Research Paper

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The Middle-Income Trap and Resource-Based Growth: the Case of Brazil

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This paper examines Brazil's economic growth patterns over the last three decades and identifies a missed opportunity for the country to attain high-income status by the mid-2010s. Instead, Brazil has suffered from low productivity growth, and has made little progress in transforming its production and export structures in favor of higher value-added activities. This premature de-industrialization makes it challenging for Brazil to transition from its long-standing upper-middle-income status. Brazil now has a limited, two-decade window to catch up with high-income nations before losing its demographic dividend, potentially leaving the country with an aging population without achieving high-income status. Therefore, it is crucial for Brazil to raise productivity growth through competition policies, and by embracing technological change. Achieving this goal requires comprehensive trade reforms to improve domestic competition, and to harness technology advancements effectively. This paper discusses key elements of such a policy framework within the broader context of a development strategy aimed at breaking free from the middle-income trap.

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RESEARCH PAPER

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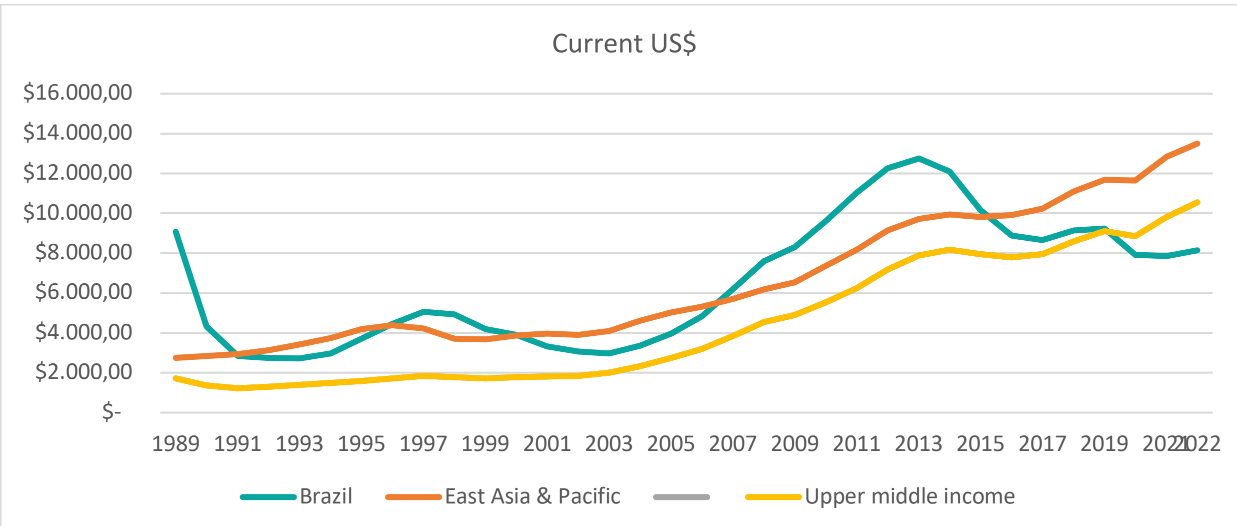
1. INTRODUCTION

In 2023, *per-capita* income in Brazil, as calculated by the World Bank Atlas method, stood at $8,140 in current U.S. dollars[1]. This places Brazil in the middle of the group of upper-middle-income countries, which encompasses nations with *per-capita* income between $4,500 and $13,800. Brazil has maintained its position within this income group for over three decades. During this time frame, Brazilian *per-capita* income has exhibited significant fluctuations (Figure 1).

Figure 1. Evolution of Brazil GNI Per Capita, Atlas Method 1989-2022



Source: World Development Indicators; last updated December 18, 2023; accessed January 5, 2024 and World Bank historical income classification

When data first became available in 1989, *per-capita* income in Brazil was approximately $9,000. However, it experienced a decline to about $3,000 by 2002, when the World Bank briefly classified Brazil as a lower-middle-income country. Subsequently, there was a notable recovery, with *per-capita* income reaching a peak of $12,750 in 2013, coming close to achieving high-income status. It has since regressed to the current level. The rollercoaster ride in *per-capita* income experienced by Brazil was unique among other upper-middle-income countries and regions, with Latin America being the only possible exception.

In this paper we provide a comprehensive review of Brazil's experience of industrialization and productivity growth over the last three decades, based on new databases[2]. We start with an overview of the resource-based structure of the Brazilian economy (section 2) and then analyze recent industrialization trends, encompassing both manufacturing value added and

[1] https://datahelpdesk.worldbank.org/knowledgebase/articles/906519

[2] The Conference Board Total Economy Database™ (2023) and Economic Transformation Database (2021).

employment (section 3). We then examine Brazil's labor-productivity growth over the past three decades, employing both the factor decomposition method (section 4) and sector decomposition method (section 5). We also explore Brazil's export structure and its evolution over the same period (section 6). We then review the factors responsible for Brazil's anemic productivity growth, which led Brazil to miss an opportunity to ascend into the high-income group of countries, leaving it with a narrower window of opportunity to address the growth issue before the demographic dividend runs out (section 7). Section 8 summarizes previous studies on the implications of a resource-based growth model. In section 9, we conclude by discussing policies aimed at mitigating the decline in productivity growth that is at the core of the income and job stagnation experienced by Brazil in recent decades.

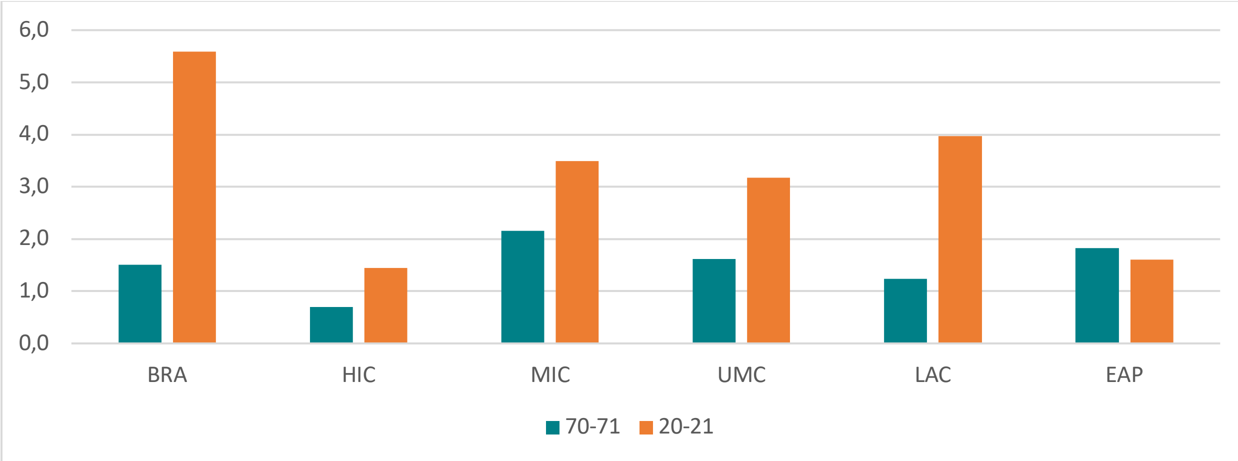
2. THE RESOURCE-DEPENDENT NATURE OF THE BRAZILIAN ECONOMY

One of the main factors behind the economic growth fluctuations in Brazil is its heavy dependence on natural resources. Over the past five decades, Brazil has become increasingly dependent on natural resources, surpassing even other upper-middle-income countries (UMICs), and many other Latin American nations. As shown in Figure 2, which spans from 1970-1971 to 2020-2021, natural resource rents as a percentage of Brazil's GDP surged significantly from 1.5% (averaging for 1970-1971) to 5.6% in 2020-2021, among the highest in the world.

Natural wealth brings both opportunities and challenges, becoming a blessing or a curse, depending on the quality of governance, and on whether the use of natural wealth leads to accumulation of other forms of capital, and to diversification and upgrading of the production and export structures (Canuto and Cavallari, 2012; Canuto and Daoulas, 2019). Cyclical fluctuations of commodity prices also create potential for macroeconomic volatility (Brambhatt *et al*, 2010).

Natural resource rents (specifically non-renewable) are defined as the difference between the costs of production and the estimated revenue from the sale of fossil fuels or minerals (World Bank, 2021, p. 198). Since natural resources are not produced, they create economic rents. Rents from non-renewable resources represent the liquidation of a country's capital stock. If countries use these rents to support current consumption, rather than to invest in new capital to replenish what is being depleted, they are, in effect, borrowing against their futures.

Figure 2. Natural Resource Rents as % of GDP after 50 Years 1970/1971--2020/2021

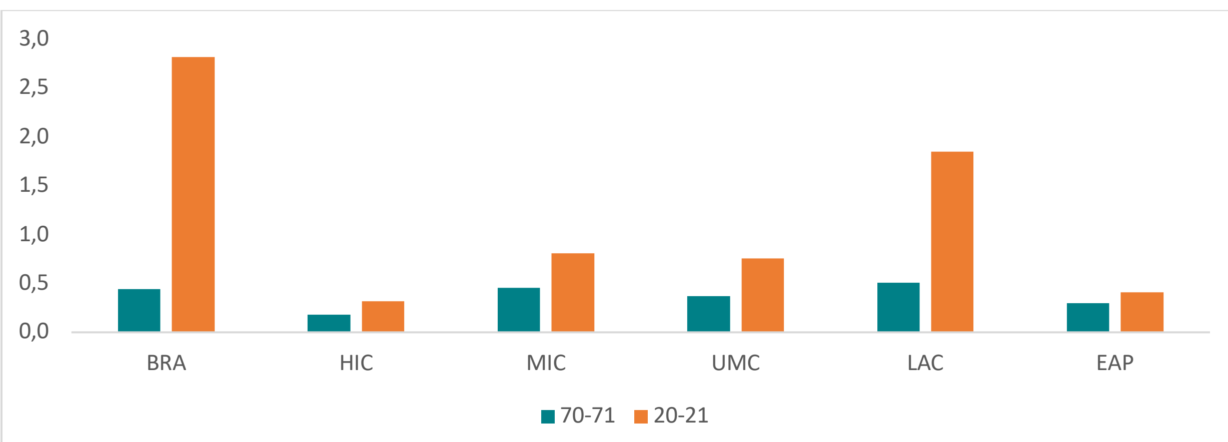


Source: World Development Indicators; last updated: 10/26/2023, accessed October 30, 2023.

Note: BRA: Brazil; HIC: high income countries; MIC: middle income countries; UMC: upper middle-income countries, LAC: Latin America & Caribbean (excluding high income), EAP: East Asia and Pacific countries (excluding high income).

Figure 3, focusing on mineral rents, underscores this trend over the period, both in the Latin America and Caribbean region and in Brazil specifically.

Figure 3. Mineral Rents as % of GDP, after 50 Years 1970/1971--2020/2021



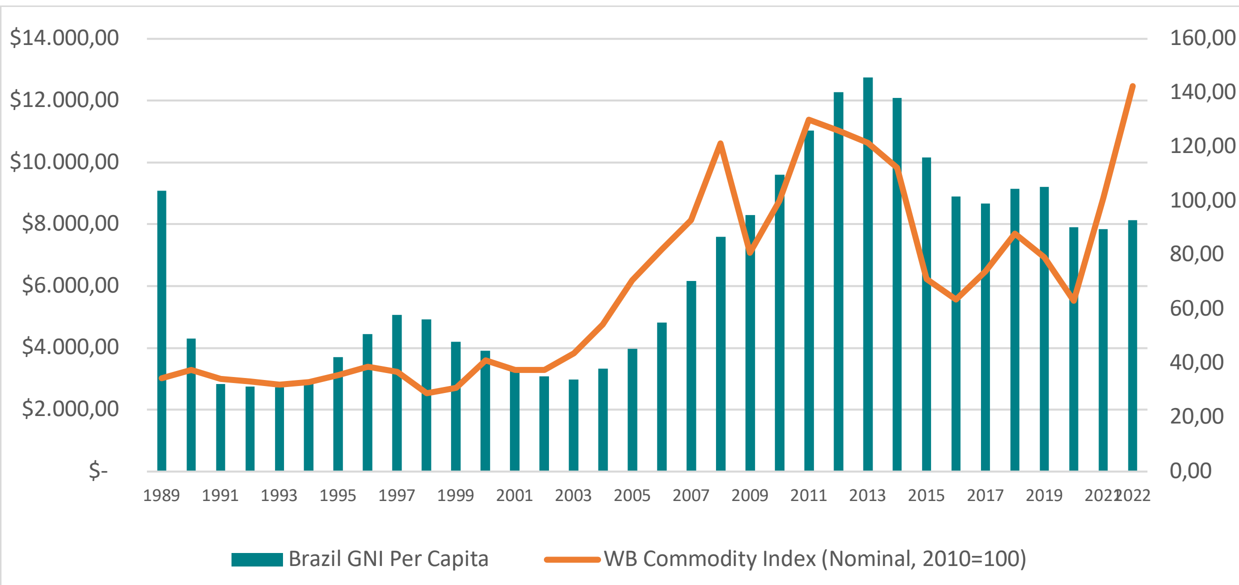
Source: World Development Indicators; last updated: 07/25/2023, accessed August 30, 2023.

Historical evidence, as highlighted by Gylfason (2001), indicates that by the beginning of the twenty-first century, only four out of 65 resource-rich developing nations—Botswana, Indonesia, Malaysia, and Thailand—had succeeded in achieving long-term investments exceeding 25% of their GDP, coupled with an average GDP growth rate surpassing 4%. The three Asian nations achieved this through economic diversification and industrialization. However, it's noteworthy that so far, none of these four countries has attained high-income status.

The pattern of rising and falling primary exports in response to fluctuating commodity prices is not a recent phenomenon. Over 70 years ago, Raul Prebish (1950, 1962) and Hans Singer (1950) postulated that developing countries that are heavily reliant on primary product exports often face declines in their terms of trade and losses of income. On the other hand, several empirical studies have found no evidence of such a secular price drift, either positive or negative (see, for example, Cuddington *et al*, 2007; Brahmbhatt *et al*, 2010).

Figure 4 illustrates how Brazil's GNI *per capita* closely mirrors the fluctuations in commodity prices.

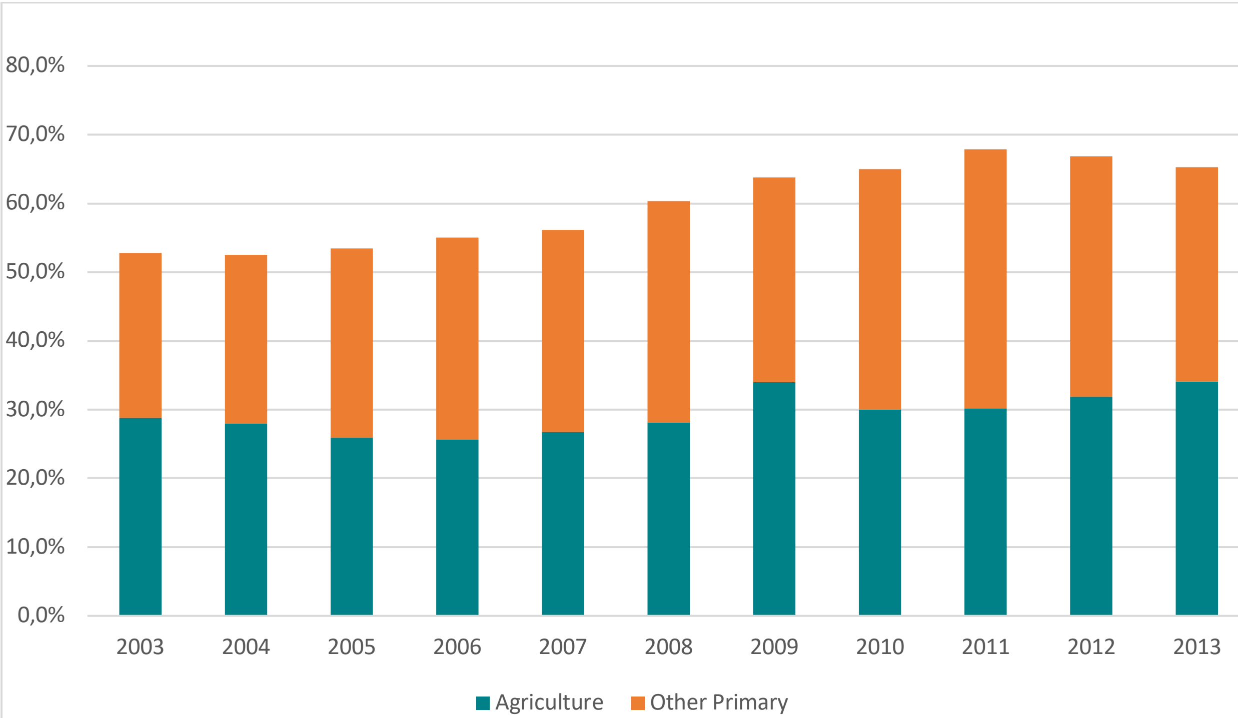
Figure 4. Brazil GNI Per Capita and Commodity Price Index 1989-2022



Source: World Development Indicators updated December 18, 2023 and the Pink Sheet; accessed January 5, 2024.

