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Article

Growth and stagnation in a dual economy: The case of Brazil

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Abstract:

The aim of the present article is to further develop the line of research initiated by Oreiro et al. (2019) by expanding the database used to calculate the EQI and the EQG, but also to control the effects of variables other than the EQG, such as the amount of capital per worker, over the PCIG and to assess the impact of the determinants of the EQG, considering both price and non-price factors. Following Tregenna and Andreoni (2020), the EQI will be redefined as the ratio between the share of the workforce in the sectors of high technological intensity with respect to the share of the workforce in the sectors of medium and low technological intensity. The EQG will then be used as an independent variable to explain the behavior of the PCIG of a sample of 47 developing countries in Latin America, the Caribbean, the Middle East, Africa, and Asia from 2001 to 2014.

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Since the second half of 2010, the Brazilian economy has been regressing. In 2019, the year before the crisis due to the COVID-19 pandemic, the Brazilian GDP had not reached the GDP of 2014, the last year of growth before the recession of 2015 and 2016. It is likely that the 2020s might follow the 2010s as another 'lost decade'. This paper explores why the Brazilian economy entered a vicious growth cycle, contrasting the virtuous growth phase, which began after the Second World War and ended in the late 1970s. Per capita income grew less than 1% per year from 1981 to 2019, contrasting with 4.5% per year from 1961-1980.[1]

We will argue that the loss in economic dynamism is rooted in the significant structural changes that began with the country's economic opening in the 1990s, resulting in fast and

* This paper benefitted from the helpful comments and suggestions of the editor and two anonymous referees from the *PSL Quarterly Review*. Any remaining errors are of the authors' responsibility.
[1] According to World Bank, *World Development Indicators*.

premature deindustrialization and deterioration in the labour market and regression in the exports basket. This paper's main argument is that Brazilian economic stagnation is a consequence of a process of the cumulative causation that is typical of a vicious growth cycle. An econometric exercise based on the circular cumulative causation model for the 1950-2019 period shows that domestic absorption is the main factor that explains the dynamics of the Brazilian economy. Once the industrialization strategy based on import substitution in the 1970s was exhausted following the rise in the external constraint and the external debt crisis in the 1980s, the investment rate declined, and the economy lost dynamism. The economic opening in the 1990s in an asymmetrical international financial system did not lead the investment rate to recover, but rather to the narrowing of the policy space, leading to an appreciation of the real exchange rate with a negative impact on exports. Therefore, deindustrialization and the specialization in the exports of commodities of low-value-added and low absorption of labour explain, for the most part, the loss of dynamism of the Brazilian economy.

The next section of this paper will deal with the theoretical references that will guide our empirical analysis. We will start with the classical structuralism that shows that economic development implies structural change towards more technologically sophisticated sectors. Then, we will argue that developing economies should seek to industrialize to reduce productivity heterogeneity and gain competitiveness in more dynamic international markets. New developmentalism theory contributes to the understanding that economies with non-convertible currencies that adopt a strategy of growth with foreign savings have their policy space narrowed in a financially integrated world. Afterwards, we discuss the evolution of the industrialization process of the Brazilian economy. Since the economic opening, the deindustrialization process has been advancing, and the result is that the economy is stagnant and more deeply heterogeneous. A final section, before the conclusion, presents an econometric exercise based on the cumulative causation process, which illustrates the vicious growth cycle of the Brazilian economy.

1. Theoretical reference

In the classical structuralist literature on development economics, labour productivity growth is the main driver of economic progress and is linked to structural change over time. Two stylized facts help introduce the idea of cumulative causation in order to explain how structural change can generate a virtuous growth cycle, which leads to an increasing productivity rate of growth along the time, or a vicious growth cycle, when productivity growth stagnates. Next, we will discuss the limits of the growth of developing economies when they open their economy and adopt a strategy of growth with foreign savings (current account deficits) before reaching a mature, productive structure. In our interpretation, this is an important contribution of the literature on new developmentalism in showing how short-term economic policy might impact structural transformation.

