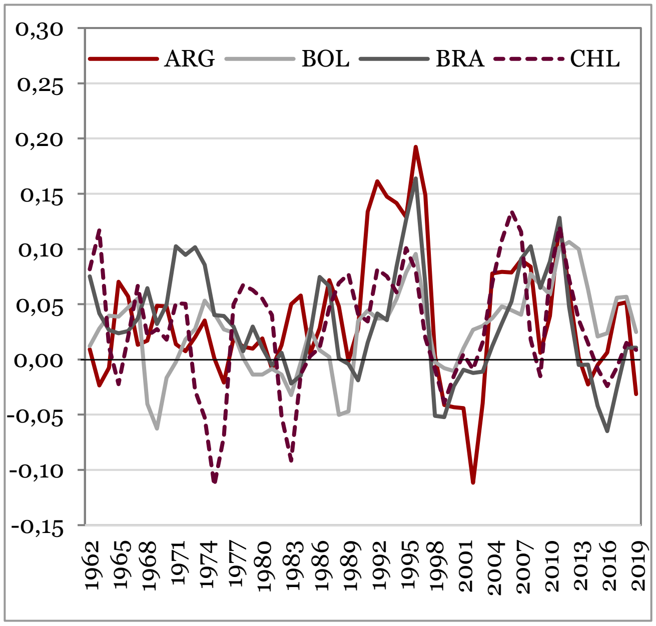
4.1. Macroeconomic growth historical trends

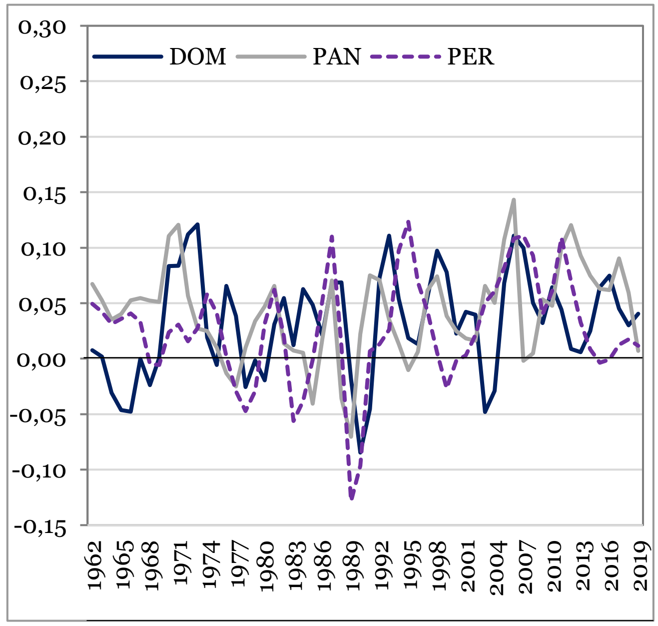
The macroeconomic performance of LACs in terms of growth is a self-defeating combination of high growth volatility and weak long-term growth trends. The growth patterns these economies experienced between 1962 and 2019 are characterized by frequent and sharp downturns and upturns, as shown in figures 1a to 1c. Among countries with growth rates

[3] We estimate the FE model using the estimator proposed by Correia (2016) for linear models with multiple fixed effects. The underlying algorithm is a generalization of the works from Guimaraes & Portugal (2010) and Gaure (2011).

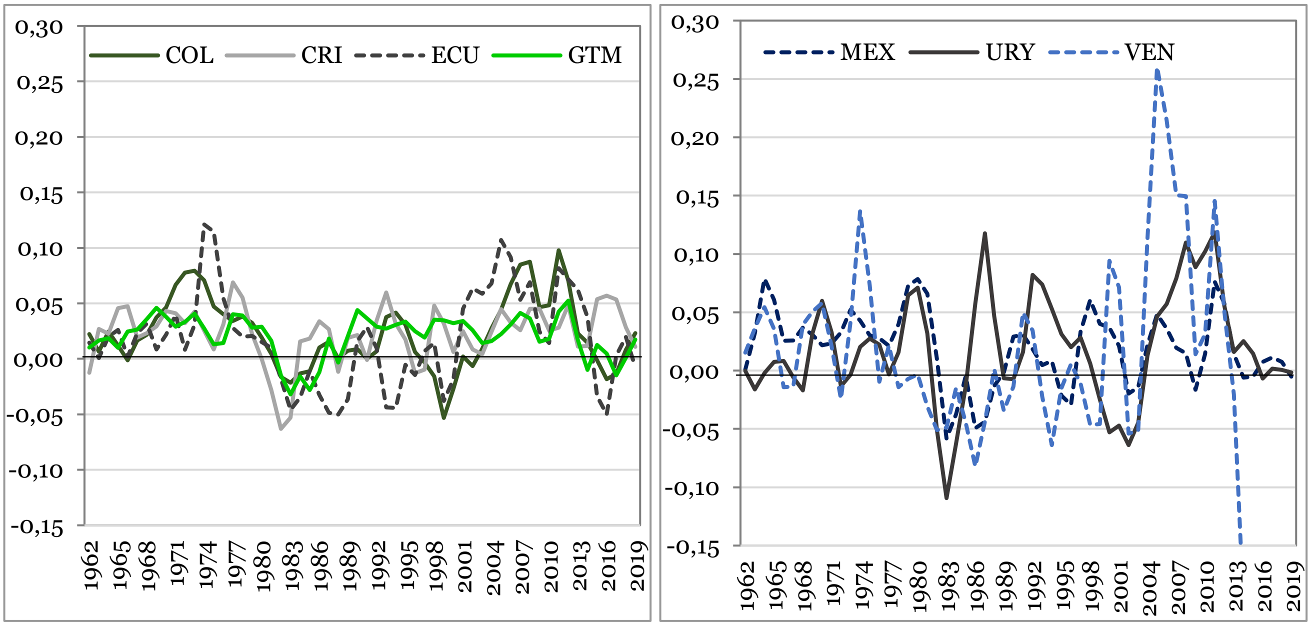
[4] Alternatively, we tested for random effects by suing the Breusch and Pagan Lagrangian multiplier (LM) test. In all the proposed specifications we failed to reject the null hypothesis.

above the simple LAC average (figures 1a and 1b), Argentina and Peru stand out as the countries with the highest growth volatility, as Venezuela among the countries with growth rates below the LAC measure (figure 1c).





Figures 1a and 1b. Output per capita growth. Selected countries growing above the LAC average (1962-2019). Notes: (1) Growth series measured in 2-years moving averages; (2) Horizontal line corresponds to LAC simple average over the period; (3) ARG=Argentina, BOL=Bolivia, BRA=Brazil, CHL=Chile, DOM=Dominican Republic, PAN=Panama, and PER=Peru. Source: own elaboration on Penn World Table 10.1.



Figures 1c and 1d. Output per capita growth. Selected countries growing below the LAC average (1960-2019). Notes: (1) growth measured in 2-year moving averages; (2) Horizontal line corresponds to LAC simple average over the period; (3) CRI=Costa Rica, COL=Colombia, ECU=Ecuador, GTM=Guatemala, MEX=Mexico, URY=Uruguay, and VEN=Venezuela; (4) Venezuela series trimmed after 2013 (falling below 0.15 yearly). Source: own elaboration on Penn World Table 10.1.

This general pattern of weak growth performance throughout the period is also expressed in Table 2. We also compute the rate of years with negative growth as the ratio between the years with negative output per capita growth and the total years within the period. Using this measure, we can find that, on average, LACs have experienced stagnation in 29% of the years considered. In countries like Argentina, Mexico, and Ecuador, more than 30% of the years during that period report negative output per capita growth rates. In contrast, the average rate of years with negative growth for European and East Asian countries is 12% of the period, while for North America is nearly 14%. As a result, the yearly average output per capita growth in LACs accounts for 2.3%, while the average growth for European and North American countries is 3.3%, and 5% for East Asian states[5].

Growth volatility is also measured by the standard deviation of the yearly growth rates. In these terms, Venezuela presents the highest volatility, while Argentina, Chile, and the Dominican Republic follow by reporting the second-highest rates. If we compute significant growth breaks, the upturns or downturns in countries' growth rates greater than 2

[5] Data source: Penn World Table 10.1.

percentage points, the results show that Venezuela, Dominican Republic, Argentina, Peru, and Mexico experience the most frequent episodes of negative growth and/or output booms.