Section 8 discusses in detail the challenges of resource-based growth. But it is important to note that from 2003 to 2013, when *per-capita* income in Brazil approached the high-income threshold, exports of primary goods experienced a remarkable annual growth rate of 15.5% (Figure 5). This growth trajectory saw primary goods exports surge from $38.1 billion in 2003 to $155.2 billion a decade later. Consequently, the share of primary exports in total exports increased from 53% to 65%. The share of agricultural goods expanded from 29% to 34%, while exports of metals, stones, and minerals saw an uptick from 24% to 31%. By contrast, the share of machinery and instruments dropped from 7.2% to 4.7% over this period. At the same time, as we shall see, the overall productivity performance—as measured by total factor productivity (TFP)—remained lackluster.

Figure 5. Brazil--Percentage Share of Primary Goods in Total Goods Exports 2003-2013



Source: Author's calculations from the Growth Lab at Harvard University. The Atlas of Economic Complexity. http://www.atlas.cid.harvard.edu. Accessed January 5, 2024.

It is important to highlight that while there is no causal relationship between natural wealth and GDP *per capita* (Canuto and Cavallari, 2012), no country has been able to go from developing status to high-income status through natural-resource development alone. The key to success hinges on the extent to which natural wealth is used to boost the accumulation of other forms of assets, to diversify the structure of production toward higher value-added activities, and ultimately to raise productivity growth. Manufacturing in general plays an important role in this respect.

3. THE PERFORMANCE OF BRAZIL'S MANUFACTURING SECTOR

In most cases, manufacturing plays an important role in transitions from low- to middle- and high-income levels (Dinh *et al*, 2012; Canuto, 2019). In most cases of successful evolution from low- to middle-income *per capita* in recent history, the underlying development process has been broadly similar. Typically, there is a large pool of unskilled labor that is transferred from subsistence-level occupations to more modern manufacturing or service activities, which do not require much skill upgrade from those workers, but nonetheless employ higher levels of capital and embedded technology. The associated technology is available from richer countries and easy to adapt to local circumstances. The gross effect of such transfers—usually happening in tandem with urbanization—is a substantial increase in structural transformation and total factor productivity-growth effects, i.e. an expansion of the value of GDP that goes beyond what can be explained by the expansion of labor, capital, and other physical factors of production in the economy.

Reaping the gains from such 'low-hanging fruit' in terms of growth opportunities sooner or later faces limits, after which growth may slow, and the economy may become trapped at middle-income levels. This happens because of diminishing returns to factors of production. The turning point in this transition occurs either when the pool of transferrable unskilled labor is exhausted, or in some cases, when the expansion of labor-absorbing modern activities peaks before that exhaustion happens.

Beyond this point, raising TFP and maintaining rapid growth becomes dependent on the economy's domestic ability to move upward in manufacturing, services, or agricultural value-added toward activities characterized by technological sophistication. Raising TFP is also dependent on meeting high requirements in terms of human capital and intangible assets, such as design and organizational capabilities.

The path from low- to middle-, and then to high-income *per capita*, corresponds to increasing the share of the population moving from subsistence activities to simple modern tasks, and then on to more sophisticated tasks. Within-sector productivity gains and moving up the value-added scale rise in weight, relative to productivity-lifting, cross-sector structural change (Gill and Kharas, 2015), because, as *per-capita* income rises, the variation in productivity levels across sectors becomes narrower (McMillan *et al*, 2014; Dinh, 2017) so that the scope for structural transformation becomes smaller.

An institutional setting supportive of innovation and complex value-added chains of market transactions is essential. Instead of mastering current standardized technologies, the challenge is the creation locally of domestic capabilities and institutions, which cannot be simply brought in or copied from abroad. Provision of education to labor and of appropriate infrastructure becomes a minimum condition.

Brazil went through an extraordinary manufacturing-based growth-cum-structural-change in the 1950s to 1970s. High GDP growth rates were underpinned by the transfer of occupations from subsistence-level rural activities to light and heavy-and-chemical manufacturing sectors in cities.

One feature though must be highlighted in the case of Brazil: the transition from low- to middle-income types of labor occupancy and economic structure deaccelerated before the end of the period of 'low-hanging fruit' because of fragilities associated with the trade and macroeconomic policies pursued (Canuto, 2013). As a result, levels of income concentration and social exclusion in cities remained very high.

And Brazil's growth performance in both GDP and manufacturing value-added has lagged its counterparts in the upper-middle-income category (Table 1). Furthermore, since 2010, it has fallen even below that of the Latin American and Caribbean nations (excluding high-income countries). This trend fits with a global pattern of de-industrialization observed in developing countries (Rodrik, 2016). Table 1 presents the average annual growth rates of GDP and manufacturing value-added in Brazil and in comparable nations.

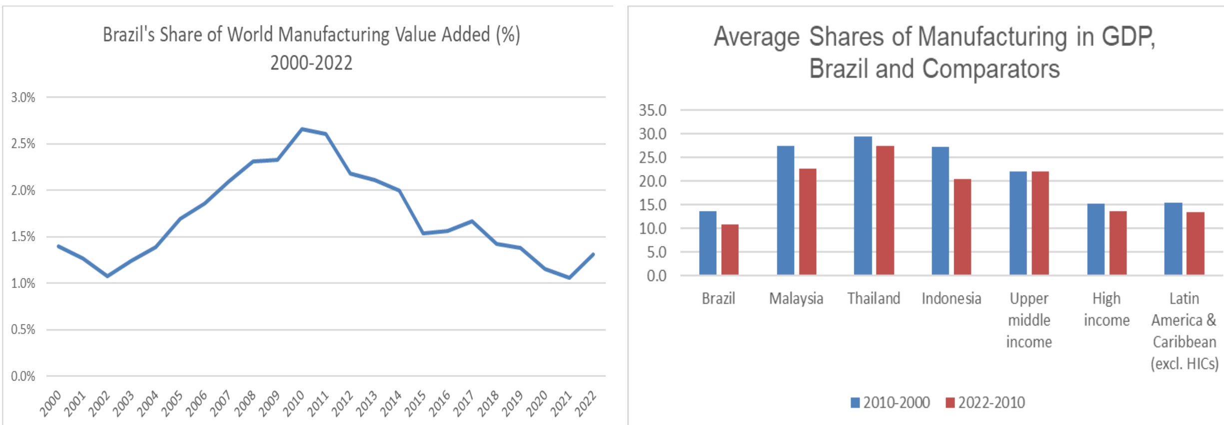
Table 1. Brazil Performance in GDP and Manufacturing Value-Added 2000-2022

		Average Annual Growth (OLS)		
Country Name	Variable Name	2000-2010	2010-2022	
Brazil	GDP (constant 2015 US$)	3.8%	0.3%	
Brazil	Manufacturing, value added (constant 2015 US$)	2.9%	-1.8%	
Brazil	Manufacturing, value added (% of GDP)	13.7	10.8	
Malaysia	GDP (constant 2015 US$)	5.0%	4.2%	
Malaysia	Manufacturing, value added (constant 2015 US$)	4.6%	4.5%	
Malaysia	Manufacturing, value added (% of GDP)	27.5	22.6	
Thailand	GDP (constant 2015 US$)	4.6%	2.3%	
Thailand	Manufacturing, value added (constant 2015 US$)	5.6%	1.3%	
Thailand	Manufacturing, value added (% of GDP)	29.5	27.4	
Indonesia	GDP (constant 2015 US$)	5.3%	4.9%	
Indonesia	Manufacturing, value added (constant 2015 US$)	4.6%	3.8%	
Indonesia	Manufacturing, value added (% of GDP)	27.3	20.5	
Upper middle income	GDP (constant 2015 US$)	6.9%	4.5%	
Upper middle income	Manufacturing, value added (constant 2015 US$)	N/A	N/A	
Upper middle income	Manufacturing, value added (% of GDP)	22.0	22.1	
High income	GDP (constant 2015 US$)	1.9%	1.7%	
High income	Manufacturing, value added (constant 2015 US$)	1.9%	1.7%	
High income	Manufacturing, value added (% of GDP)	15.2	13.7	
Latin America & Caribbean (excl. HICs)	GDP (constant 2015 US$)	3.5%	1.1%	
Latin America & Caribbean (excl. HICs)	Manufacturing, value added (constant 2015 US$)	2.5%	0.2%	
Latin America & Caribbean (excl. HICs)	Manufacturing, value added (% of GDP)	15.4	13.4	
Source: World Development Indicators database; accessed October 30, 2023.				
Last Updated: 10/26/2023				
Growth rates are calculated using Ordinary Least Squares.				

Between 2010 and 2022, while the manufacturing value added of Latin America and Caribbean countries (excluding high-income nations) grew slightly at 0.2% per annum, that of Brazil actually declined by 1.8% per annum (Table 1). While data on manufacturing value added for the upper middle-income group are not available, the fact that the GDP of this group grew by 4.5% per annum, while its share of manufacturing in GDP remained at 22%, suggests a similar 4.5% growth for manufacturing value added. Nevertheless, even this performance falls short when compared to East Asian countries (Table 1).

Consequently, Brazil's global share of manufacturing output dwindled from its peak of 2.7% in 2010 to approximately 1.2% in 2021-2022 (Figure 6, left panel). Brazil's share of manufacturing value-added in GDP remains among the lowest within the upper-middle-income category, even lower than that of developed countries (Figure 6, right panel).

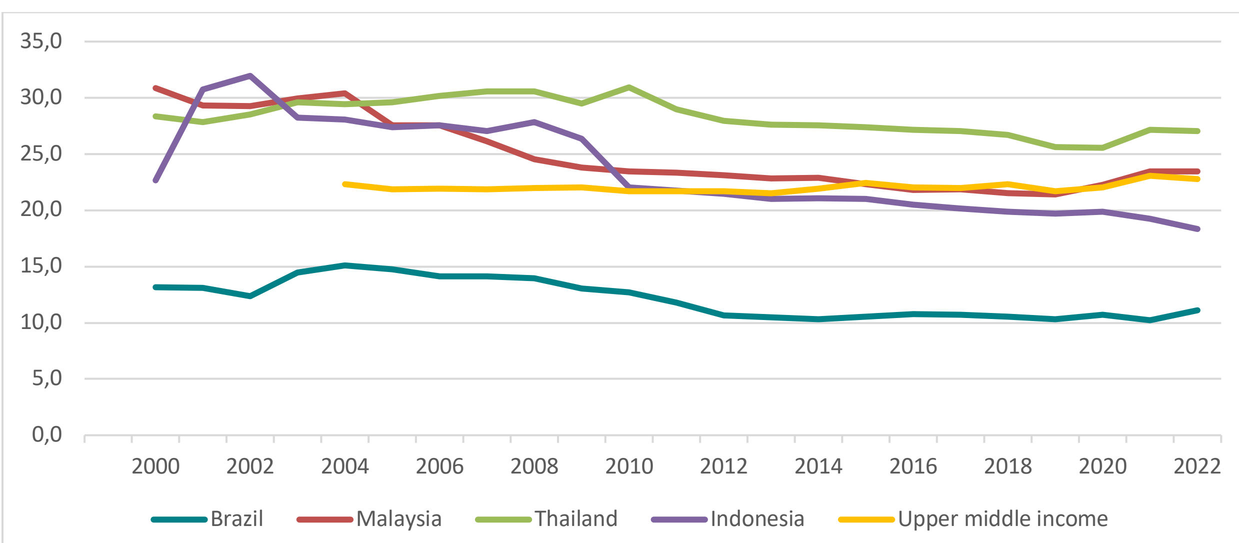
Figure 6.



Source: World Development Indicators, last updated October 26, 2023, accessed November 2, 2023.

Figure 7 shows the share of manufacturing in Brazilian GDP, and its comparators, since 2000. This share has been in decline since peaking at 14.1% in 2004. This indicates that the country has undergone premature de-industrialization, aligning with the experience of other developing nations (Rodrik, 2016).

Figure 7. Share of Manufacturing in GDP at Current Prices (%) 2000-2022



Source: World Development Indicators database; updated December 18, 2023, accessed January 3, 2024.

Employment. Industrial employment is a critical aspect of industrialization because of its role in job creation. Unfortunately, data paucity poses many challenges. While the World Bank offers comprehensive GDP data and sectoral value-added, it lacks data on sectoral employment. The Economic Transformation Database (ETD), developed by the University of Groningen in collaboration with the United Nations University-World Institute for Development Economics Research (UNU-WIDER), offers time-series data on employment and value added for 12 sectors across 51 countries, including nine Latin American countries (Table 2). However, it only covers 1990 to 2018, omitting more recent events, such as the COVID-19 pandemic. Additionally, its data source for value added differs from that of the World Bank.

Table 2 reveals a general deceleration in the growth rate of manufacturing value added for Latin American countries (LACs), based on the ETD, accompanied by a corresponding decline in manufacturing employment. Brazil stands out in terms of the magnitude of this decline. It ranks as the worst performer among the nine LACs included in the ETD.

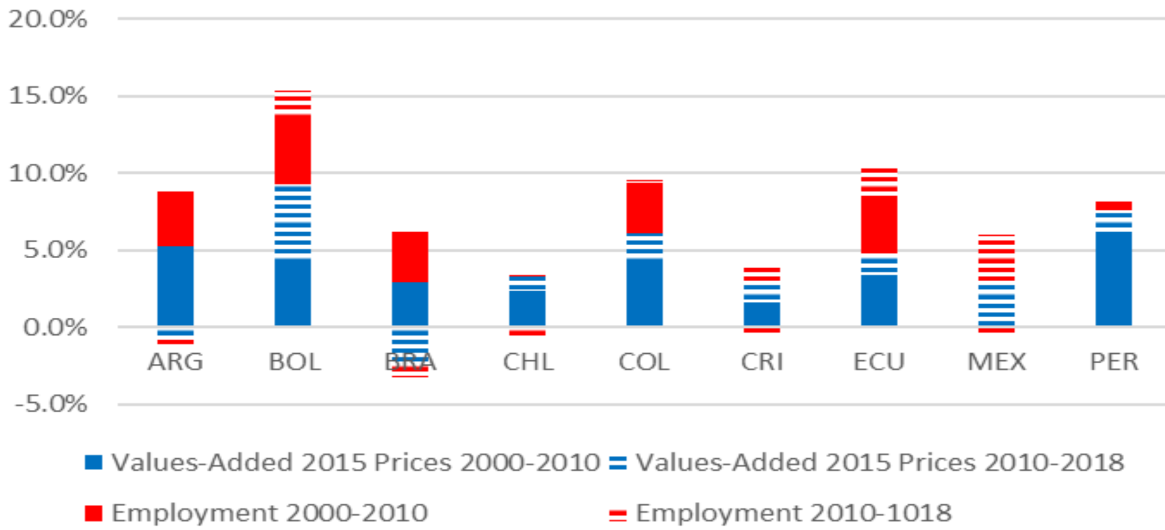
Figure 8 shows the annual growth of manufacturing employment during 2000-2010 (solid red) and 2010-2018 (striped red), alongside the corresponding growth of value-added (solid blue and striped blue, respectively), for the nine Latin American countries (LACs). Among these nations, Bolivia emerges as the top performer, with an average annual growth rate of value-added at 4.6% p.a. for both periods. Peru and Colombia are the next best, although both experienced a decline in annual growth rates, dropping from 6% and 4.2% p.a. in the first period, to approximately 2% in the second period. Brazil's value-added grew at 2.9% between 2000 and 2010, but declined by 2.3% during the second period, making it one of the poorest performers among the nine countries.

Table 2. Performance of Brazil and other LAC Manufacturing Value Added and Employment

Country	Annual Growth Rates of Manufacturing Value-Added 2015 Prices		Annual Growth Rates Manufacturing Employment	
	2000-2010	2010-2018	2000-2010	2010-1018
Argentina	5.2%	-0.9%	3.6%	-0.3%
Bolivia	4.4%	4.8%	4.4%	1.6%
Brazil	2.9%	-2.3%	3.3%	-0.9%
Chile	2.3%	1.0%	0.0%	-0.7%
Colombia	4.2%	1.9%	3.2%	0.3%
Costa Rica	1.6%	1.1%	-0.4%	1.2%
Ecuador	3.4%	1.4%	3.4%	2.3%
Mexico	0.4%	2.6%	-0.4%	3.0%
Peru	6.0%	1.6%	0.5%	0.0%
Unweighted Average	**3.4%**	**1.2%**	**2.0%**	**0.7%**
Source: Author's calculations from the Economic Transformation Database				
Note: Growth rates of value-added at constant 2015 prices and employment are calculated using regressions				

For manufacturing employment, Bolivia led among the nine countries during the 2000-2010 period, while Mexico did well in the second period. Brazil's performance was average during the first period, but ranked the lowest in the second. With the exception of Bolivia, all other eight countries witnessed a decrease in manufacturing's share of GDP.

Figure 8. Lac Average Annual Growth Rate (%) of Employment (Red) and Manufacturing



Source: Author's calculations from the Economic Transformation Database, 2021 (de Vries *et al*, 2021). Growth rates are calculated from regression line.

One key indicator for evaluating Brazil's progress in industrialization is the employment share within agriculture over time. A shift away from agriculture, a sector characterized by low productivity compared to others, can signify improved resource allocation. Interestingly, among Latin American and Caribbean countries, the reduction in agricultural employment did not coincide with an increase in manufacturing employment. In Brazil, the significant reduction in the agricultural employment share (9.8% during 2010-2018, and 5% during 2000-2010, Table 3) was accompanied by a reduction of approximately 1% in manufacturing, indicating that resources from agriculture have shifted elsewhere, to sectors less productive than manufacturing (other services). We will return to this point later.