1.1. Stylized facts to explain structural change and the cumulative causation model

The process of structural change is better described by the model formalized by Dixon and Thirwall (1975), which is inspired by Kaldor's proposition of how the cumulative causation process affects the development of an economy. In this process, growth is driven by demand, which impacts the competitiveness of the export sector and leads to an increase in exports, feeding back productivity growth.

In the circular cumulative causation model, productivity adjusts to the growth rate of output, which is explained by the growth rate of autonomous expenditure. In a virtuous growth cycle, the autonomous expenditure stimulus is channelled to the productive structure, creating productivity gains by exploiting static and dynamic economies of scale. The wage rate should increase according to productivity gains, and the continuous distributional conflict between wages and profits should induce the incorporation of technical progress. In an open economy, a virtuous growth cycle would increase export revenues as the economy becomes competitive in higher value-added goods. In a vicious cycle, on the other hand, the transmission mechanisms of the autonomous expenditure are unable to promote the structural transformation that will increase aggregate productivity, which means that the productive transformation follows a specialization pattern in sectors of low complexity. In an open economy, this implies specialization of exports in producing goods of comparative advantages, mostly in low-value-added goods.

Kaldorian growth models developed in the 1970s and later were based on stylized facts that allow us to describe a virtuous and a vicious growth cycle.[2] The beginning of the industrialization process is a virtuous growth cycle. Through this process, productive resources—especially labour—are gradually reallocated from the traditional, low-productivity agrarian sector to the modern industrial sector, where individual workers have a higher capital endowment and there are greater backward and forward linkages with other sectors of the economy. Thus, the industrialization process occurs through a structural change towards higher productivity and technologically sophisticated economic segments. A second stylized fact points to the manufacturing sector which, through a stronger presence of static and dynamic economies of scale, pushes and sustains the rise in average productivity rates in the economy as a whole. As long as the productive structure evolves and becomes more complex and diversified, with greater interaction between the various industries, productivity gains in more dynamic sectors (i.e. the manufacturing industry and the services associated with it) will spread to other sectors, increasing the growth potential of the economy.[3] An increase in average wages will be observed, following the increase in overall productivity (see Kaldor, 1955-56, 1957, 1966; Kaldor and Mirrlees, 1962; Feijo and Lamônica, 2013). However, this might not occur in the presence of a large informal labour market, which contributes to keeping wages low in the formal sector. Rodriguez (2009, p. 80) explains that as a result, high profit margins are sustained as the productivity gains of technological improvements are appropriated by firms.

[2] See Nassif et al. (2020b) for a longer list of stylized facts. See also Argyrous (1996), Targetti and Foti (1997), Leon-Ledesma (2002), Setterfield (2002), among others, for the cumulative causation model.

[3] This is the Kaldor-Verdoorn law, according to which the higher the growth rate of industrial output, the higher the growth rate of industrial productivity and of the economy because of the backward and forward linkages of the manufacturing sector. See Kaldor (1966) and McCombie and Thirlwall (1994, chapter 2).

These two stylized facts allow us to identify a condition of premature deindustrialization, and therefore one of a vicious growth cycle when a regressive change in the productive structure may lead to a decline in the importance of the manufacturing sector to drive the growth of the economy's productivity.[4] In this case, labour migration to lower productivity sectors must be observed increasing labour informality and the economy loses its structural traction to continue growing with positive and sustainable productivity gains in the long run.

1.2. Structural change and the contribution of new developmentalism theory

For the new developmentalism theory, one important issue used to explain the dynamics of the causality causation process is the economic policy arrangement that provides the short-term stimulus to aggregate demand. Short-term macroeconomic policies supporting long-term growth should keep the main macroeconomic prices at the 'correct' level[5] to stimulate capital accumulation, thus favouring structural change towards the development of more technological sectors and activities.