Country	Average growth (1962-2019)	Rate of years with negative growth periods (1)	Volatility (Std. Dev.)	Volatility (Growth Spells) (2)
PAN	0.041	0.200	0.055	14
ARG	0.036	0.317	0.073	20
DOM	0.033	0.267	0.060	21
BRA	0.032	0.300	0.057	13
CHL	0.029	0.300	0.066	17
BOL	0.027	0.217	0.047	16
PER	0.026	0.283	0.057	18
CRI	0.024	0.217	0.033	14
LAC	0.023	0.289	0.072	16
COL	0.023	0.200	0.036	16
GTM	0.021	0.167	0.023	9
MEX	0.019	0.367	0.038	18
URY	0.019	0.283	0.054	15
ECU	0.017	0.333	0.050	15
VEN	(0.028)	0.517	0.187	23

Table 2. Average output per capita growth, growth standard deviation and growth spells (1962-2019) for selected LAC countries over the period. Notes: (1) Ratio between years with negative output per capita growth rates and total years within the period; (2) We compute any change of more than 2% (up or down) over the growth series. Source: own elaboration on Penn World Table 10.1.

4.2. Manufacturing industry. A long-term analysis

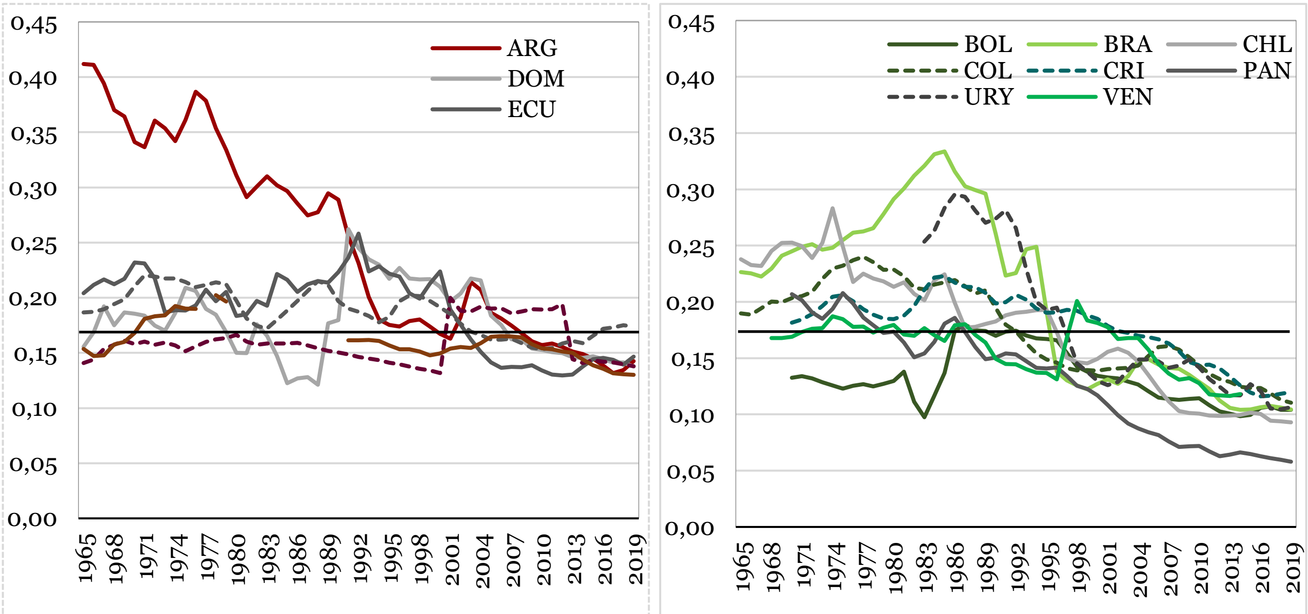
A clear-cut finding from Table 3 is that deindustrialization has been a worldwide phenomenon during the last decades. Every region and country displays a decrease in manufacturing shares during the considered periods. What is striking for Latin America is however the relatively steeper decline, especially between 1991 and 2019 (at a rate of -7%).

Evolution of manufacturing share in GDP. LAC countries in the global context. Circa 1965-2019

Manufacturing share in GDP		Total period		Sub-period 1. Circa (1965 - 1991)		Sub-period 2. Circa (1991 - 2019)	
Country	Years	Initial share (1)	Rate Diff. (2)	Years	Rate Diff.	Years	Rate Diff.
Countries above the LAC average (3)							
Argentina	1965-2019	0.412	-0.267	1965-1991	-0.168	1991-2019	-0.407
Uruguay	1983-2019	0.254	-0.149	1983-1991	0.030	1991-2019	-0.179
Chile	1965-2019	0.238	-0.148	1965-1991	-0.047	1991-2019	-0.101
Brazil	1965-2019	0.226	-0.123	1965-1991	-0.008	1991-2019	-0.115
Panama	1970-2019	0.207	-0.150	1970-1991	-0.052	1991-2019	-0.098
Countries below the LAC average							
Ecuador	1965-2019	0.204	-0.057	1965-1991	0.032	1991-2019	-0.090
Colombia	1965-2019	0.190	-0.080	1965-1991	-0.011	1991-2019	-0.070
Costa Rica	1970-2019	0.182	-0.061	1970-1991	0.024	1991-2019	-0.085
Mexico	1965-2019	0.172	-0.014	1965-1991	0.003	1991-2019	-0.017
Venezuela	1968-2014	0.168	-0.047	1970-1991	-0.021	1991-2014	-0.027
Dominican Republic	1965-2019	0.156	-0.018	1965-1991	0.107	1991-2019	-0.125
Peru	1965-2019	0.153	-0.025	1965-1991	0.008	1991-2019	-0.033
Guatemala	1965-2019	0.141	-0.003	1965-1991	0.008	1991-2019	-0.011
Bolivia	1970-2019	0.133	-0.028	1970-1991	0.045	1991-2019	-0.072
LAC, other regions/countries, World							
China	2004-2019	0.320	-0.052	-	-	2004-2019	-0.052
East Asia & Pacific	2004-2019	0.234	-0.004	-	-	2004-2019	-0.004
14 LAC countries	1970-2019	0.207	-0.086	1970-1991	-0.013	1991-2019	-0.072
Low & middle income	2004-2019	0.204	-0.005	-	-	2004-2019	-0.005
OECD members	1997-2019	0.180	-0.046	-	-	1997-2019	-0.046
United States	1997-2019	0.161	-0.050	-	-	1997-2019	-0.050
World	2004-2019	0.165	-0.005	-	-	1997-2019	-0.005

Table 3. Evolution of manufacturing shares in GDPs. LAC countries in the global context. Notes: (1) Initial share refers to manufacturing share for the first year in the considered period; (2) Indicates the differences in shares during each period/sub-period; (3) Countries above (below) the LAC average include those that report higher (lower) manufacturing shares than the average for the region at the initial years. Source: own elaboration on WDI.

From figures 2a and 2b, Argentina shows the deepest fall in the manufacturing share, with a difference of -27 p.p. from 1965 to 2019, including a 9-p.p. drop in the 1977-1981 period and a 10-p.p. drop during the 1990 decade. Considering the sub-periods (before and after the globalization phase started), until 1991, 8 in 14 countries experienced upward manufacturing shares, followed by a significant reversal after. It is worth mentioning that most of these states had historically recorded shares below the LACs average. With respect to the other six, except for Mexico, this group includes the largest countries. To sum up, while every country in LAC has seen a decline in the manufacturing share of GDP, the largest economies have been the most affected over the last 50 years.