Figure 9 shows the average employment share in agriculture and manufacturing for the 9 LAC countries across three decades: 1990-2000, 2000-2010, and 2010-2018. Among the nine countries in the sample, Bolivia, Brazil, and Ecuador experienced the most significant drops in their shares of agricultural employment, not only during the last decade (2010-2018) but also during the previous one (1990-2000).

Table 3. Gains in Average Employment Shares 1990-2018

	Agriculture		Manufacturing	
	(3)-(1)	(3)-(2)	(3)-(1)	(3)-(2)
ARG	-3.9%	-1.3%	-3.7%	-0.5%
BOL	-25.7%	-10.0%	2.4%	0.1%
BRA	-9.8%	-5.0%	-1.3%	-0.8%
CHL	-4.0%	-1.5%	-5.1%	-1.7%
COL	-9.5%	-3.8%	-1.5%	-0.4%
CRI	-8.7%	-0.8%	-7.5%	-3.3%
ECU	-10.8%	-5.0%	-1.0%	-0.3%
MEX	-5.9%	-1.5%	-3.3%	-1.2%
PER	-6.5%	-4.0%	-4.3%	-1.5%

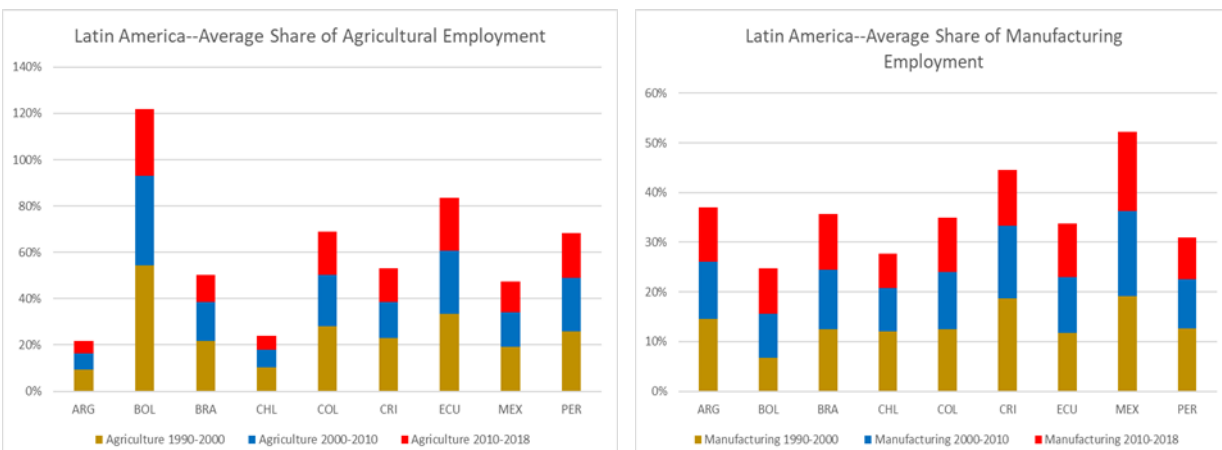
Source: Author's calculations from the Economic Transformation Database, 2021 (de Vries *et al*, 2021).

Note: (1) Average share 1990-2000

(2) Average share 2000-2010

(3) Average share 2010-2018

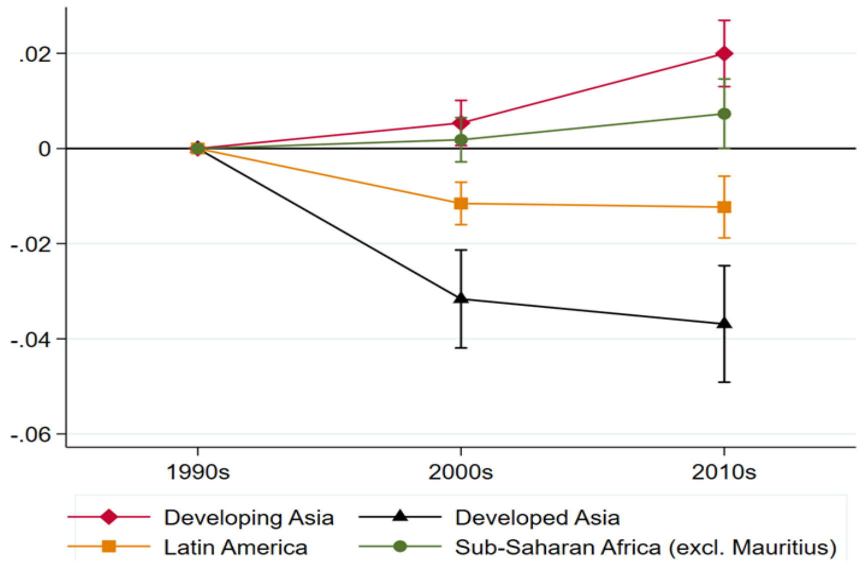
Figure 9. Changes in LAC Agricultural and Manufacturing Employment Shares 1990-2018



<u>Source</u>: Author's calculations from the Economic Transformation Database, 2021 (de Vries *et al*, 2021). Growth rates are calculated from ordinary least squares.

Kruse *et al* (2021) employed the ETD to assess industrialization trends in developing nations. They conducted regressions to examine heterogeneity in industrialization trends by interacting period dummies with country or region fixed effects, while keeping income and population effects constant. Figure 10, which illustrates industrialization trends in the 2000s and 2010s relative to the 1990s, confirms the deindustrialization trend observed in Latin America, particularly in Brazil, as discussed earlier.

Figure 10. Industrialization Patterns by Region Relative to the 1990s

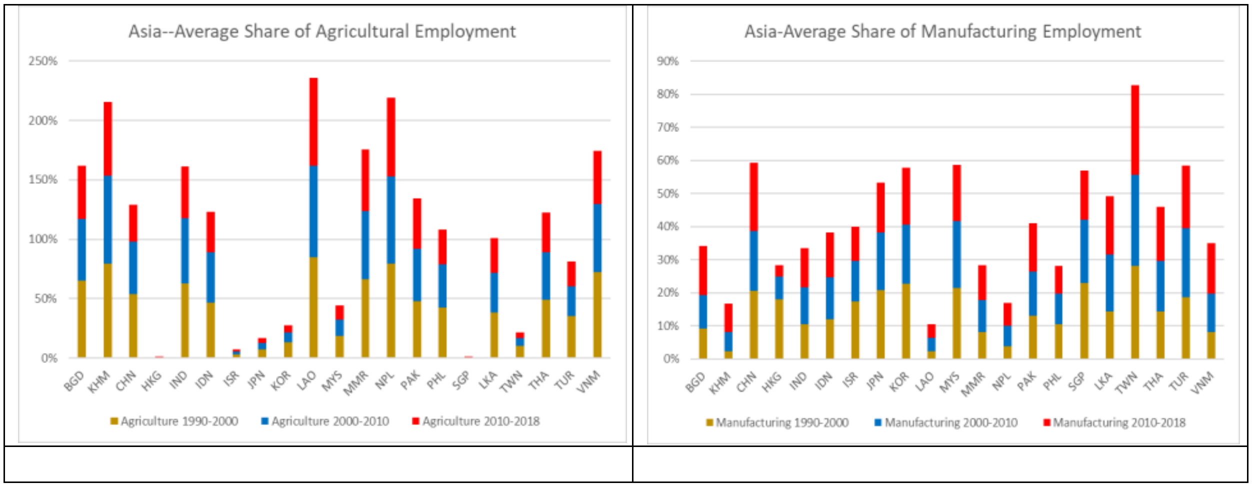


Source: Figure 5 in Kruse *et al* (2021), page 18.

Note: dependent variable is the manufacturing employment share. Marginal effects by region are shown. Each marginal effect is estimated on the basis of a separate regression.

For a broader perspective, Figure 11 shows the average shares of agriculture and manufacturing employment in Asia over the same period. Economies with the most significant reductions in agricultural employment shares include Hong Kong, Korea, Taiwan, Singapore, and China. Conversely, Cambodia, Vietnam, Nepal, Laos, and Bangladesh recorded substantial gains in manufacturing employment. In Latin America, Bolivia, Brazil, Argentina, and Chile saw remarkable reductions in agricultural employment shares, while Chile, Costa Rica, Peru, Argentina, and Mexico witnessed the largest increases in manufacturing employment shares.

Figure 11. Changes in Agricultural and Manufacturing Employment Shares 1990-2018 in Asia



Source: Author's calculations from the Economic Transformation Database, 2021 (de Vries *et al*, 2021). Growth rates are calculated using regression.

4. ANALYSIS OF BRAZILIAN PRODUCTIVITY GROWTH USING FACTOR DECOMPOSITION

Productivity is the primary driver of sustained economic growth. Currently, there are two distinct methods to study productivity growth: factor decomposition discussed in this section, and sectoral breakdown discussed in the next section.

Factor decomposition. In a Cobb-Douglas production function, output is linked to factors of production as follows:

$$Y = AK^{\alpha} L^{(1-\alpha)}$$

where Y is output (value added), A is the productivity term, or the efficiency with which inputs are used in the production process, K is the capital stock, L is the labor force, and α is the share of capital share of income.

Taking log and differentiating the above equation yields:

$$\hat{Y} = \alpha\hat{K} + (1-\alpha)\,\hat{L} + \hat{A}$$

where $\hat{Y}$ denotes output growth; $\hat{K}$ and $\hat{L}$ denote growth rates of capital and labor; α and 1-α denote the share of capital and labor in income; and $\hat{A}$ is the growth rate of productivity. This equation shows output growth as a weighted average of capital and labor growth, plus the growth rate of productivity. This last term is commonly referred to as total factor productivity (TFP):

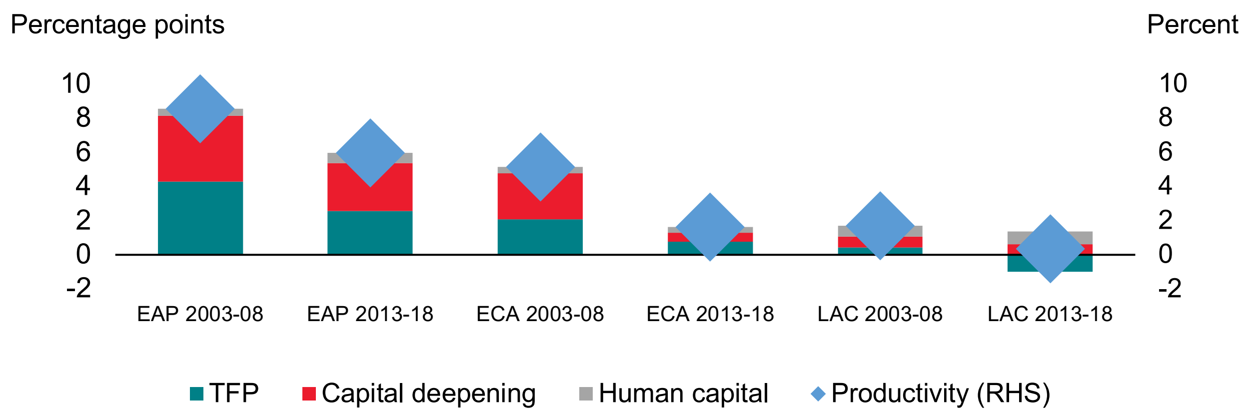
$$\hat{A} = \hat{Y} - \alpha\hat{K} - (1-\alpha)\,\hat{L}$$

This economy-wide productivity term, TFP, summarizes everything we do not know about the efficient use of inputs, including technology progress, machinery per worker, institutional arrangements, and structural transformation. Seminal work by Denison (1982), Jorgenson (2005), Solow (1970), and others, showed that this term amounts to almost half of total output growth. Both capital and labor are subject to diminishing returns. Hence, long-lasting change in output depends on the growth of productivity.

In our analysis, we further differentiate labor quantity and labor quality. as well as capital in information and technology (IT) versus capital in non-IT.

Recent trends in Latin American productivity growth using factor decomposition. The World Bank, in a study conducted by Dieppe (2021), examined the evolution of total productivity growth in all regions of the world. All emerging market and developing economies (EMDEs) faced a decline in productivity growth because of factors including slowing working-age population growth, stagnant educational levels, and reduced growth in global value chains. After the 2008 Global Financial Crisis (GFC), all regions experienced a drop in productivity growth, with Latin American countries being the most severely affected, even more so than sub-Saharan Africa. Productivity growth declined from 1.7% between 2003-2008 to just 0.4% between 2013-2018 (Dieppe, 2021). Figure 12 further illustrates the contraction of TFP growth in Latin America during the post-GFC period, a trend that may have been exacerbated by the COVID-19 pandemic.

Figure 12. Factors Contributing to Productivity Growth, 1990s-2018

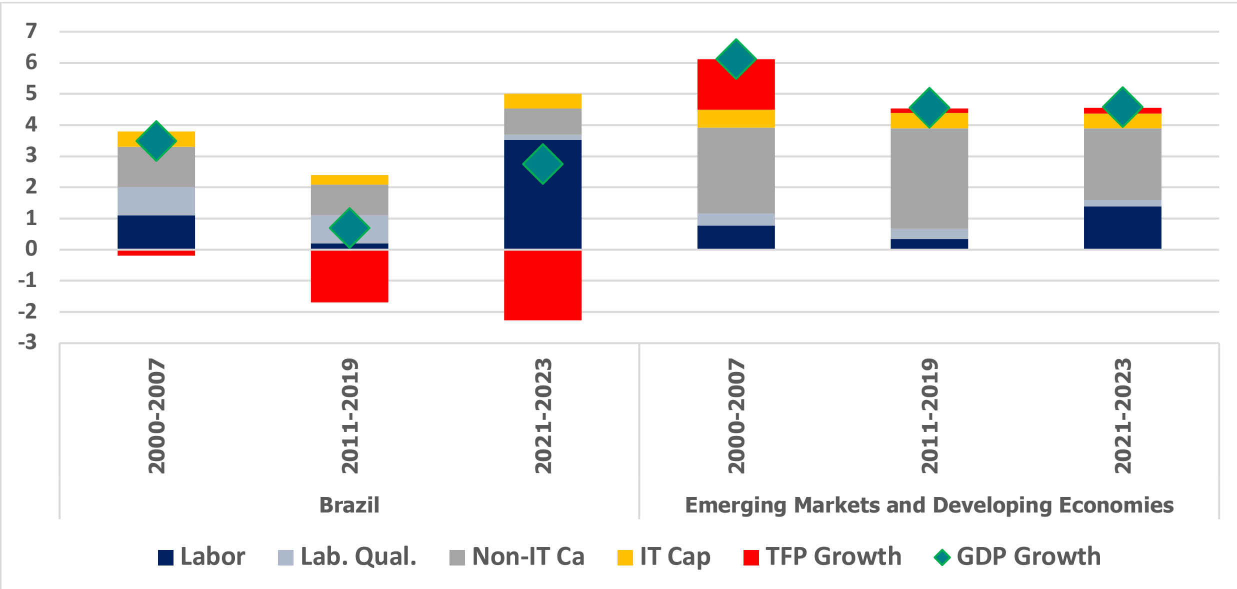


Source: Figure 5.1E in Dieppe (2021).

Note: Productivity is defined as real GDP per worker (at 2010 market prices and exchange rates). Country group aggregates for a given year are calculated using constant 2010 U.S. dollar GDP weights. Data for multiyear spans shows simple averages of the annual data. Productivity growth is computed as log changes. Sample includes 93 EMDEs, including 8 in EAP, 21 in ECA, 20 in LAC. ECA: Europe and Central Asia, LAC: Latin America & Caribbean, EAP: East Asia and Pacific countries.

Figure 13 presents the contributions of labor (dark blue), labor quality (light blue), non-IT capital (light green), IT capital (purple), and TFP (red), with the green diamond representing GDP growth, for Brazil and for EMDE.

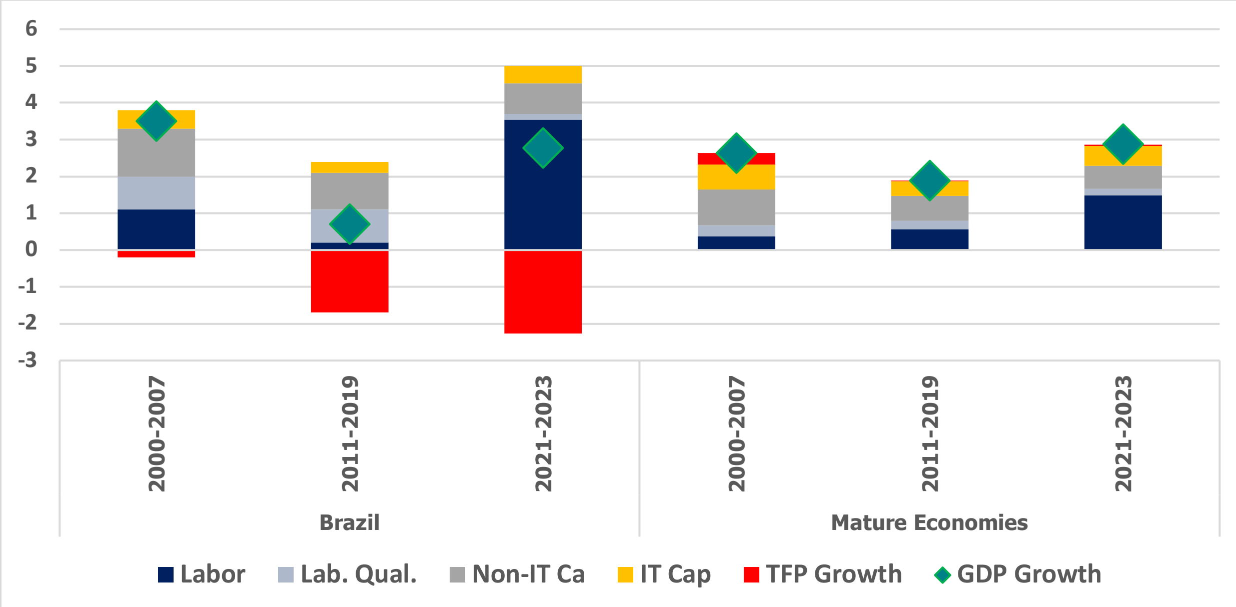
Figure 13. Factors Contributing to GDP Growth (%)



Source: Author's calculation from The Conference Board Total Economy Database™ (April 2023).