However, when the economy operates with permanent deficits in the current account (i.e., adopting a growth strategy with foreign savings) the real exchange rate is appreciated, as the economy needs to permanently attract foreign capital. Besides, the overvaluation trend will be more intense if the economy suffers from the Dutch disease, which allows domestic producers of commodities to support long periods of real exchange rate appreciation. On the other hand, an overvaluation trend of the real exchange rate does not stimulate capital allocation in more technological sectors and reinforces specialization in the production of low technological goods. This is an important cause of premature deindustrialization and, consequently, of the deepening of labour market heterogeneity (Bresser-Pereira et al., 2014).

Two other factors explain the appreciation trend of the real exchange rate: the low-liquidity premium of developing economies' currency (the requirement of a higher domestic interest rate) in a context of volatile capital flows and the use of the exchange rate as a nominal anchor against inflation.

The low-liquidity premium is associated with the financial integration of developing economies, with low weight in international trade and depending on capital flows, which places their domestic currency at the bottom of the 'currency hierarchy' in the institutional arrangement of the International Monetary System (see Paula et al., 2017, and Carneiro, 2008). Therefore, commodity-exporting economies that use foreign savings have their currency tied to the international commodities market dynamics and the influx of capital. Because of the large flow of short-term capital, the autonomy of macroeconomic policy is narrowed. Thus, the financial integration of developing economies is asymmetrical because of the lack of equalization of interest rates and the overvaluation trend of the domestic currency (see Paula et al., 2017). The presence of the Dutch disease reinforces the overvaluation trend of the real exchange rate.

[4] According to Cimoli and Porcile (2013, p. 7), investing in illiquid assets is essential to make the economic structure more dense, complete, diversified and homogeneous, which are all characteristics of a developed economy.

[5] The main macroeconomic prices and their 'correct' level are: the level of the interest rate, which should be low; the level of the exchange rate, which should be competitive; the rate of wages, which should rise with productivity and the rate of inflation, which should be low in order to guarantee a satisfactory rate of profit for competitive industrial companies (Bresser-Pereira, 2019; see also Feijo and Lamônica, 2019).

Finally, a trend towards real exchange rate appreciation is also observed under the inflation targeting regime. This is because when inflationary expectations increase, the monetary authority should raise the domestic interest rate, increasing interest rate differential. A higher interest rate differential will attract capital, appreciating the exchange rate. An appreciated exchange rate will cool off inflationary pressures. Thus, the appreciation cycle of the real exchange rate is reinforced.

In summary, the growth strategy with foreign savings in economies with currency with low liquid premium does not deliver more dynamism to the domestic economy. It distorts macroeconomic prices, which leads to the misallocation of resources and moving away from structural change that increases growth potential. On the other hand, it tends to accentuate economic duality and low insertion in the world trade due to the presence of the Dutch disease.

2. The Brazilian economy

The Brazilian economy has been stagnant for over 40 years. The foreign debt shock in the early 1980s interrupted the strategy of rapid industrialization – which was based on national development plans, absorption of foreign savings and import substitution, and high import tariffs. The oil shocks in the 1970s and the sharp increase in American interest rates in 1979 ended the post-war period of accelerated growth. From 1962 to 1980, GDP growth was 7.4% per year. The Brady Plan at the beginning of 1990 was the solution to external debt and allowed Brazil to return to the international financial market.