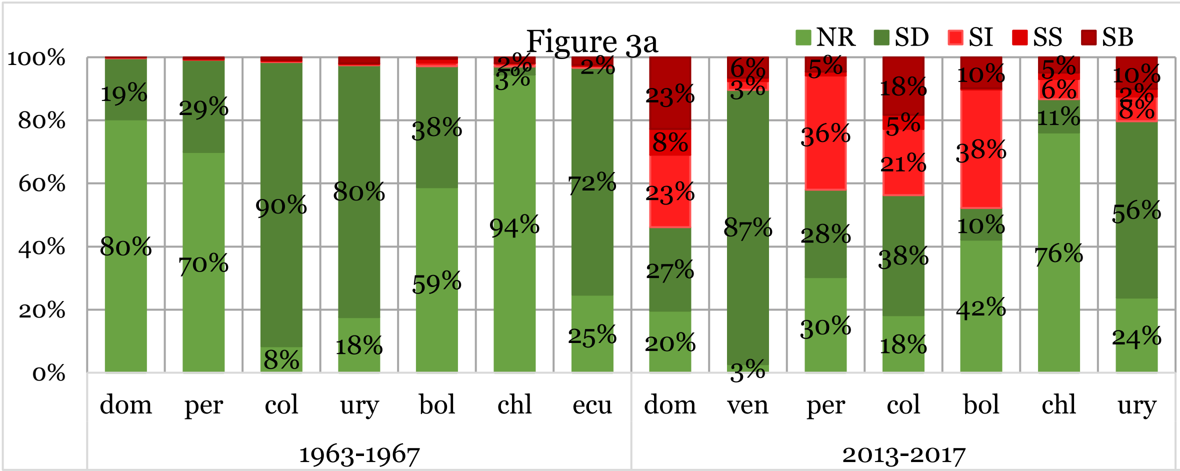


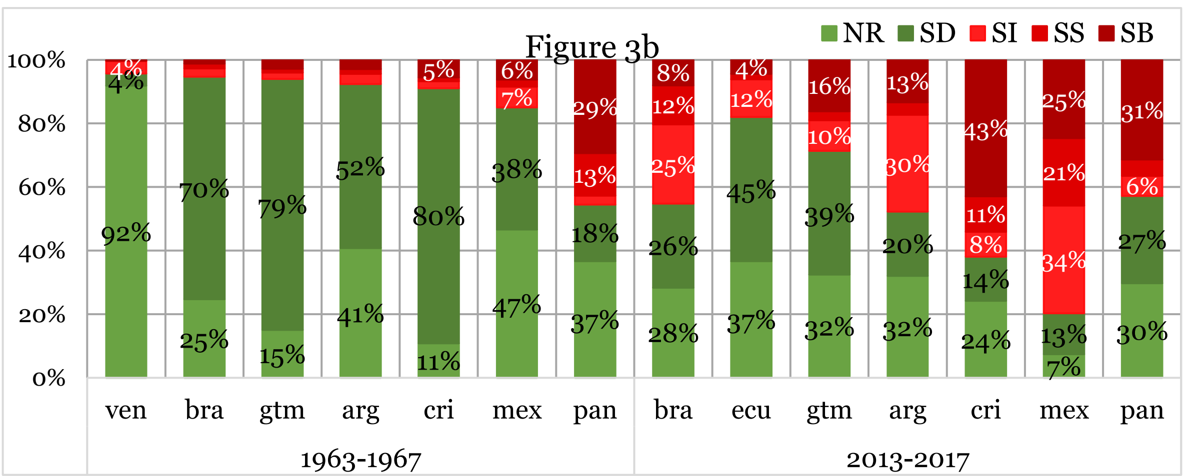
Figures 2a and 2b. Manufacturing industry share in Value Added. Circa 1965-2019. Countries with manufacturing share above (2a) and below (2b) LAC average over the period. Note: growth series measured into 2-year moving averages. Horizontal line corresponds to LAC simple average over the period. Source: own elaboration on WDI.

4.3. The productive structure and the specialization profiles

Figures 3a and 3b (see below) outline the nature of LACs' specialization profiles at the beginning and end of the period. We have sorted the countries according to their export shares in NR and SD classes, both associated with a weak specialization strategy, reflecting their level of dependency on this product composition. It is worth mentioning that the criteria used for grouping technologies in this study slightly differ from those adopted in Dosi et al. (2022). While they associate scale intensive class products with bad specialization strategies, we adopt a more context-dependent evaluation for the region (where NR and SD account for more than 90% of exports), by including SI products among the good-specialization profiles. Figure 3a includes high/medium dependent countries, which report the highest NR+SD export shares, while figure 3b displays countries with weaker export shares, representing a product composition middle/low dependent on natural resources.

From both figures, we can observe that all the countries have reduced their export shares in these bad specialization technological classes. Yet, the evolution of the product composition within countries' exports has been remarkably diverse. Among the high/medium dependent countries displayed in figure 3a, only Peru, Colombia, and Bolivia have export shares below 60% at the end of the period (2013-2017). This condition is reflected in 5 of 7 middle/low-dependent countries (figure 3b), where the NR-based and SD classes represent less than 50% (and even less than 40% in Costa Rica and Mexico).





Figures 3a and 3b. Export shares according to technological classes by country. Comparison between periods 1963-1967 and 2013-2017. High/medium (3a) and medium/low (3b) dependent countries. Note: countries sorted according to (NR+SD) share in 1963-1967. NR=Natural Resources; SB=Science Based; SD=Supplier Dominated; SI=Scale Intensive; SS=Specialized Suppliers; SB=Science-Based. Source: own elaboration on COMTRADE Database.

RCA intensity by technological class

Figure 4 displays Kernel density distributions for specialization intensities across technological classes (Pavitt's and NR-based manufactures). The distributions of all classes are skewed. Yet, natural resources-based, supplier-dominated, and scale-intensive classes - defined as the *downstream* patterns of specialization as they are associated with the production of final goods- show the widest support. In contrast, specialized suppliers and science-based classes are the most concentrated, with an RCA support of approximately two-thirds of the total support of the SD class. These differences are consistent with the RCA intensities by technological class and country (see table A1 in the appendix). At the national level, mainly NR and SD classes report levels above 1 among the selected years, while the rest of the classes hardly show these values.

Thus, the asymmetric pattern of production translates into sharp differences across the distributions. This phenomenon is in line with the findings of Dosi et al. (2022) for developing countries, where the export structure is far less balanced than the one displayed by developed economies.

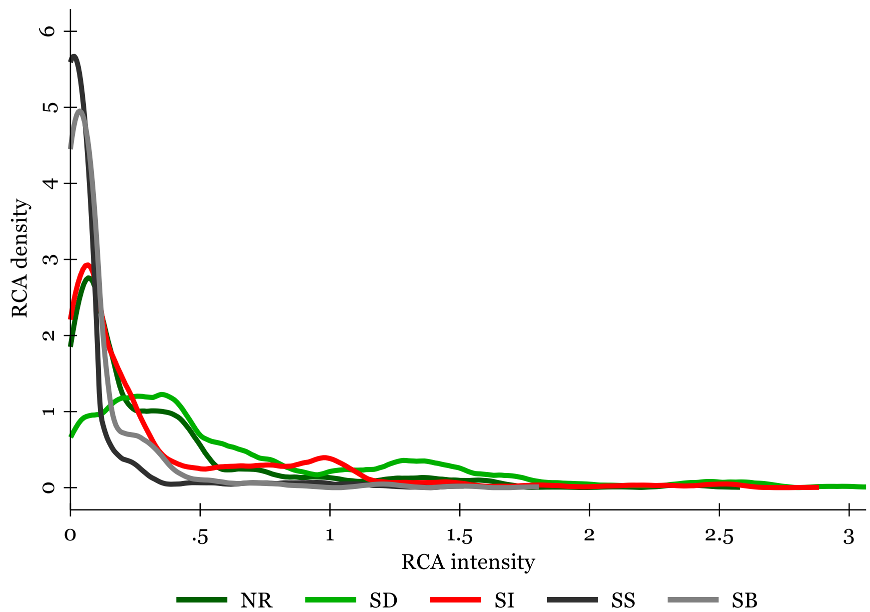


Figure 4. RCA intensity by technological classes. Latin American countries (1962-2017). Note: RCA evaluates exports with respect to the world exports at the products level, aggregated by technological class. Source: own elaboration on COMTRADE Database.

Entropy measures: The Theil Index

The dispersion of exports is, alternatively, examined by the most known measure of Entropy, the Theil index (1972). In Figure 5, we observe the direct connection between the Theil index and the RCA intensity, reflecting that any export profile based on higher product concentration is closely in line with the comparative advantages that countries might present.