Similarly, Figure 14 compares Brazil's results to those of mature economies. The negative trend in TFP has worsened over the years, particularly during the 2010s, and the elimination of the contributions of IT and non-IT capital during 2021-2023 is a significant concern. Two observations stand out: Brazil's labor quality appears to positively contribute to productivity growth, more so than in other EMDEs, and IT investment seems lower than in other EMDEs. Previous studies (e.g. Agenor and Cavuto, 2012) emphasized the importance of IT capital, or *"advanced infrastructure,"* for sustained economic growth.

Figure 14. Factors Contributing to GDP Growth (%)



Source: Author's calculation from The Conference Board Total Economy Database™ (April 2023).

To address the question of whether different results would arise with different time periods, Figure 15 shows that the outcomes would remain the same even if the 2003-2013 period, a period of solid economic growth, were considered. During this period, TFP growth was negative, and the primary factor contributing to growth was non-IT capital, which eventually encountered diminishing returns. This inability to sustain growth is postponing Brazil's transition to a high-income status.

5. ANALYSIS OF BRAZILIAN PRODUCTIVITY GROWTH USING SECTORAL DECOMPOSITION

Sectoral decomposition of productivity. While the factor decomposition method provides insights into which production factor (capital, labor, or TFP) contributes to output growth, it cannot reveal inter-sectoral resource shifts, a key factor for economic growth. Specifically, it doesn't capture the structural transformation, or the gains in overall productivity arising from resources moving from low- to high-productivity sectors. This necessitates the use of a multi-sector model with labor productivity defined as the ratio of value-added to employment.

Utilizing this labor productivity metric has more implications than mere data convenience. As noted by Baumol *et al* (1989), labor productivity reflects prospective consumption or living standards. They asserted that this metric captures humanity's efforts to attain the current economic yield, making it an apt measure for gauging an entity's capacity—be it a firm, industry, or an entire economy—to reward its workforce.

Assuming an economy with *n* output sectors, one can decompose the overall output growth into three components (McMillan *et al*, 2014; Timmer *et al*, 2014) as follows:

$$(1) \qquad \Delta Y_t = \sum_{i=1,n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=1,n} y_{i,t\text{-}k} \Delta \theta_{i,t} + \sum_{i=1,n} \Delta y_{i,t} * \Delta \theta_{i,t}$$

The left-hand side of the equation (1) represents the change in economy-wide labor productivity, defined as GDP divided by employment over the period concerned. The first term on the right-hand side (RHS) measures the 'within-sector effect'—or change in sector productivity due to capital, technology, etc., assuming there is no change in sectoral employment. For example, in the agriculture sector, an improvement in yields because of a new type of seed, or an enhancement in irrigation infrastructure, would lead to positive change in this within-sector effect, even if there is no change in the labor share in the sector. Conversely, a prolonged war could cause a drop in agricultural output, leading to a negative effect.

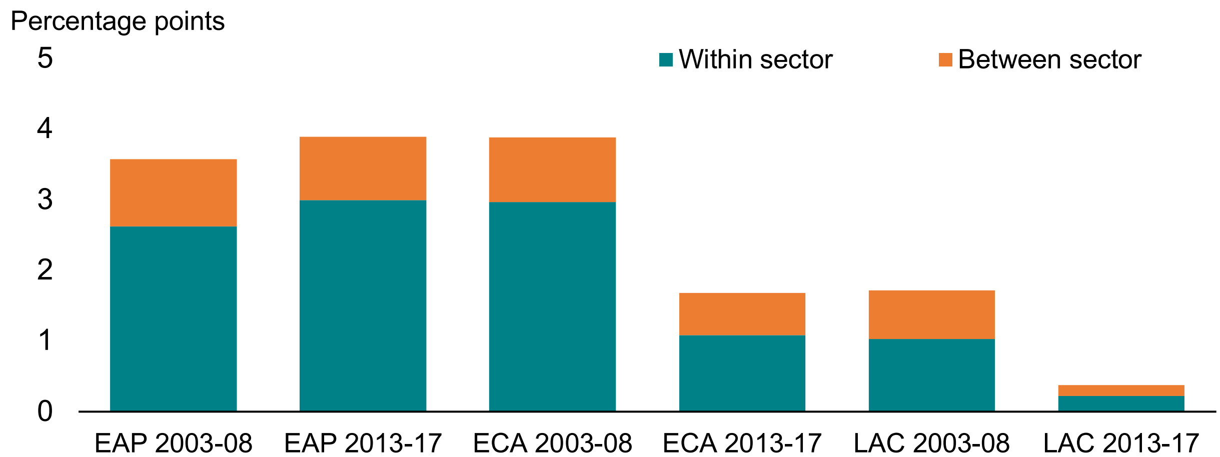
The second term on the RHS refers to the static structural change, and reflects the change in productivity brought about by the sectoral gain or loss in employment, assuming there is no change in productivity over the period. As such, it measures the pure effect of the labor movement on overall productivity change. This term indicates the movement of labor from sectors with below-average productivity ***levels*** to those sectors with above-average productivity levels. In general, for an economy that grows, this term is positive: more jobs created tend to be created, so the gains would more than offset the losses.

The third term on the RHS is the dynamic structural change. It is a product of the change in sector employment and the change in productivity, and therefore indicates the 'right' direction of productivity change. Specifically, this term indicates the movement of labor from sectors with below-average productivity ***growth*** to those sectors with above average productivity ***growth***. This term is thus positive if the economy progresses along the structural transformation path, that is, resources move from low-productivity to high-productivity sectors. It is negative if the reverse happens, for example, if resources move from high- to low-productivity sectors.

The sum of the second and third terms is the structural transformation effect. Some authors refer this as the *"between sector"* effect, or *"structural change"* (Diao *et al*, 2019). In this paper, we use the terms 'structural change' and 'structural transformation' interchangeably. Note that there are two caveats from an *ex-ante* standpoint. First, labor movement is only possible if jobs are created in the higher-productivity sectors. It is obvious that no structural transformation will take place if there are no jobs in the higher-productivity sectors. Second, sectors with higher productivity may be capital-intensive, leaving little-to-no room for additional job creation because of demand constraints. This is the case with many utility sectors and natural resource-based sectors.

The World Bank analyzed recent trends in LAC productivity using a sectoral decomposition method. Figure 15 presents sectoral decomposition analysis conducted by the World Bank's Dieppe (2021), focusing on three regions: East Asia and Pacific, Europe and Central Asia, and Latin America and the Caribbean (LAC). Notably, during 2013-2017, both within-sector and between-sector effects showed substantial reductions in LAC countries.

Figure 15. Within- and Between-Sector Contributions to Regional Productivity Growth 2003-2017

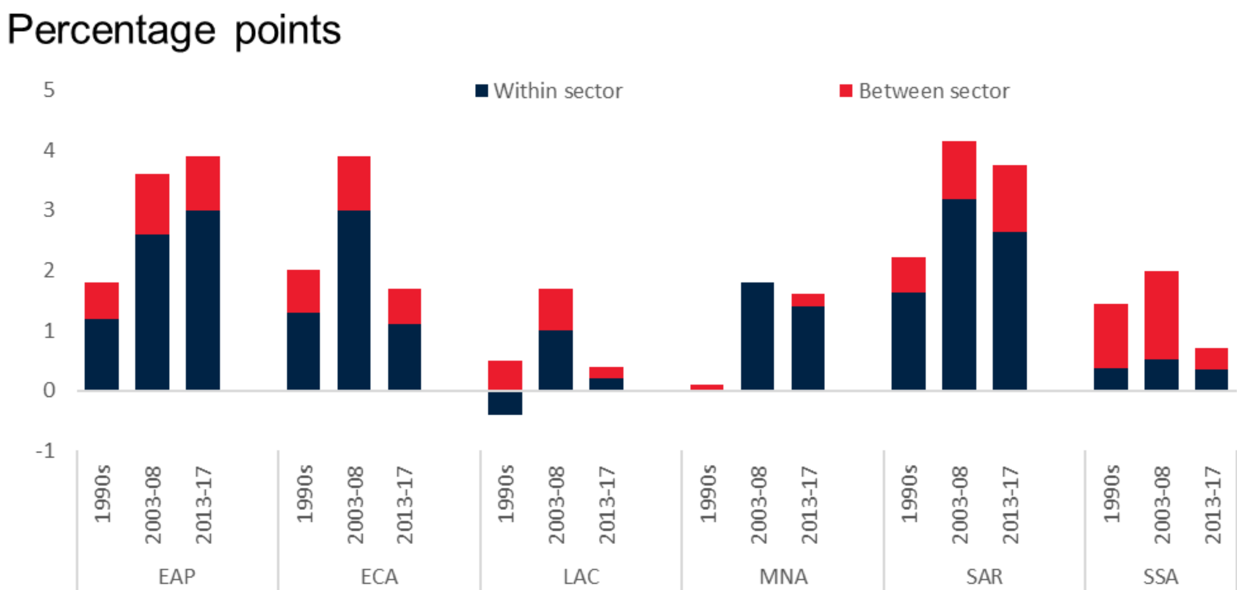


Source: APO productivity database; Expanded African Sector Database; Groningen Growth Development Center Database; Haver Analytics; ILOSTAT; OECD STAN; United Nations; World KLEMS.

Note: Productivity is defined as real GDP per worker (at 2010 market prices and exchange rates). Median contribution for each region. Growth within sector shows the contribution of initial real value added-weighted productivity growth rate of each sector and 'between-sector' effect shows the contribution arising from changes in sectoral employment shares. Sample includes 69 EMDEs, of which nine are in EAP, 11 in ECA, 17 in LAC.

Productivity gains from the structural-transformation effect, involving the reallocation of labor between sectors, slowed down in various regions (as defined by the World Bank) worldwide during the post- GFC era, as depicted in Figure 16. This slowdown was particularly pronounced in Latin American countries and sub-Saharan Africa. Within-sector productivity improvements also saw a slowdown, with East Asia and the Pacific (EAP) being the sole region achieving within-sector productivity gains during the post-GFC period.

Figure 16. Within-Sector and Structural Transformation Contributions to Productivity Growth by Region (1990s-2017)

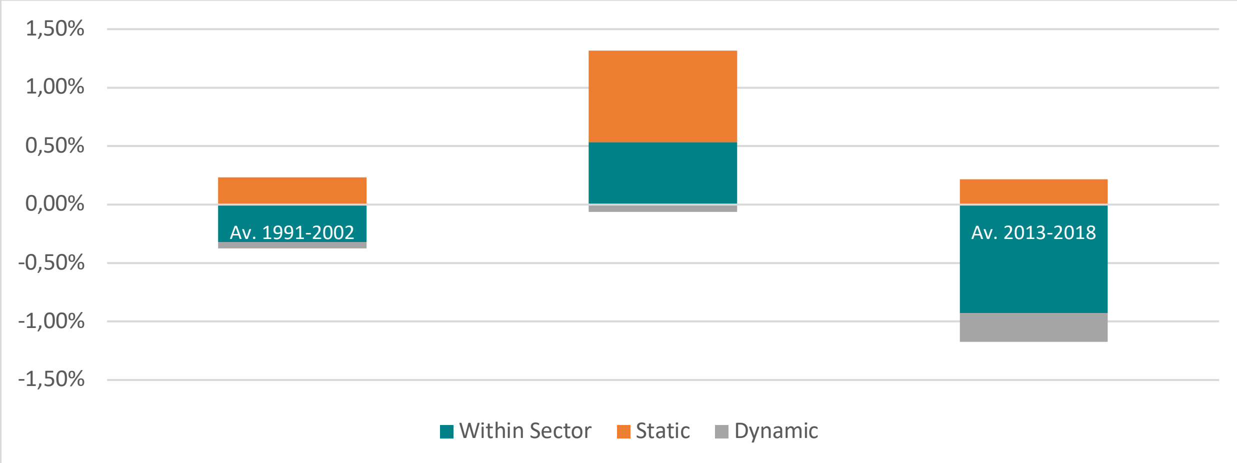


Sources: Figure 7.3B Dieppe (2021); Table APO; EASD; GGDC; ILO; KLEMS; national sources; OECD; United Nations; World Bank. Notes: Based on samples of 94 countries for 1995-1999 and 103 countries for 2003-2017. Median of the country-specific productivity. Growth within sector shows the contribution of initial real value-added weighted productivity growth rate and between sector growth effect give the contribution arising from changes in the change in employment share. Median of the country-specific contributions.

Analysis of Brazil's productivity using the Economic Transformation Database. An examination of Brazilian productivity growth by sector over a 28-year span, from 1990 to 2018, confirms the slowdown in total productivity growth since 2007. The average growth rate of labor productivity over this period was 0.5% per annum. Figure 17 illustrates the decomposition of Brazilian productivity growth during this period, indicating an increase in within-sector productivity growth and a structural-transformation effect mainly driven by the static component during the 2003-2013 period. However, both these factors declined in the subsequent period.

Throughout 1990-2018, the agriculture sector in Brazil reduced its workforce significantly because of high productivity growth. Meanwhile, manufacturing also shrank, with the surplus labor not transferring to manufacturing, like in East Asia. Instead, this labor was absorbed by services, where productivity was lower than in manufacturing and only marginally higher than agriculture, resulting in a minimal impact on resource allocation. Services and trade sectors absorbed the most workers, collectively accounting for a larger share of the workforce in 2018 compared to the early 1990s.

Figure 17. Brazil Decomposition of Productivity Growth 1991-2018



Source: Author's calculations from the Economic Transformation Database, 2021 (de Vries *et al*, 2021).

To gain a better understanding of intersectoral resource movements and within-sector effects across various sectors, the original 12 sectors in the Economic Transformation Database were regrouped into seven sectors. Table 4 provides a detailed breakdown of average annual growth within and between sectors for each period. Agriculture remained the primary contributor over the entire 1991-2018 period, especially in recent times, while manufacturing's contribution decreased over the years, turning negative in 2014-2018. On the other hand, mining, utilities, and construction made positive contributions to overall GDP growth.

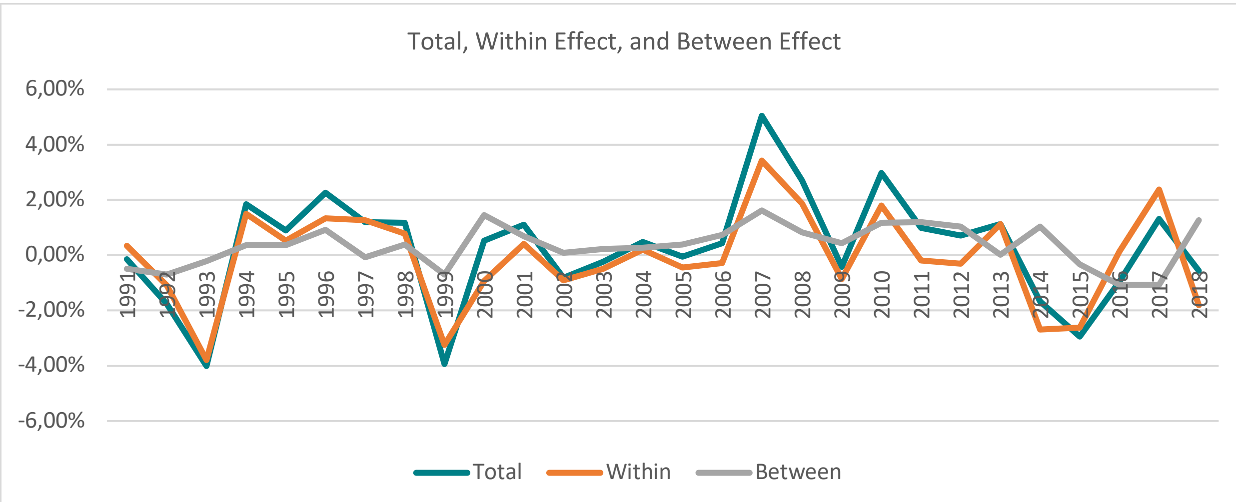
Table 4. Average Within- and Between-Sector Effects, 1991-2018

Within-sector effect	**Agri.**	**Manuf.**	**Oth. Ind.**	**Trade**	**Transport**	**Financial**	**Oth. Serv.**	**Total**
Average 2014-2018	0.34%	-0.21%	0.09%	-0.43%	-0.11%	-0.09%	-0.51%	-0.92%
Average 2003-2013	0.22%	0.03%	0.05%	0.23%	0.01%	0.11%	-0.11%	0.53%
Average 1991-2002	0.18%	0.43%	0.23%	-0.16%	0.02%	-0.25%	-0.77%	-0.32%
Between-Sector Effect								
Average 2014-2018	-0.18%	-0.19%	-0.38%	0.14%	0.05%	-0.01%	0.54%	-0.03%
Average 2003-2013	-0.16%	0.01%	0.12%	0.08%	0.04%	0.13%	0.51%	0.72%
Average 1991-2002	-0.08%	-0.27%	-0.17%	0.27%	0.08%	0.02%	0.32%	0.18%

Source: Author's calculations from the Economic Transformation Database, 2021 (de Vries *et al*, 2021).