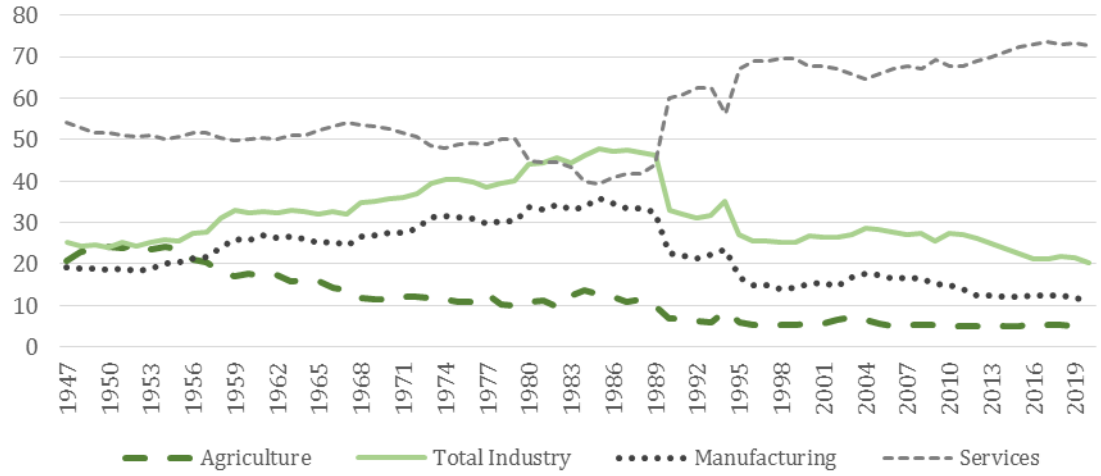
The Real Plan (1994) ended the high inflation regime of the 1980s and early 1990s, establishing the exchange rate as an inflationary anchor. Economic opening implied both the gradual removal of import barriers to increase domestic competition and the opening of the capital account. The adoption of the fixed exchange rate regime as the main anchor of price control implied an overvaluation of the domestic currency, which continued even when the fixed exchange rate regime was abandoned in 1999. The combination of higher competition and an overvalued exchange rate favoured the modernization of the productive structure through the imports of relatively cheaper inputs and modern machinery. At first, the domestic substitution of intermediate and capital goods by imports had a positive impact on labour productivity. However, by the end of the 1990s, labour productivity decelerated. The result of the productive restructuring was to promote a structural change characterized by premature deindustrialization (see, also, Palma, 2005; Oreiro and Feijo, 2010).

2.1. Fast industrialization/Fast deindustrialization

Figure 1 shows the evolution of the share of the main sectors of activities in GDP since the war. In 1947, the first year of the series, agriculture represented 20.7% of total GDP and manufacturing industry 19.3%. Manufacturing took pace in the mid-1950s when the share of the agriculture sector started to decline. In 1985, manufacturing was responsible for 35.9% of GDP, reaching the highest level in the series. Since then, it started to decline and in 2020 it represented 11.3% of GDP. As the share of manufacturing declined, so did the share of the agriculture sector: in 2020, the latter reached 6.8% of GDP. However, the movements in total

employment compared with the evolution of the value-added in each sector had been very different.

Figure 1 – *Percentage share of the value added (current prices) on GDP, main sectors of activities, 1947-2020*