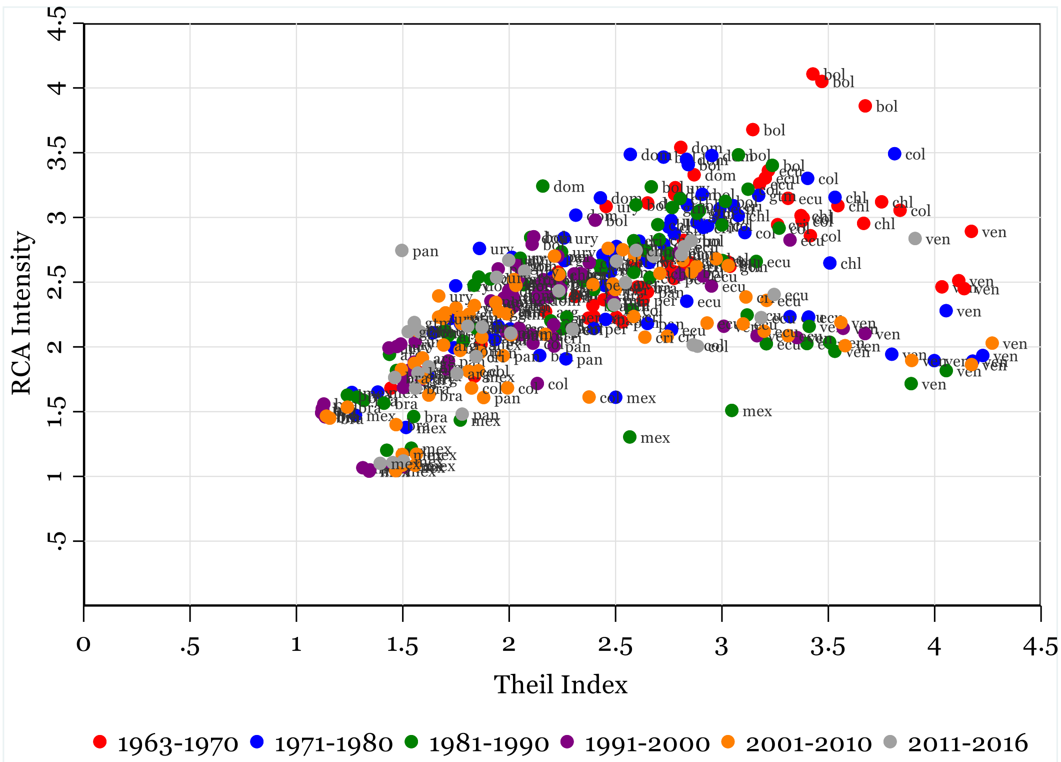
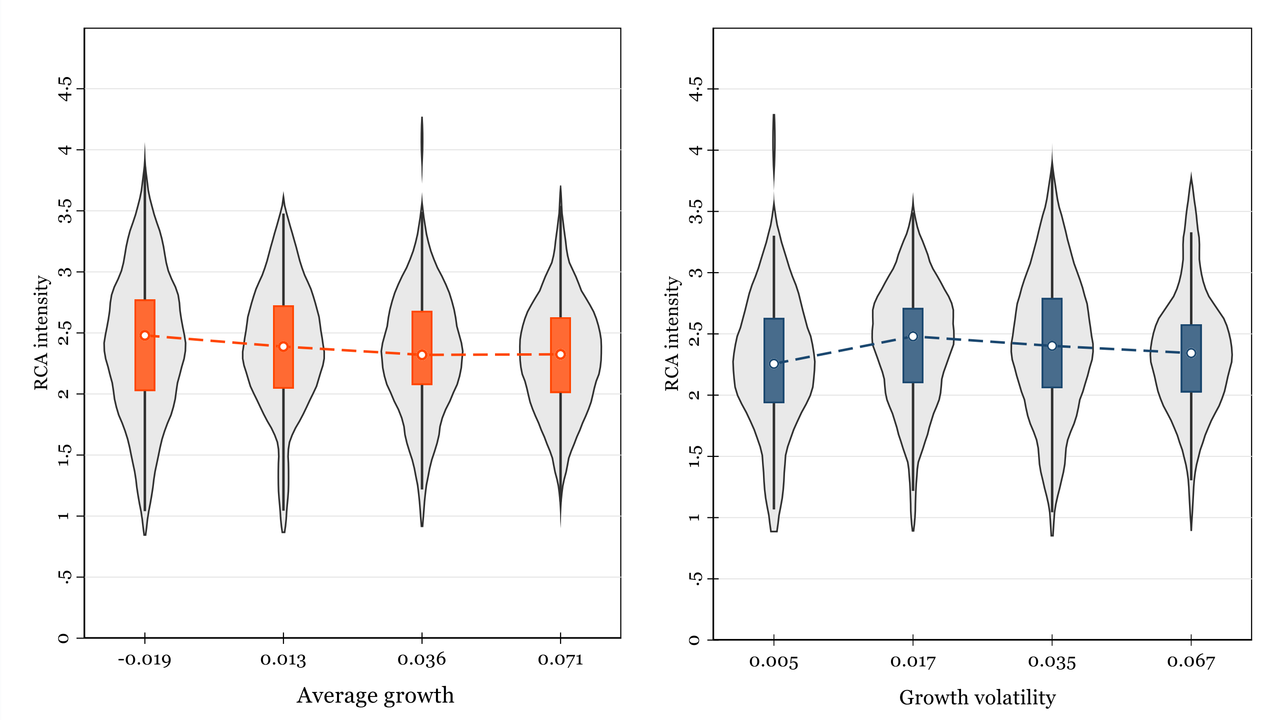


Figure 5. RCA intensity and Theil Index. Scatter plot for Latin American countries (1967-2017). Notes: RCA and Theil measures for 2-year periods. Source: own elaboration on COMTRADE Database.

4.4. Growth sustainability and RCA intensity

In this section, we examine if there is a nexus between RCA intensity at the country level and both measures of macroeconomic growth performance: average output per capita growth and growth per capita volatility estimated for 2-year periods. In Figure 6a (6b), we use violin plots to draw the Kernel density distributions of RCA intensities for each quartile of average growth (growth standard deviation), measured. Each plot includes the standard parameters: the median and the interquartile range of the RCA intensities for each of the LACs in the period 1962-1967.



Figures 6a and 6b. RCA intensity and growth performance. Violin plot by quartiles of average output per capita growth and growth per capita volatility. Latin American countries (1962-2017). Notes: (1) Panel a (left) measures quartiles of 2-year average output growth; panel b (right) measures quartiles of standard deviation on 2-year output growth; (2) Dash lines display median RCA values for each quartile. Source: own elaboration on COMTRADE Database and Penn World Table 10.1.

From the violin plots, we can conclude that there is no clear-cut relationship between RCA intensity and average output growth (tests only reveal significance between extreme points). For growth volatility, the pattern described also shows a lack of sensitivity to factorial efficiency (no statistically significant differences were identified)[6].

Similarly, we examine the nexus between RCA by technological classes and growth performance through box plots (see figures A1 to A5 in the appendix). These findings confirm the previous results. In sum, comparative advantages *per se* do not appear to be influencing growth in LACs. This first evidence is against the usual prescription of following comparative advantages as a source of growth.

4.5. Econometric results

We now report the results of the econometric Models 1-5 (Equation 4), which link different measures of revealed comparative advantage and export concentration. The estimators used consist of OLS over a pooled dataset and a fixed effects model[7].

In the first case, table 4 shows the regression results for model 1, which includes RCA intensity by country as well as other key macroeconomic indicators acting as control variables. We observe that, for the OLS estimator, the RCA intensity by country does not reveal any link with average output per capita growth in LACs, whereas for output per capita volatility, it yields a statistically significant, although weak relationship.

Regarding panel models, the factorial efficiency measure at the country level does not appear to be statistically linked to output per capita growth, while it delivers a positive link to growth volatility, though weak in economic terms. Consequently, the synthetic measure of comparative advantages at the national level does not affect growth prospects for the countries in the region. In terms of persistence, the lagged growth rate explains a significant part of the evolution of average growth only for the fixed effects estimator (with a weak effect for the OLS specification). Yet, the lagged volatility does not present any effect over the current measure.