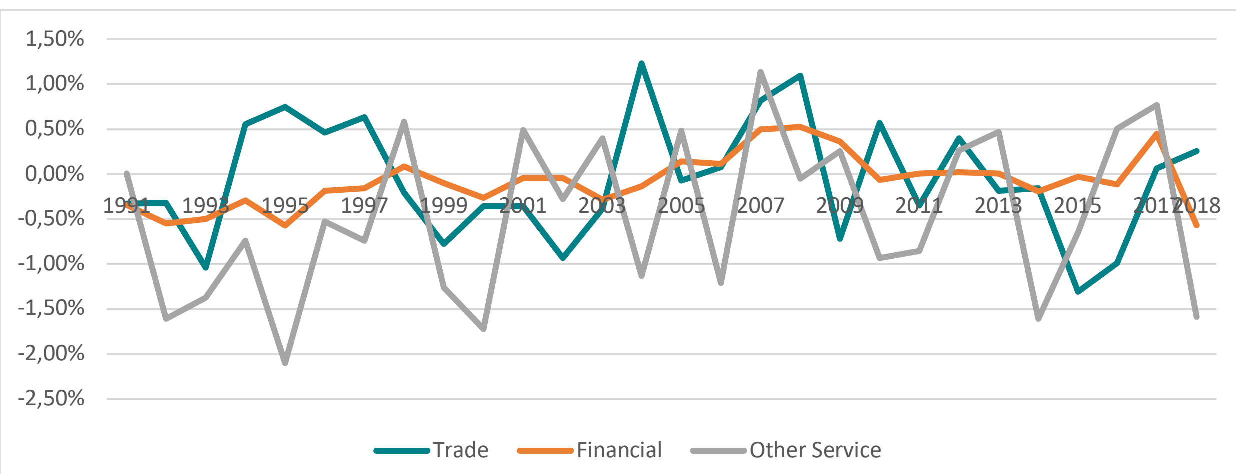
Figure 18 shows that structural transformation played a minor role in overall productivity growth in Brazil during 1991-2018, except for the 2003-2013 period. In contrast to developed economies, manufacturing in Brazil did not exhibit significant productivity improvement. Even the financial sector showed limited productivity growth, despite expectations of technological advancement (Figure 19).

Figure 18. Brazil Annual Productivity Growth 1991-2018



Source: Author's calculations from the Economic Transformation Database, 2021 (de Vries *et al*, 2021).

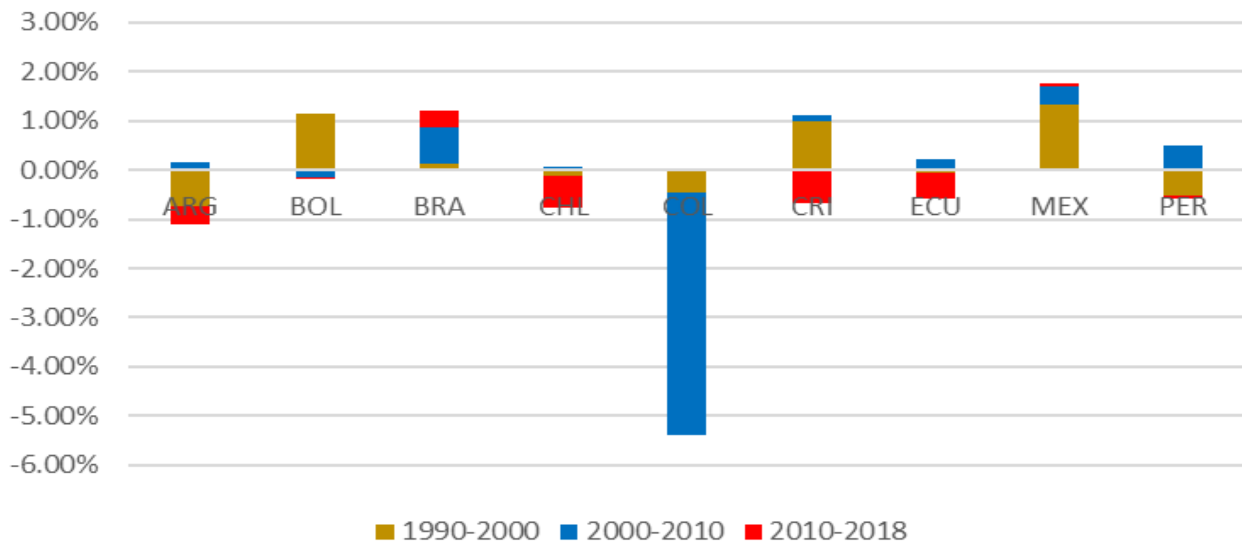
Figure 19. Brazil Within-Sector Effect in Trade, Financial, and Other Services 1991-2018



Source: Author's calculations from the Economic Transformation Database, 2021 (de Vries *et al*, 2021).

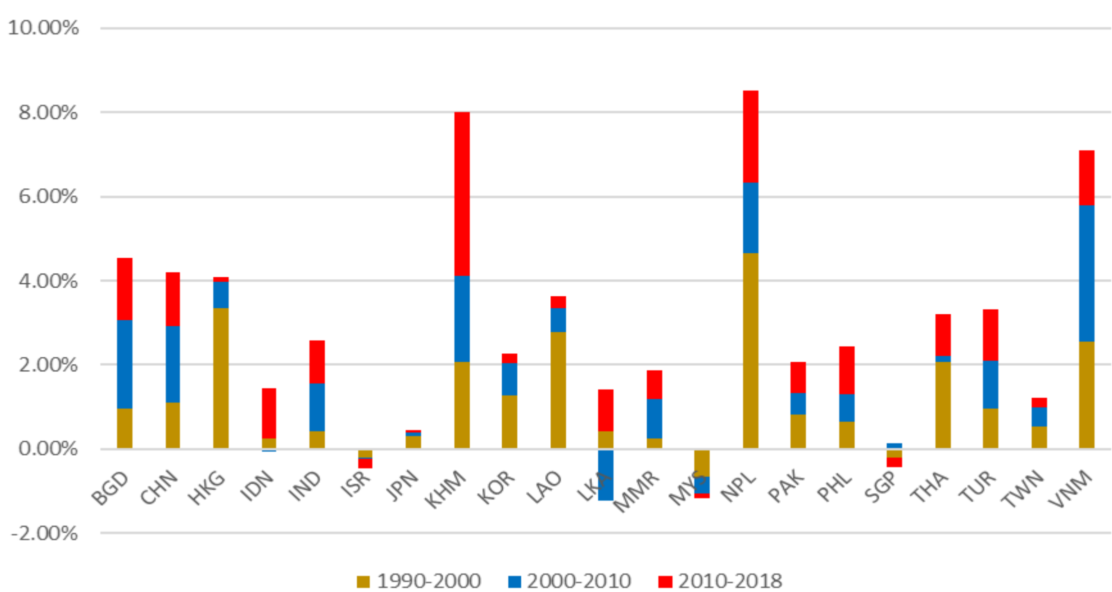
Brazil is not the only Latin American country experiencing a reverse structural transformation, as noted by Rodrik (2016). Figure 20 displays structural transformation effects for nine LAC countries included in the Economic Transformation Database. Brazil has not done too badly in this group, while Colombia seems to have fared the worst. Among these countries, Mexico, Bolivia, and Costa Rica stand out as the most successful in terms of structural transformation. For comparison, Figure 21 depicts the evolution of the same effect for Asian countries.

Figure 20. Evolution of Structural Transformation in Latin American Countries 1990-2018



Source: Author's calculations from the Economic Transformation Database, 2021 (de Vries *et al*, 2021). Period average is simple average growth rates because the growth rates are calculated from regression line.

Figure 21. Evolution of Structural Transformation in Asian Countries 1990-2018



Source: Author's calculations from the Economic Transformation Database, 2021 (de Vries *et al*, 2021).

Conclusion. Structural transformation, i.e. the reallocation of resources from less-productive to more-productive sectors and activities, is an important process of economic development. Both the Growth Commission Report and World Development Report 2013 stressed that diversification and structural transformation represent an essential part of the process of catching up (Commission on Growth and Development, 2008; World Bank, 2012).

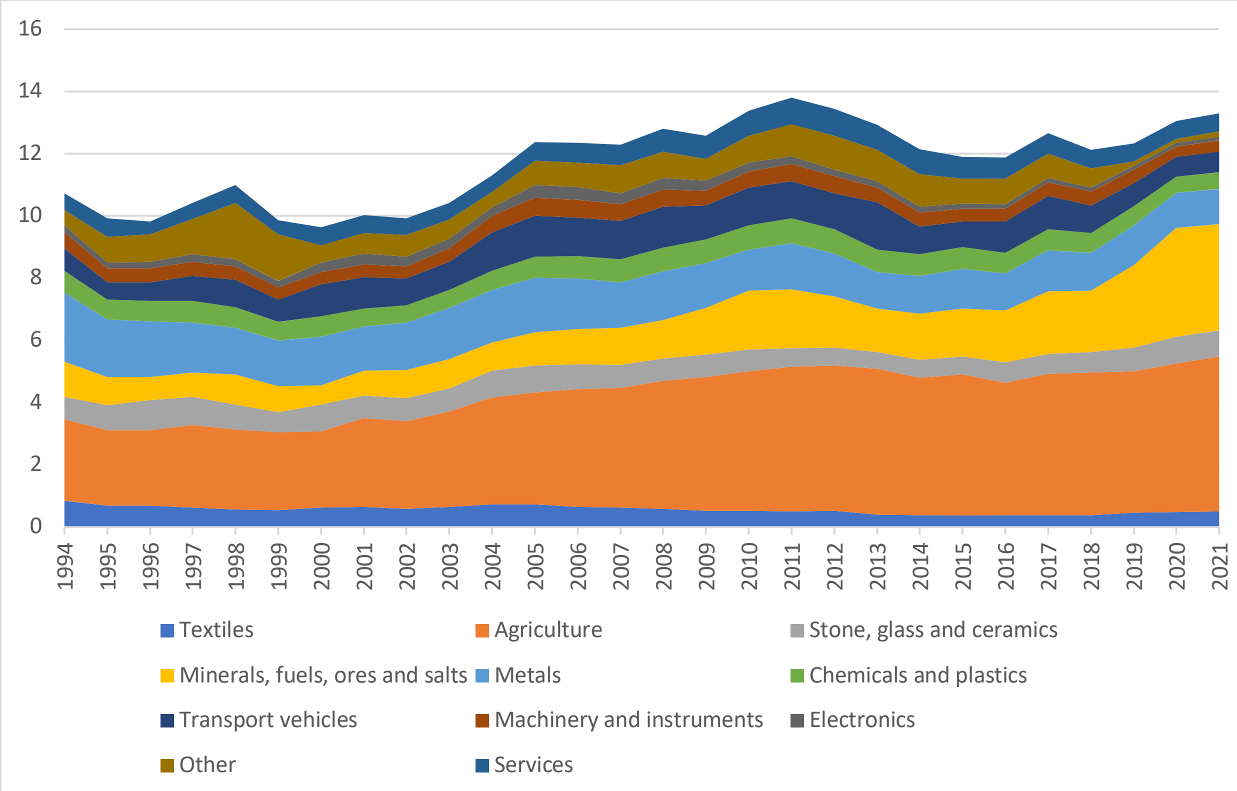
McMillan and Rodrik (2011) argued that, typically, countries with low productivity levels have leveraged rapid and extensive processes of export-led structural transformation to achieve high productivity growth and to transition to higher-income status. The source of the productivity gains was the regular reallocation of labor and capital to the most-productive industries, resulting in the contraction of low-productivity sectors and expansion of high-productivity ones. In upper middle-income countries (UMICs), for example, this process of structural transformation led to a shrinking of nearly 20 percentage points in agriculture as a share of GDP over the last five decades, converging to a share of less than 10 percent of GDP in 2014. The industry share initially rose to approximately 30 percent of GDP in the early 1980s before falling sharply in subsequent decades.

But, as a country develops, productivity levels among its different sectors converge and the scope for structural transformation shrinks. This is why the between-sector contribution to productivity growth in the developed countries tends to be small (Dinh, 2017). This may explain why structural transformation has been slow in Brazil. The coefficient of variation, which measures the degree of variation among productivity levels in different sectors, was 1.8 for Brazil from 1990-2018, compared to 3.2 for Colombia and 3.1 for Ecuador. During the 1990s and 2010s, the structural transformation contribution was even negative in Brazil. A closer look at the employment structure over the years shows that both the agriculture and manufacturing sectors released workers, who went into the services sectors where productivity in some areas was even lower than agriculture. As a result, the structure of production in Brazil is predominantly services-oriented, and the composition of GDP looks more like that of developed economies than upper middle-income countries, among which Brazil now sits. This structure implies that the scope for structural transformation remains small for Brazil in the years ahead.

6. BRAZILIAN EXPORT STRUCTURE

Reflecting its domestic production structure, Brazil has been rather slow at diversifying its exports, constraining its ability to accelerate growth and benefit from new trade relationships that can offer technology-embodied FDI. This diversification is the key to spawning more sophisticated industries and increasing access to the world market. Figure 22 shows the evolution of Brazilian exports from 1994 to 2021.

Figure 22. Brazilian Share (%) of World Trade 1994-2021



Source: Data from the Growth Lab at Harvard University. The Atlas of Economic Complexity. http://www.atlas.cid.harvard.edu Accessed January 2, 2024. Manufactures included light oils, petrochemical products, and carpets.

Figure 23 shows the composition of Brazilian exports between 1995 and 2021. In 2000, Brazilian exports were reasonably well-diversified, with electronics, transport vehicles, and machinery and instruments accounting for 23.4% of total exports. By 2019, the share of these products had dropped to 11% and by 2020, to 9%. The share of agricultural products rose from 28% to about 30-40% over this period.

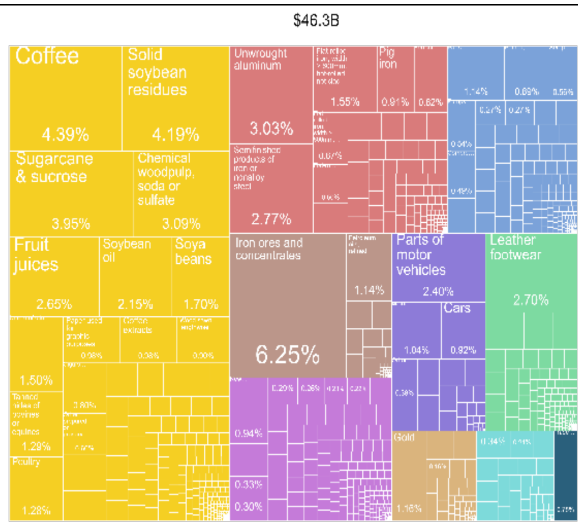
Brazil’s trade openness remains relatively low, reducing competition and hindering technological progress through imports. Tariffs and non-tariff measures protect domestic industries, limiting integration into global value chains (GVCs). Dynamic gains from trade reforms are expected to be substantial.

The closeness of the Brazilian economy is well documented (Canuto *et al*, 2015). World Bank data show Brazil's trade to GDP ratio at 39% in 2022 compared to its peer group of 60%, while pervasive tariffs and non-tariff measures (NTM) heavily protect domestic industries. The percentage of imports subject to at least one NTM is the largest in the world: 89% for technical barriers and 65% for quantity controls. Brazil has the world’s second-highest local-content requirements.

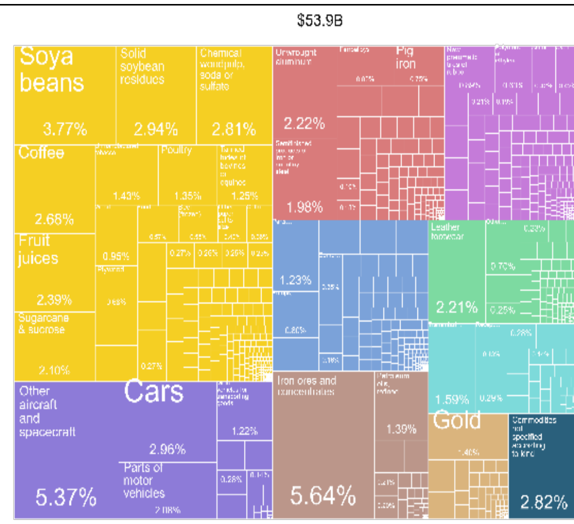
Figure 23.