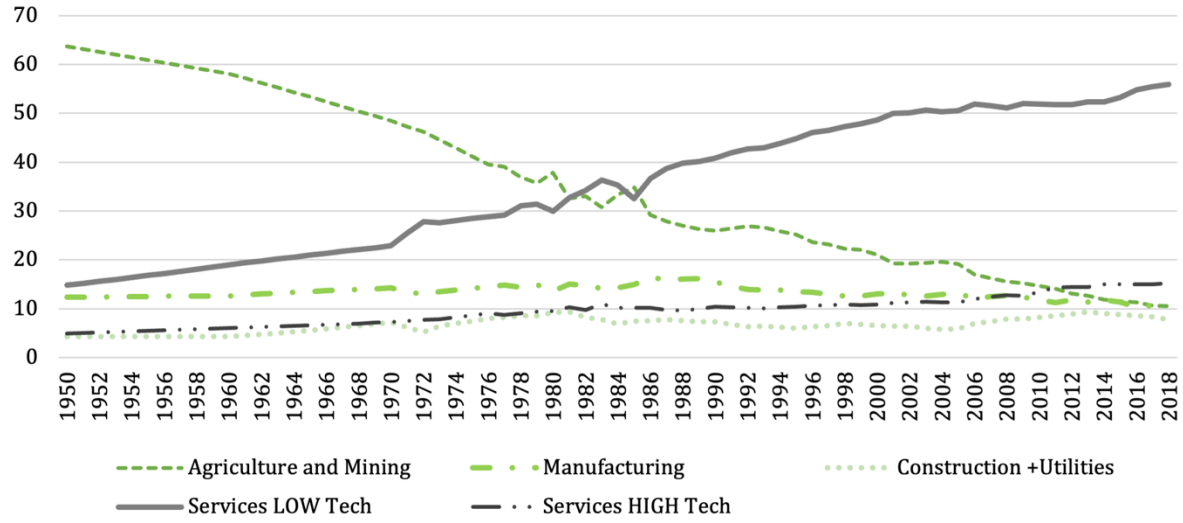


Source: Brazilian Statistical Office, *National Accounts*. From 1947 to 1989: *National Consolidated Accounts*; from 1990 onwards: *Quarterly National Accounts*.

Figure 2 compares the evolution of the share of employment of sectors of activities for 1950-2018, as shown on the University of Groening's database. As discussed above, structuralist literature states that, in a well-succeeded process of industrialization, labour should move from lower-productivity to higher-productivity sectors in a virtuous development cycle. This movement would lower labour productivity differentials among the sectors and make the productive structure less heterogeneous. Wage share should increase in pace with labour productivity and an expanded domestic market as well as improve the competitiveness of exports. However, figure 2 shows that in Brazil, the labour reallocation occurred mainly by displacing employment from agriculture and mining to the services sector, especially to the segments of low skilled labour and lower productivity.[6] The share of manufacturing employment remained effectively unchanged between 1950 and 2018.

[6] Catela, Cimoli and Porcile (2012), when discussing the trend of productivity and structural heterogeneity in the Brazilian manufacturing industry in the 2000s, found that structural heterogeneity did not fall, despite the increasing returns due to innovation and learning.

Figure 2 – *Percentage share of sectoral labour in total employment, 1950-2018*



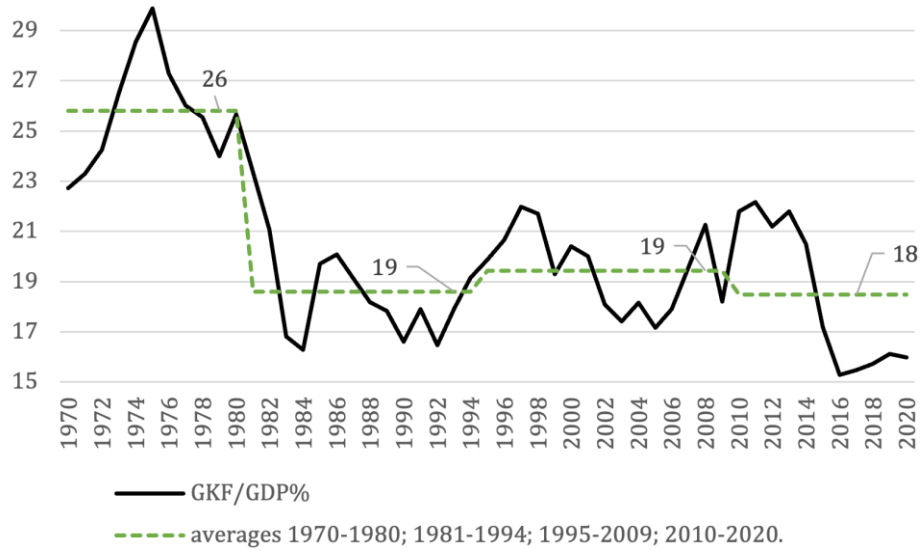
Source: Groningen Growth and Development Center database. From 1950 to 2005 data from Groningen Growth and Development Centre 10-sector database, June 2007, http://www.ggdc.net/; and from 2006 onwards data from https://www.rug.nl/ggdc/structuralchange/etd/. Services Low Tech include Wholesale and Retail Trade, Hotels and Restaurants; Community, Social and Personal Services and Government Services. Services High Tech include Transport, Storage, and Communication and Finance, Insurance, and Real Estate.