Among the control variables, we identify a clear-cut detrimental outcome of inflation volatility on the growth path in LACs by revealing a negative effect over average growth and a positive one over volatility, both in the OLS and the fixed effects estimators.

[6] To verify these findings, we tested the equality of the distributions with Kolmogorov–Smirnov tests. For average growth and standard deviation quartiles, distributions did not reject the null hypothesis of equality. As we applied the K-S tests for measures of 2-year average, we also tested for larger time spans (5-/10-years). From these findings, we can confirm that increasing time spans translate into greater statistical significance both in average growth and growth volatility. However, these nexuses are still weak in economic terms.

[7] Table A2 in the appendix reports the correlations coefficients between the regression variables.

	Model 1 - RCA intensity by country			
Estimator	OLS		FE	
Dependent variable	GDPp/c Avg. growth	GDPp/c volatility	GDPp/c Avg. growth	GDPp/c volatility
RCA intensity	-0.004	0.012**	-0.004	0.012**
	(0.007)	(0.005)	(0.007)	(0.005)
Lag. Growth rate	0.135*	-	0.135**	-
	(0.070)		(0.050)	
Lag. Volatility	-	-0.015	-	-0.015
		(0.066)		(0.066)
Initial GDPp/c	-0.018	-0.012	-0.018**	-0.012
	(0.014)	(0.012)	(0.007)	(0.012)
Openness	-0.014	-0.014	-0.014	-0.014
	(0.021)	(0.016)	(0.017)	(0.016)
Exc. Rate volatility	-0.013	0.004	-0.013	0.004
	(0.010)	(0.010)	(0.010)	(0.010)
Inflation volatility	-0.073***	0.059**	-0.073**	0.059**
	(0.028)	(0.025)	(0.028)	(0.025)
Constant	0.197	0.104	0.205**	0.117
	(0.121)	(0.103)	(0.070)	(0.111)
Period controls/FE	Yes	Yes	Yes	Yes
Country controls/FE	Yes	Yes	Yes	Yes
R2	0.367	0.304	-	-
No. of countries	-	-	14	14
Obs.	358	358	358	358

Table 4. Estimation results (I) of factorial efficiency and growth performance in Latin America**.** Notes: (1) Model 1: RCA intensity at country level; (2) *** p<0.01, ** p<0.05, * p<0.1; (3) Robust standard errors in parentheses. Source: own elaboration on COMTRADE Database and Penn World Table 10.1.

The estimates for Model 2 include RCA by technological classes (displayed in Table 5 below). The specialized suppliers', science-based', and scale intensive classes appear as the taxa where significant coefficients emerge. In the first two cases, the coefficients reveal a negative effect for output per capita growth, whereas, in the scale intensive class, a positive effect for growth volatility appears. The fixed effects estimator reports similar findings. Inflation shows a negative relationship with growth, a sustained result for every specification. Lagged growth rate and lagged volatility reveal no significant effects, neither for OLS nor for FE estimators.

In Model 3, we focus on the quality of specialization in the countries' exports based on the productive structure. For primary products, this specification yields significant (and positive) confirms the negative effect on growth volatility. The products associated with good specialization profiles report similar results to the previous model (a negative effect for output per capita growth). The rest of the coefficients in OLS and fixed effects models do not reveal any significant effect on growth patterns in LACs.

Finally, inflation volatility has a negative effect on output per capita growth and a positive effect on growth volatility. The terms that capture persistence do not show significant results in any estimator.

	Model 2 - RCA intensity by technological class				Model 3 - RCA intensity by quality of specialization			
Estimator	OLS		FE		OLS		FE	
Dependent variable	GDPp/c Avg. growth	GDPp/c volatility	GDPp/c Avg. growth	GDPp/c volatility	GDPp/c Avg. growth	GDPp/c volatility	GDPp/c Avg. growth	GDPp/c volatility
RCA Not manufact.	-0.012	0.015*	-0.012	0.015*	-	-	-	-
	(0.009)	(0.008)	(0.009)	(0.008)				
RCA NR-based manuf.	-0.013	0.006	-0.013	0.006	-	-	-	-
	(0.011)	(0.007)	(0.011)	(0.007)				
RCA Sup. Dominated	-0.002	0.006	-0.002	0.006	-	-	-	-
	(0.007)	(0.005)	(0.007)	(0.005)				
RCA Scale intensive	-0.011	0.024**	-0.011	0.024**	-	-	-	-
	(0.014)	(0.012)	(0.014)	(0.012)				
RCA Spec. Suppliers	-0.048**	0.029*	-0.048**	0.029*	-	-	-	-
	(0.019)	(0.015)	(0.019)	(0.015)				
RCA Sci.-Based manuf.	-0.028**	-0.012	-0.028**	-0.012	-	-	-	-
	(0.012)	(0.011)	(0.012)	(0.011)				
RCA Not manufact.	-	-	-	-	-0.010	0.019**	-0.010	0.019**
					(0.008)	(0.008)	(0.008)	(0.008)
RCA Bad specializ.	-	-	-	-	-0.004	0.009*	-0.004	0.009*
					(0.007)	(0.005)	(0.007)	(0.005)
RCA Good specializ.	-	-	-	-	-0.023**	0.016	-0.023**	0.016
					(0.011)	(0.010)	(0.011)	(0.010)
Lag. Growth rate	0.112	-	0.112	-	0.125*	-	0.125*	-
	(0.069)		(0.069)		(0.070)		(0.070)	
Lag. Volatility	-	-0.065	-	-0.065	-	-0.031	-	-0.031
		(0.068)		(0.068)		(0.068)		(0.068)
Initial GDPp/c	-0.022	-0.015	-0.022	-0.015	-0.017	-0.013	-0.017	-0.013
	(0.015)	(0.012)	(0.015)	(0.012)	(0.014)	(0.012)	(0.014)	(0.012)
Openness	-0.019	-0.019	-0.019	-0.019	-0.013	-0.016	-0.013	-0.016
	(0.020)	(0.016)	(0.020)	(0.016)	(0.021)	(0.016)	(0.021)	(0.016)
Exc. Rate volatility	-0.014	0.006	-0.014	0.006	-0.012	0.004	-0.012	0.004
	(0.010)	(0.011)	(0.010)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Inflation volatility	-0.070**	0.057**	-0.070**	0.057**	-0.073**	0.058**	-0.073**	0.058**
	(0.028)	(0.026)	(0.028)	(0.026)	(0.028)	(0.025)	(0.028)	(0.025)
Constant	0.245*	0.136	0.260*	0.151	0.197	0.109	0.208	0.124
	(0.126)	(0.109)	(0.137)	(0.118)	(0.120)	(0.101)	(0.131)	(0.110)
Period controls/FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls/FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.378	0.337	-	-	0.375	0.314	-	-
No. of countries	-	-	14	14	-	-	14	14
Obs.	358	358	358	358	358	358	358	358

Table 5. Estimation results (II) of factorial efficiency and growth performance in Latin America. Notes: (1) Model 2: RCA intensity by Pavitt + NR-based manufactures, model 3: RCA intensity by specialization strategies; (2) *** p<0.01, ** p<0.05, * p<0.1; (3) Robust standard errors in parentheses. Source: own elaboration on COMTRADE Database and Penn World Table 10.1.

The last findings evaluate the relation between the Theil index and output per capita growth and volatility, in the standard value (Model 4) and the trimmed measure (only for values above the periods' median). The results in Table 6 show that export concentration positively influences growth volatility (considering OLS and FE estimators in Models 4 and 5). Inflation volatility reduces growth on average and fosters its volatility, and the evolution of growth depends (with a weak effect) on the previous trend.