Composition of Brazil's Merchandise Exports Between 1995 and 2021

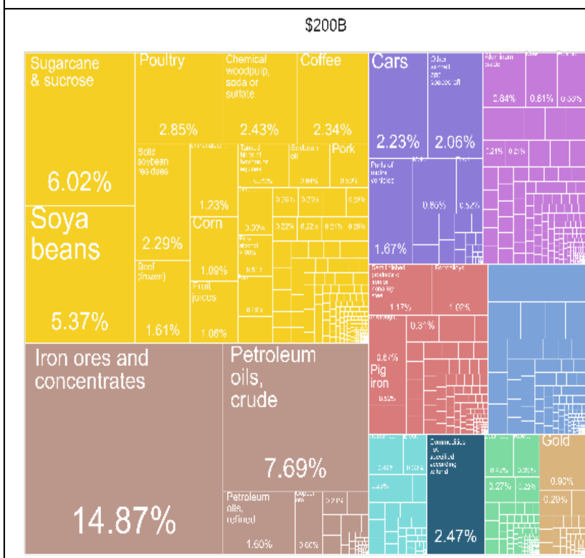
A: In 1995, Brazil exported mostly coffee, solid soybean residues, and sugarcane and agricultural products.



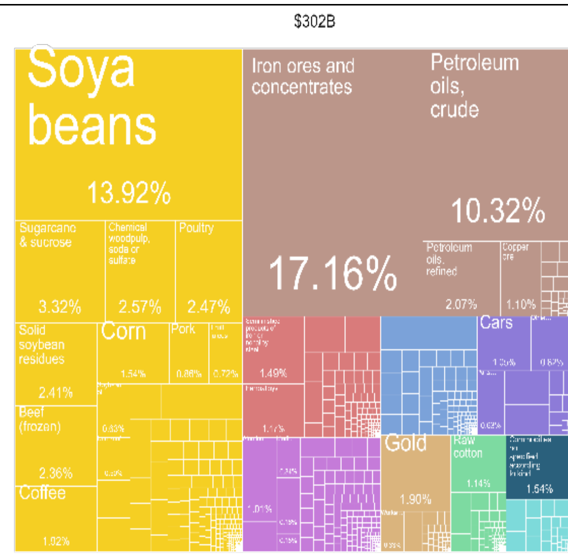
B: In 2000, exports became diversified, with other aircraft (5.4%), cars, parts of motor vehicles, while the largest export mineral export was iron ores (5.6%). Largest agricultural product was soya beans (3.8%).



C: By 2010, iron ores remained the largest export (15%) followed by petroleum (8%), while other aircraft and cars fell to 2% each. The largest agricultural export was sugarcane (6%) followed by soya beans (5.4%).



D: By 2021, Brazil's exports remained dominated by agricultural products, minerals, and garments.



Source: The Growth Lab at Harvard University. The Atlas of Economic Complexity. http://www.atlas.cid.harvard.edu Accessed January 2, 2024.

Brazil's overall integration into GVCs is comparatively low when compared to its peers. Trade facilitation measures, such as border management and clearance processes, remain subpar for a country at Brazil's income level. Modeling work using a Computable General Equilibrium model has shown that coordinated reforms within the Mercosur bloc would result in static GDP gains of approximately 1%. Additionally, a trade agreement between Mercosur and other markets, such as the European Union or Pacific Alliance, could lead to an extra 0.5 percentage points of GDP growth. Dynamic gains not accounted for by the model are likely to be even higher, potentially resulting in an additional annual GDP growth of 2% (Dutz, 2018).

Diversifying into new products is crucial for Brazil's sustainable income growth, as its export growth has been heavily concentrated in low and moderate complexity products, leaving it vulnerable to fluctuations in commodity prices. Notably, the largest contributions to export growth have come from products including ores, slag, ash, and mineral fuels, oils, and waxes. This concentration in raw materials and commodities also means a concentration in export markets. In 2021, one-third of Brazilian exports went to China, with another 11% going to the U.S.

Economic growth is driven by diversification into new products that are incrementally more complex. Brazil has added eight new products since 2006 (Table 5) and these products contributed $3 in income *per capita* in 2021. Brazil has diversified into too few products to contribute to substantial income growth.

Table 5. New Export Products Since 2006 and Income Contributions

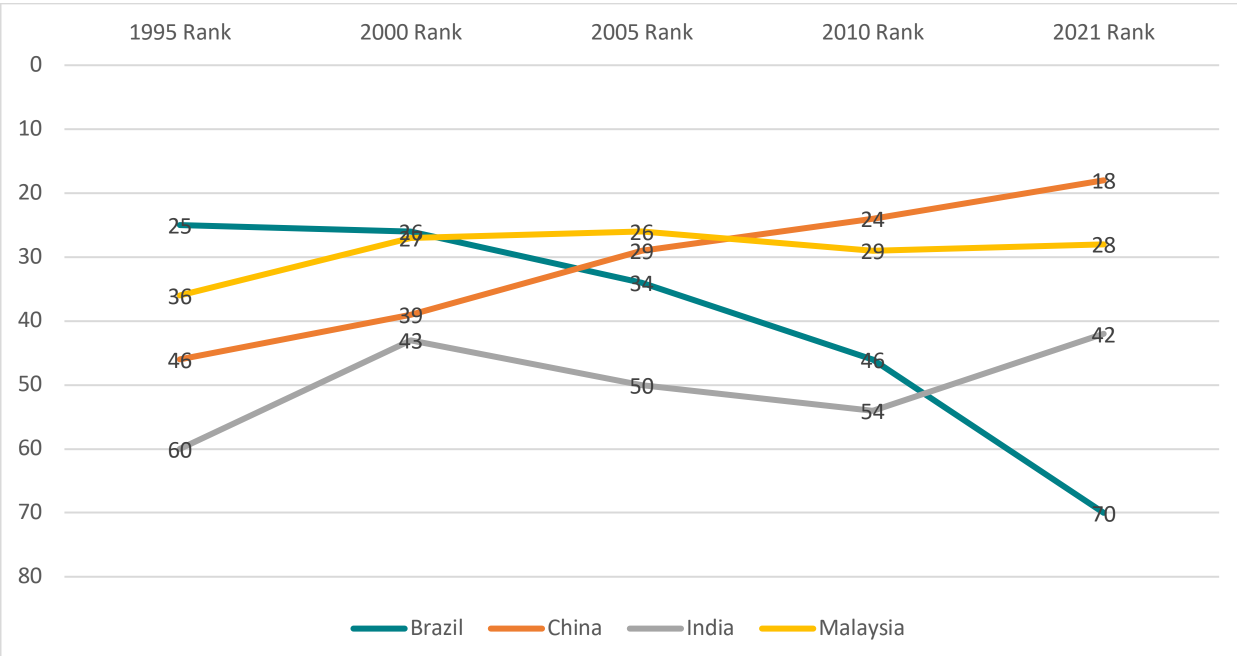
Country	New products	US$ *per capita*	US$ (Total value)
Argentina	10	43	1.95B
Chile	10	25	484M
Brazil	8	3	549M
USA	5	233	77.4B

Source: https://atlas.cid.harvard.edu/countries/32/new-products. Accessed January 2, 2024.

<u>The technological complexity of exports is declining.</u> Brazil has been slow in diversifying into new and potentially high-FDI markets with high growth. More importantly, the technological complexity of its exports has declined compared to two decades ago. Brazil's economy has become less complex, dropping 34 positions in the Economic Complexity Index ranking, because of the lack of export diversification.

Economic development necessitates the accumulation of productive knowledge and its application in increasingly complex industries. The Economic Complexity Index[3] measures a country's knowledge and skills through the products it produces. In 1995, Brazil ranked 25th out of 129 countries in the Complexity Index. However, by 2021, it had fallen to 70th position (Figure 24). In 1995, Brazil's complexity ranking for exports exceeded those of Malaysia, China, and India. However, in the 2010s, the gap in complexity ranking between these countries and Brazil widened significantly, as Malaysia, China, and India diversified away from mostly low-value exports into more complex manufactured goods.

Figure 24. Complexity Ranking for Selected Countries 1995-2021



Source: The Growth Lab at Harvard University. The Atlas of Economic Complexity. http://www.atlas.cid.harvard.edu. Accessed January 2, 2024.

Historical economic data demonstrates that countries moving from upper-middle income status to high income rely on trade to boost domestic competition and absorb technological progress through imports. However, Brazil faces three challenges in this respect. First, its export structure is dominated by commodities and raw materials, leaving it exposed to global commodity price fluctuations. Second, Brazil's exports are heavily concentrated in China and the U.S., making it vulnerable to external shocks from these countries. Third, the

[3] The Growth Lab at Harvard states *"The ECI of a country is calculated based on the diversity of exports a country produces and their ubiquity, or the number of the countries able to produce them (and those countries' complexity). Countries that are able to sustain a diverse range of productive know-how, including sophisticated, unique know-how, are found to be able to produce a wide diversity of goods, including complex products that few other countries can make."* See http://www.atlas.cid.harvard.edu. Accessed January 2, 2024.

complexity of Brazilian exports has declined, with two implications: it hinders the advancement of Brazil's export and production structure to higher value-added sectors, and misses out on the opportunity to upgrade its technological progress in the era of Industry 4.0[4].

7. ANEMIC PRODUCTIVITY GROWTH AND PUBLIC SECTOR BLOAT

We have shown that, over the past three decades, Brazil has failed to significantly boost its productivity growth, missing a crucial opportunity to accelerate its economic development and attain the status of a developed nation. Instead, its recent growth trajectory has relied primarily on the exploitation of natural resources and raw materials, with an emphasis on increased labor and capital inputs, rather than TFP improvements. While there have been extraordinary productivity gains in the agricultural sector (106.5% from 2000 to 2013, according to World Bank (2016), and steadily at 3% per year since then), the overall process of structural transformation has made a minimal contribution. The surplus labor released from the agriculture sector has mostly flowed into the services sector, characterized by relatively low productivity levels. Consequently, the positive impact of structural transformation, when it does occur, has been muted.

However, the missing of opportunities through structural transformation must not divert one's attention away from a more serious source of Brazil's recent dismal performance: the poor performance of within-sector productivity growth. As Canuto and De Negri (2017) pointed out, based on several empirical studies, this factor seems to carry even more weight than between-sector productivity growth.

Table 6 shows the potential gains in aggregate productivity growth that Brazil would have had if it had the same occupational structure as the U.S. and Germany in 2009. These gains are much smaller than those it would have had if, despite keeping its occupational structure, it had the sector-specific productivity levels of those advanced countries. Clearly the within-sector contribution outweighs the between-sector contribution.

Table 6. Brazil's Gains in Aggregate Productivity Growth, 2009

If it had the same occupational structure as	
U.S.	68.3%
Germany	58.2%
If it had the same productivity as	
U.S.	576.9%
Germany	427.9%

Source: Miguez and Moraes (2014).

[4] Such as in the areas of the Internet of Things or Artificial Intelligence.

To give a medical analogy, Brazil has been suffering from both productivity anemia and public-sector bloat (Canuto, 2023). On the one hand, it has not enjoyed the sort of productivity growth expected of economies at this stage of development—the harvesting of easy efficiency gains, ranging from improved business organization to rapid diffusion of imported technology. On the other hand, the appetite for expanding public spending has become increasingly incompatible with limited productivity gains, particularly since the spending has not delivered on the accompanying hopes for socioeconomic mobility.

Anemic Productivity Growth

Since 1990, Brazilian output per employee has increased at a snail's pace of only 0.5% per year (Figure 18). That was to some extent the consequence of relatively low investment in physical capital. But it was mainly due to the dismaying pace of gains in efficiency.

Agribusiness is an exception, as we have mentioned. Productivity in Brazilian agriculture is rising well above the average rate globally. But its proportional impact on GDP is not enough to offset Brazil's dismal performance in manufacturing and services. Which raises an obvious question: why is productivity growth so slow?

One reason is lack of competition. A combination of poor transportation infrastructure that limits geographic markets, differentiated state tax regimes, subsidies to specific firms, and fairly high barriers to import competition, make it more likely that inefficient firms will survive, with a price paid in terms of lower average productivity. Policies to support the private sector need to shift from compensation for high internal costs, to strengthening the adoption and diffusion of technologies.

Then there's the issue of education and the formation of human capital. In Brazil's case, these could benefit from a less-rigid allocation of public resources and the dissemination of successful experiences from states and municipalities, such as those in the northeast state of Ceará, where an alignment between rewards and student performance was established. The population's access to education has improved in the past three decades. But quality has a way to go, as seen in Brazil's scores in the OECD's Programme for International Student Assessment exams, which are far below Europe, North America, and East Asia.

Infrastructure. Brazil's infrastructure stock has been depleting since 1990, when spending first fell below the level needed to maintain it (about 3% of GDP). The causes are as plain as they are painful: budgetary constraints that favor politically earmarked spending over investment, limited government capacity for project planning, and poor practices in procurement and contract and asset management.

While Brazil's GDP doubled in real terms between 1990 and 2016 (and population growth, alas, nearly kept pace), the stock of infrastructure grew by just 27%. Infrastructure investment averaged over 5% of GDP between the 1920s and 1980s, a period in which *per-capita* income grew at an average annual rate of 4%, and urbanization reached 60%. But in the past two decades, the pace of investment has fallen to less than 2.5% of GDP, even below its maintenance level. Although access to electricity and telecommunications has improved since the 1990s, basic sanitation and transportation networks fall short of those of Brazil's peers, even taking into account Brazil's huge land mass and low population density.

The fall in public investment has not been offset sufficiently by private investment in infrastructure, unlike in other countries in the region, notably Chile and Colombia. The need for ongoing fiscal austerity in the future (see below) reinforces the need to develop ways to tap private capital markets for public infrastructure finance. But it's not just a matter of getting the money to accelerate the pace of public investment. Quality matters, too, and mismanagement is a serious barrier to success.

Take, for example, the deficiencies in resource allocation and operation. In transport, the bias toward roads over rail generates massive economic and environmental costs, equivalent to 1.4% of GDP, or 2.2 times current annual investment in the sector. Meanwhile, operating inefficiencies in water supply have been around 0.7% of GDP, or more than three times the current annual investments in sanitation.

But when it comes to improved efficiency in the choice and management of infrastructure projects, the biggest barrier is political. The way in which political coalitions have traditionally been built and campaigns funded in the country's recent past has led to the fragmentation of budget allocations for capital investment, and the frequent selection of poorly designed projects. This problem is hardly unique to Brazil. Japan, for example, is infamous for its bridges to nowhere. But Brazil simply doesn't have the luxury of wasting scarce resources.

Barriers to Business. The World Bank's annual *Doing Business* report compared the costs and delays a typical company faces throughout its lifecycle in each country. In Brazil, recent changes—for example, in the kind of information that is made available to creditors and in the bankruptcy law—improved the country's position in the rankings in the last report in 2020. But nonetheless, Brazil's overall ranking is only 124 out of 190.

Brazil plainly needs further reform if it is to shake off its reputation as having one of Latin America's most frustrating business climates. Tax reform was delayed until 2023 and its implementation will only happen gradually over the next two decades: the previous system's complexity made fulfilling even basic obligations a challenge. In this respect, Brazil ranked a ghastly 184 out of 190 in the last *Doing Business* report. The legislature approved a tax reform plan in July 2023 that will gradually simplify and eliminate redundancy in Brazil's tax structure.

Another impediment to doing business is inefficient capital markets. Much was done to improve prospects in the second half of the 2010s, such as shrinking state intervention in credit allocation, and reducing the participation of large public banks in activities better left to the private sector. But there is still room to reduce costs and risks in financial operations between private agents.

Congressional approval of a ‘positive credit registry’, like a consumer credit-rating system, will have a positive effect on risk assessment and bank spreads. A bankruptcy bill [5] has been approved, which if implemented successfully, will complement the truncated reform that was approved in the first half of the past decade.

But more is needed. Widening the space for greater competition in credit options for consumers, including via fintech, would also help democratize access to finance. Facilitating such access on a sustainable basis would improve the business environment, and also strengthen the foundations for economic growth.

One other factor deserves a mention here: public corruption. Corruption can raise the cost of business in everything from obtaining zoning exceptions to protection against street crime. Even where it isn’t explicit, uncertainty about the honesty and the efficiency of courts in enforcing contracts, or administrators in assessing tax liability, effectively raises the cost of doing business. According to Transparency International’s Corruption Perception Index, Brazil’s score has fallen sharply in the last decade.

Trade Protection. Brazil has a long tradition of protecting domestic industry from foreign competition with the goal of industrialization—not to mention protection for powerful domestic interest groups. The economy is commercially closed. Consider, for example, tariffs on imports. Weighted by import shares, the average was 8.3% in 2015, the highest among comparable emerging and advanced economies. Arguably more important, tariff protection in Brazil is accompanied by non-tariff barriers and local content rules, which also eclipse the efforts of peer countries to inhibit foreign competition.

Brazil manufactures an array of goods that one would never expect from an economy at this stage of development. Before assuming that this is inherently benign—or a shortcut to industrial advancement—note that by not making efficient use of externally sourced parts, equipment, and technologies, Brazil is a step behind in terms of productivity.

This is not to minimize the dislocation that would be associated with opening. Some producers would simply not be able to compete. Moreover, the gains linked to productivity would not be evenly distributed across regions and income strata, making it imperative to adopt complementary policies to facilitate labor mobility, retraining, and the generation of new jobs. None of this would be easy or politically straightforward. But business as usual is a recipe for stagnation.