The stability of the employment share of the manufacturing sector, combined with a decline in the share of value-added from the mid-1980s onward, characterizes a process of premature deindustrialization. The most meaningful consequence is that the average labour productivity growth becomes stagnant for a long time, and the manufacturing sector loses traction to push aggregate output. In this case, a vicious development cycle unfolds and one of the negative consequences is high informality in the labour market. Recent estimates by IBGE on informal work point out that, in the first quarter of 2021, the unemployment rate reached 14.7% and the sum of informal jobs (39.6%) and those discouraged in searching for work (5.6%) reached 45.2% of the workforce.

The relatively lower growth rates of GDP from the 1980s onwards and the relative loss in the importance of the manufacturing sector in total value added is followed by a decrease in the aggregate rate of investment (figure 3). The average investment rate was 25.8% in 1970-1980 (GDP growth rate was 8.8% per year in the same period), and it decreases to below 20% in the following decades (GDP growth rate was 2.2% per year 1981-2019). Until 2009, with economic opening and price stabilization (1995), the average rate of investment showed a small recovery (19.4%) to 1980-1994 (18.6%). Starting in the 2010s until 2020, the average investment rate was close that of the period known as the first 'lost decade'.[7]

[7] Ferrari Filho and Fonseca (2015, p 102) adds that policymakers should pursue an investment rate of 25% of GDP to generate the growth needed to put the Brazilian economy back onto a path of recovery. Additionally, Saboia (2014) observes that the increase in employment in 2004-2013 was centered on low-skilled and low-wage jobs, resulting in low productivity.

Figure 3 – *Gross capital formation as a share of GDP (%), 1970-2020*



Source: Ipeadata.

2.2. Macroeconomic policy after economic opening

From the perspective of macroeconomic policy, the economic opening and the price stabilization policy narrowed the policy space for the implementation of policies to stimulate capital accumulation and investment in technical progress. According to the new developmentalism theory, macroeconomic policies for economic development should create an environment favourable to capital accumulation, innovation, and structural change in order to narrow the technological gap compared to developed economies. However, macroeconomic policy in Brazil since price stability in mid-1990s has relied on the real exchange rate as an anchor to fight inflation. Since January 1999, macroeconomic policy arrangement is centered on the so-called macroeconomic tripod – a combination of the inflation-targeting regime, floating exchange rate regime, and targets for primary fiscal surpluses.[8]

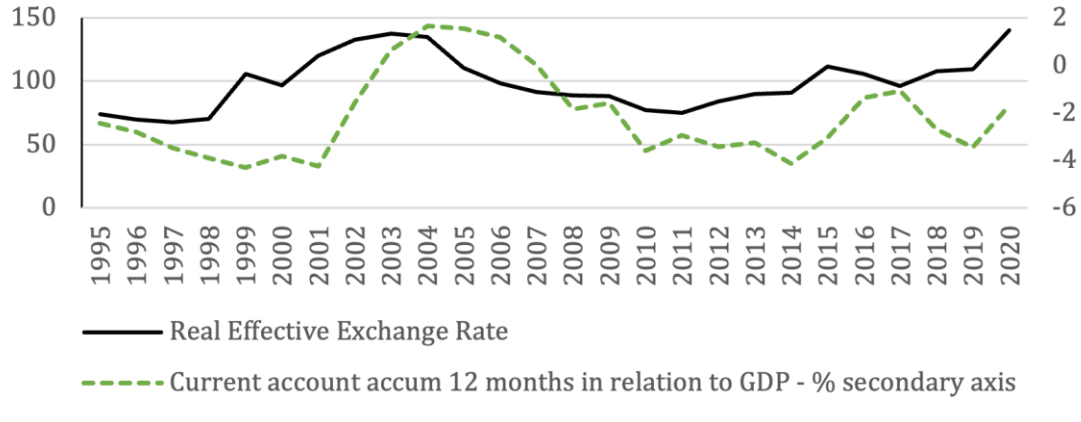
Such policy arrangement has been relatively successful at providing short-term price stability, but not for putting the economy onto a path toward sustainable long-term growth. Specifically, since the inflation targeting regime has been managed in a very orthodox way – i.e. with a strong focus on keeping inflation expectations close to the inflation target within the calendar year – it has not been able to free the Brazilian economy from low growth with high real interest rates and cyclically appreciated real exchange rate traps (see Nassif et. Al, 2020a). Such trends have been aggravated by the country's high degree of openness to capital flows, which has reduced the autonomy of monetary policy and put the Brazilian economy in a vicious cycle of low growth.