	Model 4 - Theil Index				Model 5 - Trimmed Theil			
Estimator	OLS		FE		OLS		FE	
Dependent variable	GDPp/c Avg. growth	GDPp/c volatility	GDPp/c Avg. growth	GDPp/c volatility	GDPp/c Avg. growth	GDPp/c volatility	GDPp/c Avg. growth	GDPp/c volatility
Theil Index	0.008	0.018***	0.008	0.018***	-	-	-	-
	(0.007)	(0.006)	(0.007)	(0.006)				
Theil (upper median)	-	-	-	-	0.002	0.004**	0.002	0.004**
					(0.002)	(0.002)	(0.002)	(0.002)
Lag. Growth rate	0.130*	-	0.130*	-	0.134*	-	0.134*	-
	(0.070)		(0.070)		(0.070)		(0.070)	
Lag. Volatility	-	-0.033	-	-0.033		-0.011		-0.011
		(0.066)		(0.066)		(0.066)		(0.066)
Initial GDPp/c	-0.017	-0.016	-0.017	-0.016	-0.018	-0.017	-0.018	-0.017
	(0.014)	(0.012)	(0.014)	(0.012)	(0.015)	(0.012)	(0.015)	(0.012)
Openness	-0.015	-0.022	-0.015	-0.022	-0.013	-0.016	-0.013	-0.016
	(0.021)	(0.016)	(0.021)	(0.016)	(0.021)	(0.016)	(0.021)	(0.016)
Exc. Rate volatility	-0.013	0.002	-0.013	0.002	-0.013	0.003	-0.013	0.003
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Inflation volatility	-0.075***	0.060**	-0.075***	0.060**	-0.073**	0.062**	-0.073**	0.062**
	(0.029)	(0.024)	(0.029)	(0.024)	(0.028)	(0.025)	(0.028)	(0.025)
Constant	0.162	0.126	0.169	0.141	0.186	0.170*	0.191	0.180
	(0.121)	(0.099)	(0.132)	(0.106)	(0.122)	(0.102)	(0.133)	(0.110)
Period controls/FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls/FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.369	0.316	-	-	0.368	0.305	-	-
No. of countries	-	-	14	14	-	-	14	14
Obs.	358	358	358	358	358	358	358	358

Table 6. Estimation results (III) of factorial efficiency and growth performance in Latin America. Notes: (1) Model 4: Theil index of exports diversification, model 5: Theil index (only upper median values); (2) *** p<0.01, ** p<0.05, * p<0.1; (3) Robust standard errors in parentheses. Source: own elaboration on COMTRADE Database and Penn World Table 10.1.

5. Concluding remarks

This study focuses on the weak and unstable growth patterns that have historically affected LACs. Thus, the objective of this research is to study the nexus between sectoral composition, macroeconomic growth, and volatility in 14 Latin American countries between 1962 and 2017.

First, we find that a premature deindustrialization process has taken place in all LACs, especially after the specified globalization period. Among the studied countries, the most striking case is Argentina, which experienced the deepest fall in manufacturing shares over the entire period.

Under a technological class taxonomy, the export baskets have historically specialized in natural resources and supplier-dominated industries, which is defined as a bad specialization strategy. Yet, all the countries in the region have reduced their export shares over the period in these technological classes, showing greater diversification in recent years.

In terms of factorial efficiency, RCA intensity at the country level has declined over the period for every studied nation. Nevertheless, RCA intensities by technological classes reveal strong duality. NR-based manufacturers, supplier-dominated, and scale-intensive sectors show the widest distributions, while specialized suppliers and science-based manufacturers show the lowest and most concentrated RCA intensity. Also, the estimates for RCA at the country level display a direct relationship with the Theil measure of export share concentration, i.e., higher export asymmetry is directly linked to higher RCAs.

These results are consistent over a 2-year period framing. Given the limited sample, chosen to focus on LACs, no significant relationship is identified between RCA intensity and sustained growth. In other terms, under a context of bad specialization patterns, comparative advantages per se do not appear to influence growth in LACs.

Disclosure statement

The authors report there are no competing interests to declare.

Data availability

The data that support the findings of this study are openly available in:

- UN Trade Statistics Section at https://comtradeplus.un.org/TradeFlow?Frequency=A&Flows=X&CommodityCodes=TOTAL&Partners=0&Reporters=all&period=2023&AggregateBy=none&BreakdownMode=plus.
- World Development Indicators (World Bank Group), at https://databank.worldbank.org/source/world-development-indicators

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Appendix

Selected years	Countries													
	ARG	BOL	BRA	CHL	COL	CRI	DOM	ECU	GTM	MEX	PAN	PER	URY	VEN
								NR						
1967	0.099	0.054	0.087	0.074	0.194	0.618	0.208	**2.432**	0.129	0.080	**1.072**	0.009	0.048	0.002
1977	0.133	0.007	0.079	0.120	0.163	**1.182**	0.252	0.665	0.104	0.088	0.886	0.016	0.188	0.000
1987	0.136	0.002	0.154	0.484	0.273	**1.288**	0.253	0.739	0.292	0.035	0.782	0.036	0.180	0.001
1997	0.092	0.062	0.151	0.406	0.384	**1.353**	0.472	**1.358**	0.365	0.038	0.563	0.085	0.430	0.005
2007	0.095	0.047	0.078	0.185	0.259	0.728	0.387	0.901	0.461	0.027	0.283	0.065	0.243	0.001
2017	0.081	0.050	0.060	0.274	0.234	**1.000**	0.218	**1.023**	-	0.046	-	0.187	0.314	-
								SD						
1967	0.804	0.066	**1.623**	0.053	**2.388**	**1.735**	0.373	0.464	**1.675**	0.376	0.286	0.250	**1.200**	0.004
1977	0.615	0.125	0.866	0.144	**2.599**	**1.377**	0.670	0.528	**1.708**	0.459	0.256	0.227	**1.674**	0.004
1987	0.645	0.113	0.469	0.207	**2.110**	**1.271**	0.972	0.999	**2.070**	0.124	0.366	0.371	0.988	0.008
1997	0.547	0.542	0.423	0.344	0.864	0.573	**1.266**	0.732	**1.427**	0.118	0.228	0.364	**1.205**	0.034
2007	0.535	0.206	0.372	0.198	0.355	0.126	0.600	0.203	**1.057**	0.076	0.248	0.180	**1.495**	0.006
2017	0.505	0.113	0.365	0.240	0.392	0.282	0.535	0.587	-	0.090	-	0.131	**1.555**	-
								SI						
1967	0.003	0.039	0.008	**2.369**	0.031	0.015	0.000	0.000	0.038	0.182	0.207	0.626	0.013	0.586
1977	0.030	0.822	0.060	**2.081**	0.039	0.017	0.539	0.001	0.055	0.229	0.056	0.874	0.064	0.773
1987	0.097	0.648	0.220	**1.434**	0.086	0.019	0.493	0.022	0.020	0.126	0.013	0.969	0.750	**1.057**
1997	0.140	0.447	0.266	**1.007**	0.112	0.033	0.145	0.036	0.043	0.253	0.046	0.816	0.099	0.710
2007	0.181	0.201	0.237	**1.301**	0.254	0.033	0.591	0.038	0.084	0.244	0.098	0.977	0.068	0.389
2017	0.191	0.320	0.178	0.919	0.130	0.069	0.473	0.016	-	0.431	-	0.562	0.035	-
								SS						
1967	0.000	0.000	0.002	0.000	0.000	0.003	0.000	0.000	0.005	0.003	0.063	0.000	0.000	0.000
1977	0.011	0.000	0.019	0.000	0.002	0.015	0.007	0.001	0.004	0.089	0.476	0.001	0.002	0.000
1987	0.005	0.001	0.044	0.000	0.001	0.017	0.031	0.001	0.002	0.221	0.773	0.004	0.002	0.000
1997	0.010	0.001	0.057	0.004	0.005	0.031	0.083	0.003	0.005	0.232	**1.050**	0.003	0.004	0.001
2007	0.007	0.000	0.049	0.001	0.009	0.023	0.118	0.001	0.009	0.182	0.795	0.000	0.001	0.000
2017	0.005	0.000	0.042	0.001	0.004	0.170	0.085	0.000	-	0.200	-	0.000	0.008	-
								SB						
1967	0.012	0.000	0.008	0.008	0.002	0.036	0.001	0.002	0.045	0.061	0.609	0.001	0.015	0.000
1977	0.018	0.002	0.017	0.012	0.006	0.039	0.008	0.000	0.055	0.197	0.273	0.007	0.007	0.001
1987	0.049	0.002	0.059	0.024	0.009	0.027	0.152	0.001	0.053	0.136	0.110	0.055	0.016	0.006
1997	0.026	0.277	0.048	0.048	0.045	0.153	0.270	0.004	0.068	0.254	0.165	0.088	0.043	0.028
2007	0.040	0.055	0.052	0.050	0.054	**1.216**	0.377	0.002	0.079	0.329	0.287	0.013	0.164	0.021
2017	0.071	0.036	0.030	0.065	0.056	0.726	0.455	0.002	-	0.199	-	0.014	0.071	-

Table A1. RCA intensity by technological classes and countries. Selected years for period (1962-2017). Notes: (1) RCA evaluates exports to the world exports at 3-digits products level, aggregated by technological class. (2) Bold numbers reveal factorial efficiency. Source: own elaboration on COMTRADE Database.