The Potential from Open Trade. The causes of Brazil’s lack of competition and poor productivity performance go far beyond trade protectionism. Inadequate investment in infrastructure (as noted above), a difficult business environment, distortions in long-term financing, and inefficient use of public funds in education are high on the list. Brazil does respond to corporate demands to lower their costs, but mostly in ways that are immensely

[5] https://chambers.com/articles/changes-to-brazil-s-corporate-insolvency-law

inefficient and don't touch the root problems. By one estimate, the fiscal cost of policies designed to offset government-induced impediments to efficiency run to nearly 5% of GDP.

In addition to the agenda of overcoming those domestic barriers to greater competition and increased productivity, much could be done in trade policy, even in a global scenario in which unilateral gestures toward opening are unlikely to be reciprocated:

- The tariff structure could be simplified by reducing the number of tariff levels and by easing restrictions on imports of intermediate goods and capital goods, such as industrial machinery.
- An important non-tariff barrier, local content requirements for finished goods, should be revisited.
- The tax burden on exports could be mitigated.
- Restrictions on imports of financial and professional services that serve as key inputs to production and export could be loosened.

It should be noted that, while Brazil is part of the Mercosur free-trade bloc that includes Argentina, Uruguay, and Paraguay, there is nothing in that arrangement that precludes additional initiatives within the group to reduce non-tariff barriers and, more generally, to reduce barriers relative to third countries.

The payoff could be very large. Simulations by Dutz (2018) suggest that with a combination of a better alignment of non-tariff barriers within Mercosur, and a 50% drop in tariffs with countries outside the regional bloc, real income would rise enough to bring almost 6 million Brazilians above the poverty line of $5.50 per day. Again, though, it is important to remember that the total gains would not be evenly distributed across regions and income strata, making it imperative to adopt policies to offset the dislocation.

Public-Sector Bloat

Notwithstanding lagging productivity and GDP growth, government spending in Brazil rose by 68% in real terms between 2006 and 2017. Yet as a proportion of GDP, public investment declined to less than 0.7% of GDP. A set of World Bank policy notes (World Bank 2018) lays out three reform paths Brazil could take to return to a trajectory of shared prosperity. Not surprisingly, in addition to market-oriented proposals to improve productivity performance, the notes focused on better public-sector governance and offered an unsparing assessment of priorities in public spending.

With growth lagging badly in recent years, Brazil responded by allowing spending to far outpace tax collection. Public debt rose from 54% to 74% of GDP between 2012 and 2017, and peaked at 87% in 2020. The extraordinary fiscal-support measures during the COVID-19 pandemic were made possible by suspending expenditure-ceiling restrictions embedded in the Constitution in 2017.

The expenditure ceiling has been replaced by a New Fiscal Framework, since President Lula's return to office in January 2023. The framework establishes tax revenue-dependent annual increases in public spending. But it is not expected to return the government to a fiscal trajectory that stabilizes the debt-to-GDP ratio. So public spending is likely to rise disproportionately, making it even more important to submit public expenditures to a full review.

The World Bank report (2018) highlighted opportunities for cuts to expenditures on social security, the public-sector payroll, and business subsidies, which would minimize the impact on the poor and offer some room for increased spending for high-priority projects. In 2019, Congress approved a pension reform preventing outlays from carving out an ever-greater portion of public spending, but the need to review other public expenditures remains.

Another path outlined by the World Bank was a broad rethinking of the role of the state. The mismatch between the limited growth potential that results from productivity anemia, and the relentless pressure for public spending, reflects a desire on the part of political leaders for the state to be all things to all people. The problem is aggravated by the government's inefficiency in the provision of many services. Among the sources of inefficiency: fragmentation of service delivery, poor planning, monitoring and evaluation of projects, and human-resource management without positive performance incentives.

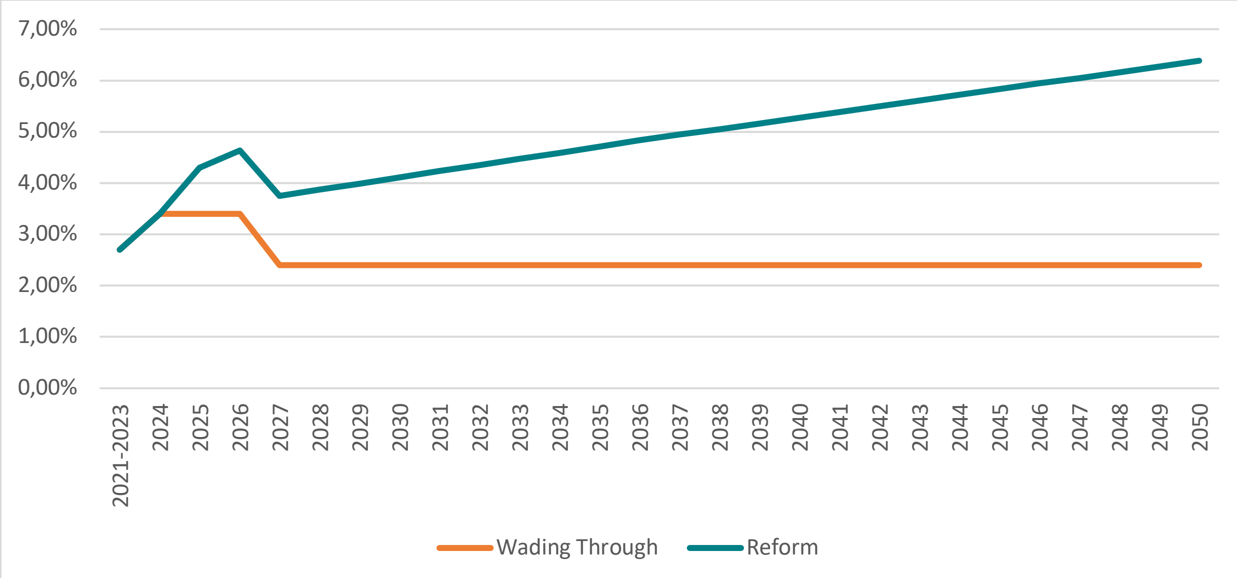
This is the case for health, education, public safety, infrastructure, transportation, logistics, and water resources management. In all of them, greater consistency between planning and execution, an emphasis on evaluation, and better coordination between public and private sectors would yield more bang for the real. The application of gradual but steady treatment, while protecting the poor and the young, is the best cure for the public-sector bloat that has afflicted the Brazilian economy.

As well as helping to maintain a credible fiscal path that contains the ballooning debt, structural reforms aimed at boosting private investments could also make a big difference. The need for a multi-year horizon of infrastructure investment decisions makes the participation of the private sector vital for generating rational policy.

A Closing Window of Opportunity

Brazil stands at a critical juncture where the window of opportunity is rapidly closing because of demographic shifts. The demographic dividend that once favored the country will soon turn against it, presenting Brazil with a crucial choice. Continuing with past policies, as depicted in Figure 25, is likely to result in stagnant *per-capita* income by 2050. Achieving even this path would require a substantial amount of luck, given the increasingly competitive global environment driven by technological advancements in developed nations, and the rapid convergence of emerging economies with their developed counterparts.

Figure 25. Wading Through Versus Reform Scenarios 2024-2050



Source: Author's calculations based on parameters from Table 7.

Figure 25 provides projections of Brazil's GDP up to 2050 under two scenarios: a 'wading-through' scenario in which past policies persist, leading to *per-capita* income stagnation, and a 'reform' scenario in which policies are oriented towards stimulating domestic production, promoting exports, and opening up the economy to absorb greater technological progress, thereby driving increased productivity growth. Parameters underlying each scenario are detailed in Table 7, alongside actual values from the last three decades as given by the Conference Board Total Economy Database™.

Table 7. Average Annual Parameters Underlying Figure 25

		Labor	Labor Quality	Non-IT Capital	IT Capital	TFP Growth	GDP Growth
Actual	2000-2007	1.1%	0.9%	1.3%	0.5%	-0.2%	3.6%
Actual	2011-2019	0.2%	0.9%	1.0%	0.3%	-1.7%	0.7%
Actual	2021-2023	3.5%	0.2%	0.8%	0.5%	-2.3%	2.7%
Wading Through	2024-2050	1.1%	0.9%	1.0%	0.5%	-1.0%	2.5%
Reform	2024-2050	1.1%	1.0%	1.0%	1.1%	0.8%	5.0%

Source: Historical values calculated from The Conference Board Total Economy Database™ (April 2023) and projections based on assumptions.

The key distinctions between the 'wading-through' and 'reform' scenarios lie in three columns of Table 7, encompassing labor quality (including education quality and vocational training), IT capital, and TFP growth. Specific policies to achieve these modest goals are discussed in section 9. Brazil has a limited timeframe in which to address these issues before demographic forces start exerting their influence.

Demographic window of opportunity. Brazil's demographic challenges include a declining fertility rate and an aging population, resulting in a shrinking workforce, increased pressure on social security systems, and slower economic growth. Like China, Brazil is set to age before reaching high-income status. However, *per-capita* income in Brazil lags behind that of China, and its policies for addressing demographic issues have been less extensive.

Brazil's total fertility rate has declined significantly in recent decades, dropping from 6.1 children per woman in 1960 to 1.6 in 2021, with expectations of remaining at this level. This fertility rate falls below the replacement rate of 2.0 children per woman, which would optimize the working-age population’s share of the total population (Lee and Mason, 2014). Additionally, Brazil grapples with an aging population, as the proportion of people over 65 has expanded rapidly. From 2.6% in 1960, this share surged to 10% in 2022 and is projected to reach 23% by 2050 and 32% by 2100, according to UN projections (2020).

Brazil's population structure is further shaped by significant trends, including an extended life expectancy of around 73 years in 2021, up from 53 years in 1960. This increased life expectancy implies a longer retirement period and a larger dependent elderly population. The old-age dependency ratio (the number of individuals aged 65 or over per 100 working-age individuals aged 20-64) is expected to rise from 14.9 in 2019 to 39.5 in 2050, straining pension and social-security systems.

Furthermore, Brazil must contend with regional disparities in demographics, with certain regions experiencing lower birth rates and aging populations, while others have higher birth rates. These disparities pose challenges for resource allocation and economic development policies. The significant trend of increasing urbanization in Brazil presents challenges in terms of infrastructure, housing, and essential services, especially in low-income areas. Disparities in birth rates, access to healthcare, and educational opportunities persist among different socioeconomic groups, exacerbating social and economic inequalities.

8. BRAZIL EXPERIENCE IN THE CONTEXT OF RESOURCE-BASED GROWTH MODELS

Traditional economic theory calls for economic development strategy based on factor endowments, initial conditions, and growth potential. This perspective suggests that each country should embrace full liberalization of its factor and product markets, allowing market forces to dictate production and export decisions. For countries such as Brazil, endowed with abundant natural resources and labor, this implies a focus on the development of these resources, despite challenges related to global price volatility and governance risks that may become a ‘curse’ for natural-resource rich countries.

There is nothing wrong with a resource-based development strategy. Many large developed economies today, including the United States, Australia, and Canada, have relied on such a strategy to reach their current positions. The distinction today between these economies and resource-based EMDEs lies in a number of critical areas, including the domestic development of technology and knowledge, the quality and maturity of institutions dealing with natural resources, and public-sector efficiency.

As pointed out by Wright (1990), while it is true that countries such as the United States developed alongside natural resources, they relied on the domestic development of technology and knowledge to exploit these resources. This technology and knowledge led to the emergence of ancillary industries, including the technology associated with mining and processing iron ore leading to steel development. The U.S. experience suggests that economic growth can be complemented by technical progress in exploration, extraction, and substitution, as well as the privatization of reserves. This is different from the current situation in developing countries, which are now importing technology and human resources for the entire sector. Many resource-rich economies may have performed poorly, not because they relied too much on resources, but because they failed to develop their mineral potential through appropriate policies. Investment in minerals-related knowledge seems to be a legitimate component of a forward-looking development program. Unfortunately, this opportunity is not widely available to developing countries today.

Barbier (2005) highlighted the prerequisites for a successful resource-based strategy. These prerequisites include reinvesting resource rents into more productive and dynamic sectors closely linked to resource exploitation to facilitate knowledge spillovers. Additionally, political, legal, and governmental institutions must discourage rent-seeking behavior, corruption, and ambiguities in property rights, while simultaneously promoting opportunities and the livelihoods of rural communities. Meeting these criteria is a formidable challenge, which explains why most countries, including those praised by Barbier—such as Malaysia and Thailand—have not successfully escaped the middle-income trap.

It should be noted that countries including the Netherlands, Norway, and the United Kingdom, effectively absorbed the negative effects of natural resources because they were already developed before discovering oil. They could marshal their entire economies, including well-established institutions, to make full use of the resources. A few countries that managed to escape the Dutch Disease, including Botswana, Chile, and Indonesia, all possessed open regimes and highly efficient public administrations, and had active public-sector involvement.

Economic development is an ongoing process of achieving sustained increases in *per-capita* income. This process requires the continuous introduction of new and improved technologies into current industries, and the transformation of labor- and resource-intensive industries into more capital-intensive ones (Dinh and Lin, 2013). This technological change is typically represented by TFP growth in a neoclassical production function, and serves as the foundation of sustained economic growth because both labor and capital will sooner or later run into diminishing returns. The average TFP growth for Brazil over the 1990-2023 period was negative (-0.9%), whereas that of EMDEs stood at 0.2%. For comparison, studies on TFP growth for the United States from 1899 to 1941 showed a value of 1.3% (Bakker *et al*, 2019), a decline from the long-accepted 1.7% estimated by Kendrick (1961). Notably, the services sector accounted for 34% of TFP growth, a percentage only marginally less than manufacturing (Bakker *et al*, 2019, p. 19).

The resource-based growth model has been the focus of a significant amount of economic research aimed at clarifying the natural-resource effects on economic growth and the mechanisms by which these effects are transmitted to the economy (Dinh, 2017; 2016). While the effects of natural resources on an economy were long recognized by John Stuart Mills in his Principles of Political Economy (1848) where he addressed the adverse effects of natural resources on labor supply and institutional quality (cited by Boianovsky 2013), and by Furtado (1957), Seers (1964), it was not until the 1980s that these effects were fully discussed in the literature (Corden and Neary, 1982; Gelb, 1988; van Wijnbergen, 1984). Auty (1994) described the resource curse in detail, and shortly after, Sachs and Warner (1995) presented their breakthrough econometric analysis of the negative relationship between resource dependence and economic growth, controlling for various factors.

Corden (1984) analyzed in detail the various effects of resources on the tradable and non-tradable sectors. Natural-resource wealth makes countries susceptible to the Dutch Disease, which, in its broadest sense, refers to an appreciation of the real exchange rate that arises from a natural resource boom, leading to a contraction in the tradable sector, usually manufacturing. During a resource boom, revenues from mineral exports rise, and consequently, the demand for domestically produced non-traded goods and services expands. This is known as the spending effect (Corden 1984). Because the government is likely to take a large share of the mineral revenues, public spending often rises substantially. The increased demand for non-tradable goods and services pushes up prices, resulting in higher input costs in the rest of the economy, particularly in exporting sectors.

Moreover, because technological progress is slower in the non-tradable sectors than in the tradable sectors, poor economic performance logically follows. As the mineral sector requires fewer input goods and domestically produced goods, the profits and competitiveness of other sectors, such as manufacturing, suffer in the face of increased imports. This weakens the competitiveness of the non-mineral sectors, leading to declining economic diversity. Additionally, there is an influx of skilled labor to the mineral sector from sectors exposed to international competition, which cannot afford to pay higher wages. Ultimately, the non-mineral export sector contracts, the public sector expands excessively, and inflation rises.

The shift away from manufacturing was detrimental to growth in many countries. If natural resources become exhausted or commodity prices fall, competitive manufacturing industries may not be able to return to previous levels of productivity quickly enough. This is because technology grows at a much slower pace in the mineral sector and the non-tradable sector, than in the non-mineral tradable sector. Also, the country's comparative advantage in non-mineral tradable goods will decline, preventing firms from investing in the tradable sector.

Over the past decade, dozens of studies have reiterated and expanded upon the economic features of abundant natural resources and slow economic growth. Authors have sought not only to econometrically verify the trend but also to explain its cause. Theories have been developed over decades, including the rate of resource extraction given by Hotelling's rule (1931), resources management to keep welfare constant by Hartwick's rule (1977), and the various effects of natural resources on national economies (Barbier 2007; Corden 1984; Matsuyama 1992; van Wijnbergen 1984).

Most studies in the late 1990s and the early 2000s confirmed the pioneering work done by Sachs and Warner (1995, 1997, 2001), which showed a negative relationship between resource dependence and growth. Auty (2001) explained this oddity in terms of the political capture of rents, while Gylfason (2001) pointed to low investment in human resources, among other factors. Some studies since the mid-2000s seem to have countered previous beliefs on the resource curse, isolating certain conditions and providing evidence that natural resources have a non-negative effect on growth (Alexeev and Conrad, 2009; Boschini *et al*, 2013; Ebeke and Ngouana, 2015; James, 2015; Lederman and Maloney, 2007, Mehlum *et al*, 2006; Stijns, 2005, 2006; Torvik, 2009; Williams, 2011).

In all, the literature analyzes in depth the presence and ubiquity of the resource curse but falls short when discussing pragmatic policy options. Most studies offer partial solutions, focusing narrowly on fiscal measures, such as prudent fiscal management, countercyclical fiscal policies, or a rule-based strategy to prevent real appreciation or to avoid the Dutch Disease. Others recommend standalone policies, such as the accumulation of international reserves to avoid nominal appreciation of the local currency, or sterilization of balance-of-payments surpluses to mitigate upward pressures on the real exchange rate.