Figure 4 illustrates the evolution of Brazil's current account balances and real effective exchange rate between 1995 and 2020. In periods of real exchange rate appreciation of the

[8] In 2017 new fiscal rules have been added to the macroeconomic arrangement, implying basically the cut of public investment and reduction in the size of the government.

Brazilian currency, current account deficits increase dramatically. In periods of currency depreciation, the current account tends to show balanced or surplus balances, as observed between 2003 and 2007.[9] Figure 4 also shows a marked trend of real appreciation of the Brazilian currency between the end of 2005 and the beginning of 2015.

Figure 4 – *Current Account Balance as a percentage of GDP and real effective exchange rate (June 1994 = 100), 1995-2020*



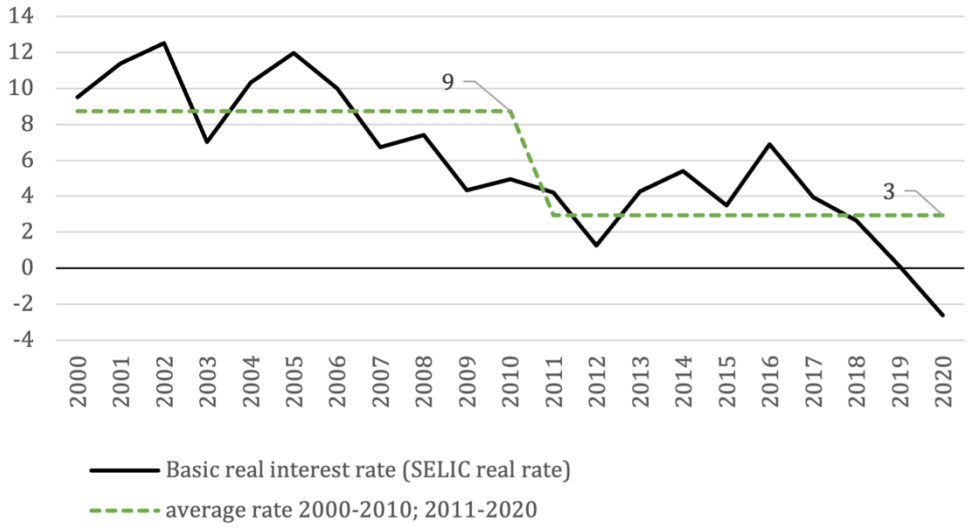
Source: Brazilian Central Bank (23839 and 11752 series).

Figure 5 shows the movement of short-term real interest rates between 2000 and 2020. Despite the real interest rate dropping to a historical low in the second half of 2010, reaching a negative rate in 2020, the average that prevailed in the 2000-2010 (8.7% per year) and in the 2010s (3.7% per year) were very high, compared with the one that prevailed in developed and many other developing countries.[10] In an economy guided by foreign savings, the domestic interest rate would no longer be relevant for investment decisions since the reference for foreign capital is the international interest rate. However, due to the differential required as a risk or liquidity premium, the domestic interest rate stimulates arbitrage gains, attracting speculative capital, causing volatility in the exchange rate—i.e. the amplifying of exchange rate appreciations and devaluations. This volatility creates obstacles to the time horizon of the investment decisions of domestic companies.

[9] As shown by Nassif et al. (2017), this misalignment has only been corrected by the sharp depreciations observed in the aftermath of domestic or international shocks.