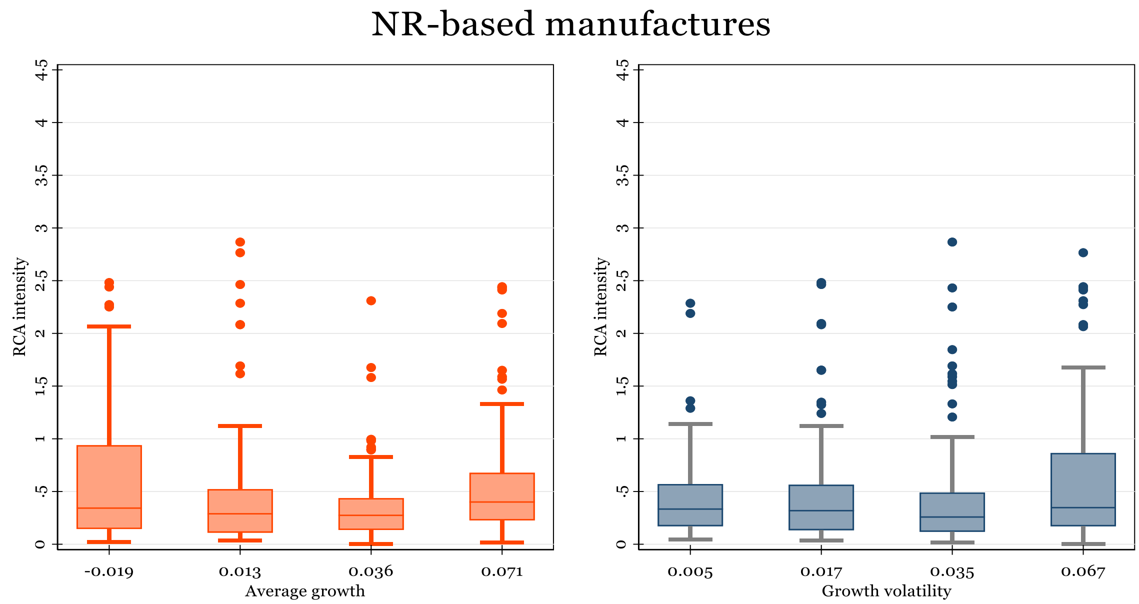

Figure A1. RCA intensity for NR-based manufactures and growth performance. Box plot by quartiles of average output per capita growth and growth per capita volatility. Latin American countries (1962-2017). Notes: Panel a (left) measures quartiles of 2-year average output growth; panel b (right) measures quartiles of standard deviation on 2-year output growth. Source: own elaboration on COMTRADE Database and Penn World Table 10.1.

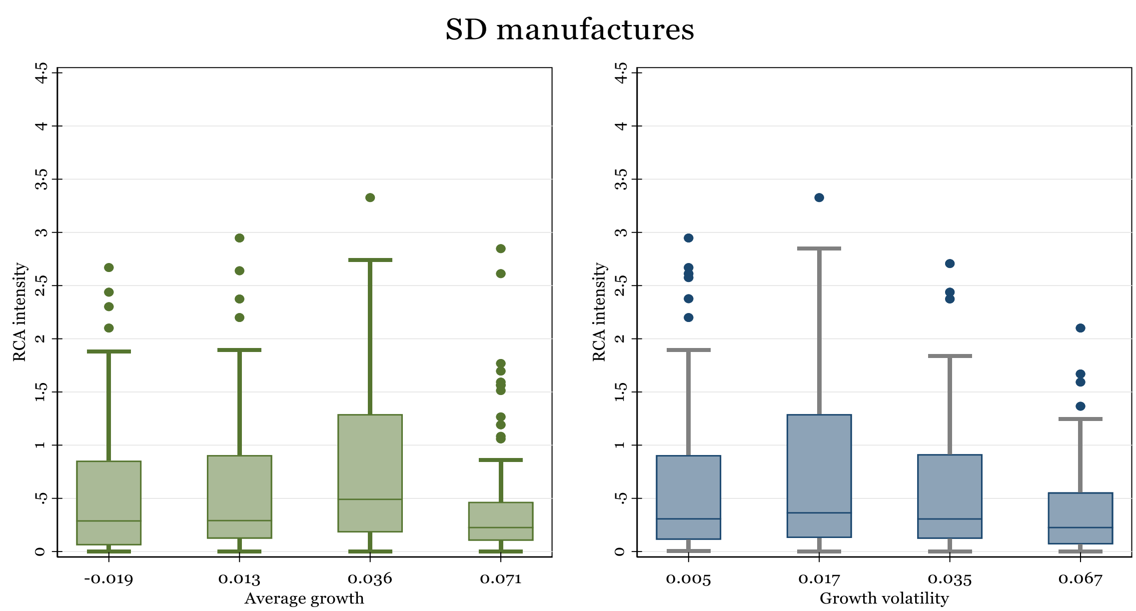

Figure A2. RCA intensity for SD manufactures and growth performance. Box plot by quartiles of average output per capita growth and growth per capita volatility. Latin American countries (1962-2017). Notes: Panel a (left) measures quartiles of 2-year average output growth; panel b (right) measures quartiles of standard deviation on 2-year output growth. Source: own elaboration on COMTRADE Database and Penn World Table 10.1.

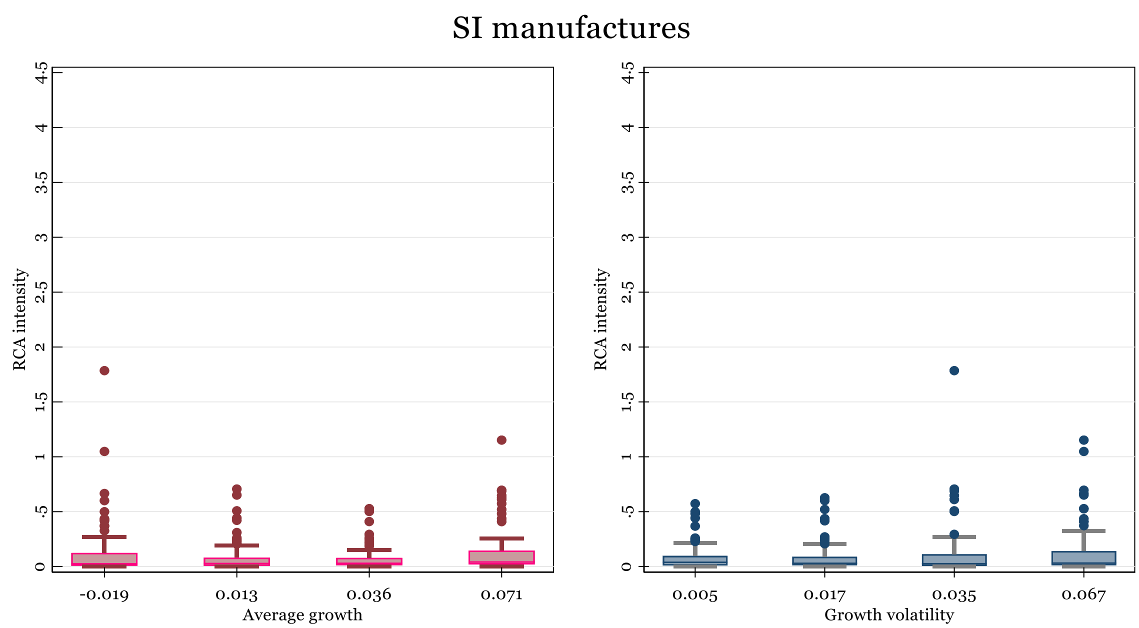

Figure A3. RCA intensity for SI manufactures and growth performance. Box plot by quartiles of average output per capita growth and growth per capita volatility. Latin American countries (1962-2017). Notes: Panel a (left) measures quartiles of 2-year average output growth; panel b (right) measures quartiles of standard deviation on 2-year output growth. Source: own elaboration on COMTRADE Database and Penn World Table 10.1.