Because the lifetime of natural resources is finite, it is imperative that the proceeds from these resources are used in the most productive way to replace them when they run out. In many ways, a nation with natural resources is similar to a lucky person who has won a lottery that pays a large sum of money for a few years. The real issue is how she manages her finances during these years so that she remains well off when she stops receiving the winning proceeds. A nation must plan even further ahead, so the importance of this question is paramount.

Hartwick (1977) showed that if these proceeds are invested in reproducible capital, *per-capita* consumption will remain constant across generations, achieving intergenerational equity as defined by Solow (1974). On the same lines, van der Ploeg and Venables (2011) argued that the permanent-income hypothesis is not applicable to poor developing countries where capital is scarce. Instead, they advocate for investment in domestic capital, except when absorption capacity is an issue, in which case money from natural resources can be parked in foreign funds while waiting for the absorptive constraint to be relaxed. They also argued that the effects of Dutch Disease can be reduced if there is unemployment in the economy, so that the greater spending associated with Dutch Disease actually draws unemployed resources into the traded sectors.

In a comprehensive review of management of natural resources in developing countries, Collier *et al* (2010) called for a modification of the permanent-income hypothesis, which, for them, was not only unduly restrictive but also wrong on theoretical grounds. While they recognized that consumption in natural resource-abundant countries should be smoothed out, the key issue is how to use resource revenue for faster growth. This, they stressed, can be done by raising the marginal product of capital, both private and public. Public capital efficiency can be enhanced through improved procedures, while private capital can be improved with the provision of public investment.

Hamilton and Ley (2013) recommended the strengthening of the public-investment management system along the lines suggested by Rajaram *et al* (2010), establishing the must-have features of a well-functioning public-investment management system, such as investment guidance and preliminary screening, formal project appraisal, independent reviews of appraisals, project selection and budgeting, project changes, service delivery, and *ex-post* project evaluation. Sachs (2007) also suggested that the effects of Dutch Disease can be reduced if the resource boom is used to finance investment, allowing public infrastructure development to offset the adverse effects of exchange-rate appreciation.

While the Collier *et al* (2010) study represented a breakthrough in terms of policy prescriptions for resource-rich, low-income countries, it stopped short of giving them more concrete advice on what to do, other than calling for linking natural resource revenues to a clear vision of long-term development. In practice, to be useful as a guide for developing countries, the modified permanent-income approach as presented by Collier *et al* (2010) needs to be accompanied by a development strategy, rather than a vague reference to investment in productive sectors.

Seers (1964) was one of the first economists who understood the connection between natural resources and job creation. He noted the peculiar characteristic of a petroleum exporting economy: high unemployment coexists with high wages. In such an economy, petroleum usually dominates both exports and government revenues. Moreover, petroleum companies are foreign-owned, as technology is beyond the reach of local industries, while in the private sector, wages are the determining factor price. In such economies, Seers contended, factors that will influence employment are taxes on exports and the public-sector surplus, enterprise profitability, and the propensity to import. Seers recommended using this surplus to create import-substitution industries right from the beginning, and not immediately opening up to imports.

In Seers's model, foreign-owned enterprises operating in natural resources can afford to pay high wages, in part because wages represent a small share of their total costs and in part because wages are a tax-deductible expense. The perpetual impact arises from the fact that the increase in wages in the petroleum (or other natural-resource) sector spreads to other sectors and applies to existing workers rather than new workers. Hence, a petroleum economy has minimum effects on new employment. Imports become cheap, sustaining the propensity to import. Urban migration means disguised unemployment becomes open, further increasing the propensity to import. Income inequality becomes worse, shifting the pattern of consumption in favor of the upper-income classes, intensifying food imports. In other countries, this would prompt policymakers to undertake drastic balance-of-payments measures, such as import controls and tariffs. However, because of the comfortable balance-of-payments position, these petroleum economies do not impose these measures.

Addressing the unemployment and underemployment aspects of resource-rich developing countries is essential. First, from a political-economy perspective, policymakers can create a self-interest group with which they can forge an alliance. Second, tax revenue, rather than natural resource revenues, can be a source of stable, less risky income. Third, this approach involves raising consumption among the current generation through work rather than through direct government transfers. Job creation fosters the learning-by-doing aspect of human capital development, once natural resources become exhausted (Lucas, 1988).

In conclusion, traditional policy approaches to resource-based growth often focus on adjusting fiscal and monetary policies to manage commodity volatility. However, these measures address the symptoms of natural-resource dependency rather than the root cause, which is how to replace these resources when they are depleted. Additionally, these policies tend to overlook the importance of job creation in resource-rich developing countries. To address these issues, a focus is necessary on structural and microeconomic policies aimed at enhancing the competitiveness of tradable sectors, including manufacturing and services. These policies should complement the development of human resources over time and have a lasting impact on economic development.

Specifically, this approach calls for a diversification strategy that prioritizes job creation and fosters industries and services capable of replacing natural resources when they are exhausted. It's essential to recognize that this approach should not be a one-size-fits-all solution; it must be tailored to the specific circumstances of each country. For Brazil, some crucial elements of this approach are outlined below.

9. POLICY REFORMS TO BOOST TFP GROWTH IN BRAZIL

The proposed policy reforms in this section aim to stimulate policy discussions that can unlock Brazil's potential to escape the middle-income trap by increasing TFP growth. These reforms can be categorized into three groups: policies aimed at enhancing competition through domestic and trade reforms, sectoral and enterprise-level policies to facilitate the integration of small and medium-sized enterprises into the economy, and policies to promote technology adoption, adaptation, and diffusion. The success of these policies to bring about sustained economic growth is also contingent on the existence of a stable and conducive macroeconomic policy framework that removes any distortionary effects on the real exchange rate. This paper focuses only on structural and microeconomic reforms.

A. Policies to Boost Competition at the National Level.

These policies address both the domestic economy and international trade.

a. In the domestic economy, the following policies could be considered:

- Expand access to quality education at all levels, with a focus on STEM fields (science, technology, engineering, and mathematics), technical skills, and lifelong-learning programs in human capital.
- Improve healthcare infrastructure and access to preventative care to enhance workforce health and productivity in healthcare.
- Invest in early childhood education and childcare programs to establish a strong foundation for future learning and development in early childhood development.
- Increase public and private R&D spending, direct resources toward research and development in key sectors with high growth potential, and encourage collaboration between universities, research institutions, and private companies to foster innovation and technology transfer.
- Enhance infrastructure and the business environment by investing in transportation, energy, and communication infrastructure to reduce logistical costs and improve efficiency. Ensure a stable and predictable legal environment to attract investment and promote growth.
- Promote competition by breaking up monopolies and reducing barriers to entry.
- Strengthen the rule of law and intellectual property rights.

Implementing these policies requires strong political will and commitment from the government to overcome vested interests and bureaucratic inertia. It's crucial to design and implement social safety nets to mitigate negative impacts on workers and communities, as some policies, such as trade liberalization, may lead to job displacement in certain sectors. International cooperation, particularly with other emerging countries, is essential for sharing best practices and accelerating progress in improving TFP.

Consideration of the above policies will necessitate a review of the existing extensive but poorly-targeted business-support framework in Brazil, to level the playing field and encourage new entrants. This review also provides an opportunity to create new market-compatible support mechanisms to promote competition. The current system is not only ineffective but also costly, with earmarked credit accounting for more than half of the total credit to the economy (Dutz, 2018). This cost is borne by both the fiscal system and depositors. Evidence suggests that BNDES (the Brazilian Development Bank) has contributed to poor aggregate productivity growth. Furthermore, a thorough review of existing labor market policies is needed to redirect budget support towards active policies, such as labor-market intermediation and job-search support, rather than passive labor-market policies.

B. Trade reforms. Brazil would benefit significantly from trade reforms, which can enhance domestic competition and stimulate economic efficiency. To achieve this, Brazil should consider a series of measures, including reducing non-tariff barriers within Mercosur and lowering tariff barriers with third-party countries. Engaging in new trade agreements, particularly Deep Preferential Trade Agreements (Deep PTAs), can generate substantial welfare gains and drive efficiency improvements among domestic producers.

Deep Preferential Trade Agreements (Deep PTAs): Deep PTAs, in contrast to traditional PTAs, require more extensive commitments in areas covered by the World Trade Organization's rulebook, and extend their scope to encompass topics beyond the WTO's current mandate. These topics include intellectual property rights (IPRs), technical barriers to trade, competition policy, and environmental protection. Deep PTAs prioritize regulatory measures over tariff measures. Recent empirical analyses confirm the increasing prevalence of deep PTAs, particularly between developed and developing countries. Developing nations view deep PTAs as a means to address local institutional shortcomings and overcome domestic resistance to reforms, as provisions in areas including investment and IPR protection can serve as commitments.

Opportunities and Challenges for Brazilian Companies: Deep PTAs offer new opportunities for Brazilian companies to upgrade within global value chains (GVCs). This can occur directly through concrete incentives for upgrading, or indirectly by addressing relevant barriers to upgrading. Key provisions in Deep PTAs, such as rules on investment, state-owned enterprises, and customs procedures, can enhance the business environment, attract FDI, and provide equal opportunities for all types of companies, paving the way for Brazilian firms to upgrade. However, challenges exist, including slow tariff elimination for certain products, a shortage of skilled labor and capital, and increased competition from new entrants into economic integration processes.

FDI Linkages and Policy Considerations: Establishing beneficial linkages between FDI and domestic firms remains a challenge in Brazil. Entering into new PTAs may require Brazil to forgo certain policy instruments, such as imposing performance requirements on foreign investors. Numerous studies have established connections between Deep PTAs and upgrading potential, as these agreements impact upgrading processes indirectly by enhancing the overall business environment. It's important to note that while PTAs are a critical factor, other elements, such as the domestic business environment, promotion of FDI linkages, and the absorptive capacity of domestic firms, also play crucial roles in driving upgrades in GVCs. Realizing the benefits of economic integration necessitates enabling policies and active government involvement, including infrastructure improvement, human capital development, vocational training, and the rule of law.

Benefits of a Deep PTA with the EU: A deep PTA between the EU and Brazil can offer several advantages. First, it can expedite domestic opening-up reforms through external pressures. Second, it would enable Brazil to shift from exporting low-tech manufacturing products and primary goods to more complex high-tech goods such as electronics, machinery, vehicles, and medical devices. This diversification can be achieved through larger trade networks and more affordable imports of intermediate goods from partner countries, enhancing Brazil's export competitiveness. Third, a free trade agreement can facilitate knowledge and technology transfer from foreign firms, supporting Brazil's transition to higher value-added production. This strategic approach aligns with Brazil's national priorities within the regional and international trade system, while also ensuring compliance with international standards, such as those of the International Labor Organization.

It is crucial to acknowledge the potential downsides to such agreements, including aggressive competition from foreign rivals in local businesses, particularly in the agriculture sector. For instance, competition may arise from meat and dairy product imports from the EU. Nevertheless, with careful negotiations and a well-structured timetable, Brazil can navigate these challenges effectively.

Summary: The qualities sought by firms and intermediate producers in GVCs to access input and final products include predictability, reliability, and responsiveness to meet demand promptly. Factors to assess in this context include traditional trade barriers, customs efficiency and procedures (including rules of origin), logistics, transportation, and telecommunications. By embracing trade reforms and pursuing Deep PTAs strategically, Brazil can position itself for economic growth and competitiveness in the global marketplace.

C. Policies to Boost Competition at Sectoral and Enterprise Levels. Brazil's business landscape faces a significant gap within its corporate spectrum, which, if filled by midsize companies, has the potential to significantly boost the country's competitiveness and innovation (McKinsey Global Institute, 2019). To enhance Brazil's overall competitiveness, policies must address challenges present in both the realm of numerous small, often informal firms catering to the domestic market, and the issues faced by a relatively smaller number of large, foreign-invested enterprises focused on export-oriented production.

Supporting Small Firms' Growth: In the case of small firms, the primary concern is fostering their growth into larger entities capable of achieving higher levels of productivity. This requires improvements in labor skills, technological capabilities, and the overall quality and diversity of products that can compete effectively with imports. To achieve this, Brazil should consider implementing policies that:

- Reduce the influence of state-owned enterprises.
- Ensure equal treatment for both direct and indirect exporters.
- Promote trading companies.
- Encourage the formation of industrial clusters and subcontracting arrangements.
- Attract FDI into upstream activities.
- Leverage industrial zones for supply chain integration.
- Amplify the spillover effects within GVCs.

Empowering Larger Enterprises: For larger, formal enterprises, the central challenge revolves around elevating the value addition of their goods by enhancing production quality and diversifying the product range. Key enablers for these enterprises include trade facilitation and efficient logistics. The strategies and methodologies that are effective in foreign-invested enterprises in terms of skills development, technology transfer, and managerial capacity building, should also be applied to domestic companies. It rests with Brazilian policymakers and the private sector to drive forward and facilitate this transformation.

Augmenting GVC Spillover Effects: Policies aimed at augmenting GVC spillover effects aim to encourage significant knowledge and capability transfers from lead firms to their suppliers along the value chain. These transfers and spillover effects contribute to alleviating the costs associated with capacity building and development. Drawing from the World Bank's framework, four distinct types of transfers and spillover effects can be identified:

- Building Human Capacity—Training and Skills Development: Governments can collaborate with lead companies to establish training programs, enabling international firms to recruit local labor and fostering long-term benefits. Such training has the potential to turn former employees of state-owned enterprises or multinational firms into successful local entrepreneurs and exporters.
- Bolstering Productive Capacity in Technology, Know-how, and Finance: Capacity-building initiatives focused on infrastructure enhancement and improving the business environment benefit not only the source company but also lead to positive spillover effects, including benefits for local SMEs.
- Enhancing Value Chain Functioning, Including Standards: Assisting local producers in meeting quality and safety standards is essential for integrating them into GVCs. Facilitating certification for value-added goods, such as organic production, can empower small-scale producers to leverage market access opportunities.
- Facilitating Trade: Lead firms and intermediate producers in GVCs prioritize predictability, reliability, and responsiveness in their access to input and final products. Key aspects to consider include reducing trade barriers, improving customs efficiency and procedures, optimizing logistics, and enhancing transportation and telecommunications infrastructure.

Promoting Equal Treatment for Exporters: To connect small enterprises, which often have low productivity but create jobs, with larger FDI or GVC-related enterprises, Brazil should offer equal treatment to both direct and indirect exporters. East Asian economies such as Japan and Korea, have successfully integrated local producers with exporters by equally incentivizing both groups. Policies that equalize incentives may include realistic exchange rates, free trade, competitive markets, and non-discriminatory domestic taxes. Additionally, providing financial tools such as pre-shipment working capital loans and post-shipment finance can support indirect exporters (Dinh, 2013a).

D. Policies to promote technology adoption, adaptation, and diffusion. Brazil is a country with immense potential. But it faces significant challenges in effectively adopting, adapting, and diffusing technology across its economy and society. These challenges prevent it from fully harnessing the benefits of technological advancement.

The government plays a crucial role in promoting innovation and technological development. It should commit to sustained economic growth through industrial technology development, craft a well-thought-out strategy, and actively guide its implementation. Open foreign investment regulations are essential to attract external expertise and resources.

Brazil can learn valuable lessons from Asian countries that have successfully promoted technological advancement. These include aligning institutional frameworks for adapting technology with industrial needs, identifying and nurturing key sectors while addressing their technological needs, understanding that technological progress takes time, and fostering collaboration between R&D institutes, universities, and industries.

- **Skills Gap and Workforce Inadequacies**: Brazil's educational system often falls short in providing the necessary skills for a technology-driven economy. There is a shortage of qualified professionals in STEM fields, and the workforce lacks training in critical areas, such as data analysis and automation. To bridge this skills gap, Brazil should revamp its education system, focus on STEM education, and collaborate with industries to provide relevant training programs.
- **Brain Drain**: The migration of talented individuals to countries with better opportunities exacerbates Brazil's skills gap. To address this issue, the government should implement policies to retain talent, create attractive opportunities for skilled professionals, and promote a culture of innovation and entrepreneurship.
- **Infrastructural Deficiencies**: Inadequate digital and physical infrastructure poses significant barriers to technology adoption in Brazil. Limited internet access and low broadband penetration in rural areas, as well as unreliable electricity grids and poor transportation networks, hinder the application of technology in various sectors. Brazil must prioritize infrastructure development, particularly in rural areas, to ensure equitable access to technology.

- **Institutional Support for R&D**: Brazil needs to establish institutions to support R&D. This is essential for strengthening the connection between enterprises, R&D institutes, and industries. These institutions can provide financial support, technical consulting services, and facilitate collaboration, as seen in the case of the Korea Technological Development Corporation.
- **Industry-Specific Policies**: Government policies should be tailored to specific industries and integrated into consistent institutions. The success of technological learning depends on government capabilities and flexibility in implementing strategies.
- **Access to Foreign Technologies**: Openness to FDI and trade in inputs is critical for accessing the best technologies. Public investment in tertiary technical and scientific education and research can also promote technological deepening.
- **Inclusivity and Women in Technology**: Efforts should be made to ensure that digitalization and technological progress benefit all segments of society. This includes boosting digital skills among women working in informal and artisanal enterprises.

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