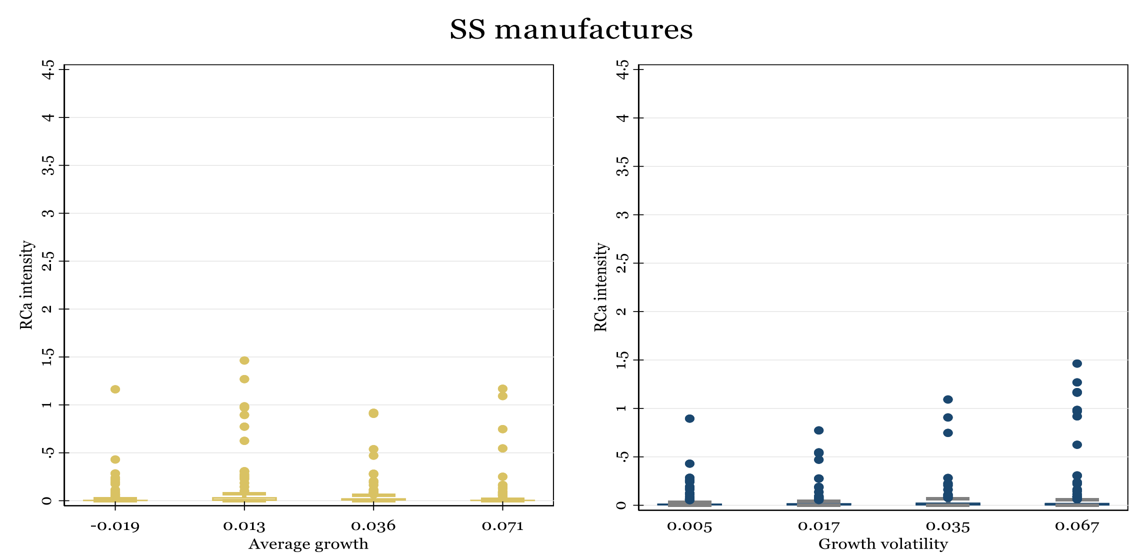

Figure A4. RCA intensity for SS manufactures and growth performance. Box plot by quartiles of average output per capita growth and growth per capita volatility. Latin American countries (1962-2017). Notes: Panel a (left) measures quartiles of 2-year average output growth; panel b (right) measures quartiles of standard deviation on 2-year output growth. Source: own elaboration on COMTRADE Database and Penn World Table 10.1.

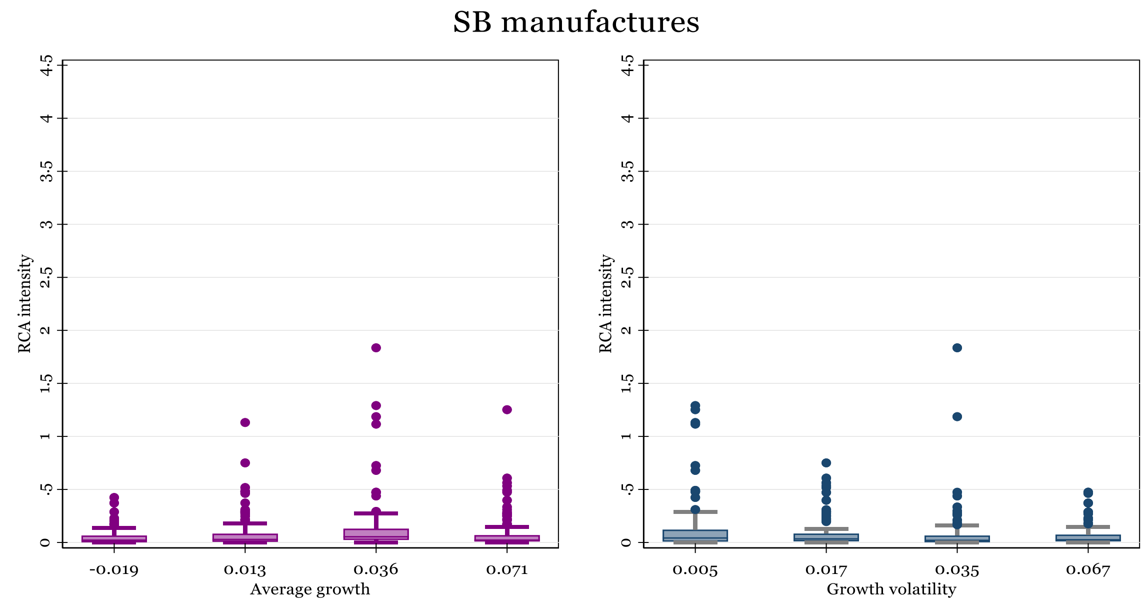

Figure A5. RCA intensity for SB manufactures and growth performance. Box plot by quartiles of average output per capita growth and growth per capita volatility. Latin American countries (1962-2017). Notes: Panel a (left) measures quartiles of 2-year average output growth; panel b (right) measures quartiles of standard deviation on 2-year output growth. Source: own elaboration on COMTRADE Database and Penn World Table 10.1.

Table A2. Correlation between regression variables

	Avg. growth	Growth volatility	RCA intensity (country)	RCA (Not manuf)	RCA (NR-based)	RCA (Sup. Dom.)	RCA (Scale Int.)	RCA (Spec. Sup.)	RCA (Sci.-Based)	RCA (Not manuf)	RCA (Bad spec.)	RCA (Good spec.)	Initial GDPp/c	Openness	ER volatility	Inflation volat.
Avg. growth	1															
Growth volatility	-0.0744*	1														
RCA intensity	-0.0761*	0.0405*	1													
RCA (Not manuf)	-0.0105*	0.0874*	0.4051*	1												
RCA (NR-based)	-0.0570*	0.1305*	0.3472*	-0.0807*	1											
RCA (Sup. Dom.)	-0.0369*	-0.1821*	0.3050*	-0.3376*	-0.3669*	1										
RCA (Scale Int.)	-0.0146*	0.0689*	-0.0359*	-0.2589*	0.0626*	-0.1020*	1									
RCA (Spec. Sup.)	0.0223*	0.1240*	-0.2163*	-0.2286*	-0.1950*	-0.1418*	-0.0376*	1								
RCA (Sci.-Based)	0.0950*	-0.1171*	-0.2487*	-0.3237*	-0.1901*	-0.1011*	0.0268*	0.2031*	1							
RCA (Not manuf)	-0.0105*	0.0874*	0.4051*	1.0000*	-0.0807*	-0.3376*	-0.2589*	-0.2286*	-0.3237*	1						
RCA (Bad spec.)	-0.0812*	-0.0697*	0.5716*	-0.3885*	0.4523*	0.6637*	-0.0475*	-0.2928*	-0.2498*	-0.3885*	1					
RCA (Good spec.)	0.0569*	0.0384*	-0.2784*	-0.4410*	-0.1828*	-0.1879*	0.5076*	0.6496*	0.6834*	-0.4410*	-0.3271*	1				
Initial GDPp/c	0.0724*	0.0317*	-0.5677*	-0.2539*	-0.1836*	-0.1953*	0.0233*	0.1508*	0.2286*	-0.2539*	-0.3349*	0.2217*	1			
Openness	0.1013*	0.0527*	0.0354*	-0.1353*	-0.0391*	-0.1169*	0.0112*	0.6256*	0.4208*	-0.1353*	-0.1435*	0.5789*	0.0638*	1		
ER volatility	-0.1829*	0.2058*	0.0013	0.0393*	0.1113*	-0.1019*	0.1009*	-0.1012*	-0.0890*	0.0393*	-0.0081*	-0.0539*	-0.1183*	-0.1863*	1	
Inflation volat.	-0.2532*	0.2742*	-0.0705*	-0.0183*	0.0893*	-0.0895*	0.0612*	-0.0600*	-0.0860*	-0.0183*	-0.0140*	-0.0497*	0.0469*	-0.1406*	0.5581*	1

Note: (*) indicates significance with $p<0.05$. Source: own elaboration on COMTRADE Database and Penn World Table 10.1.