[10] According to the Bank of International Settlements (BIS) database, in the period 2000-2019 the average real interest rate in Brazil was 6.3% per year, significantly higher than several developing countries such as Turkey (2.4%), Mexico (2.1%), South Africa (1.8%), Russia (1.5%), Argentina (1.3%), India (1.0%), Peru (0.8%) and Chile (0.6%). Data available at https://www.bis.org/statistics/cbpol.htm, and https://stats.bis.org/#ppq=CBS_C_AND_OTH_EXP_UR;pv=11~10,5,6~0,0,0~name

Figure 5 – *Domestic real interest rate (%), 2000-2020*



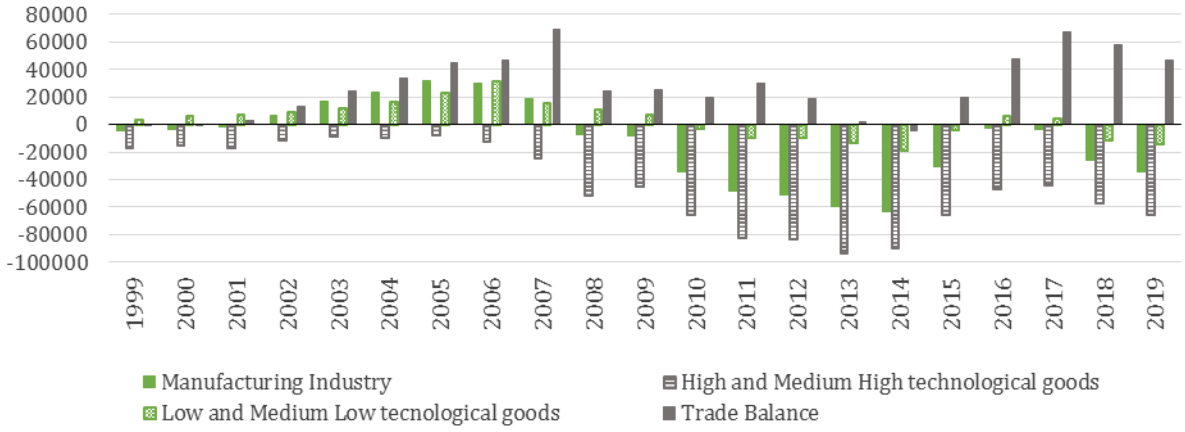
Source: Brazilian Central Bank for the real interest rate (4189 series deflated by the inflation rate accumulated in 12 months).

The most damaging consequences of the overvaluation trend of the Brazilian currency throughout the 2000s were not only the intensification of Brazil's premature deindustrialization (Nassif et al., 2015, 2018), but also a sharp reprimarization of the country's export basket.[11]

Figure 6 shows that until 2008, the country's trade balance and manufacturing industry's trade balance were both positive. Surpluses were only interrupted in the years of the currency crisis, between 1997 and 1999, and in 2001 due to an energy crisis. After 2008, the manufacturing trade balance showed a deficit. Despite that, the country's trade balance showed surpluses. Manufacturing trade deficits decreased between 2010 and 2014, then grew again. One of the reasons for the change between the evolution of the country's trade balance and the manufacturing trade balance is the strong increase in the deficit of high and medium technological intensity goods, products in which the Brazilian manufacturing industry has been chronically deficient since the 1980s. Increased deindustrialization from 2010 onwards implied a sharp increase in trade deficits in high technological goods and trade deficits in medium-low products and low technological intensity. From the 1990s onwards, the continuous surpluses in the country's trade balance were guaranteed by the evolution of net exports of goods obtained through natural resources (agriculture and mining).

[11] In line with the authors, Maia (2020) recently discussed deindustrialization in Brazil according to distinct theoretical approaches: the classical, the premature, the regressive specialization, and the 'Cambridge view'. In Gramkow and Gordon (2014, p. 60), the authors analysed the structural heterogeneity and external insertion between 1996 and 2009. They concluded that the economic model adopted by Brazil reproduced "the structural characteristics of the peripheral economy, despite presenting important transformations [during that period]".

Figure 6 – *Trade balance of goods (US$ million): total, manufacturing industry and groups by technological content, 1999-2019*



Source: Institute for the Industrial Development (IEDI).

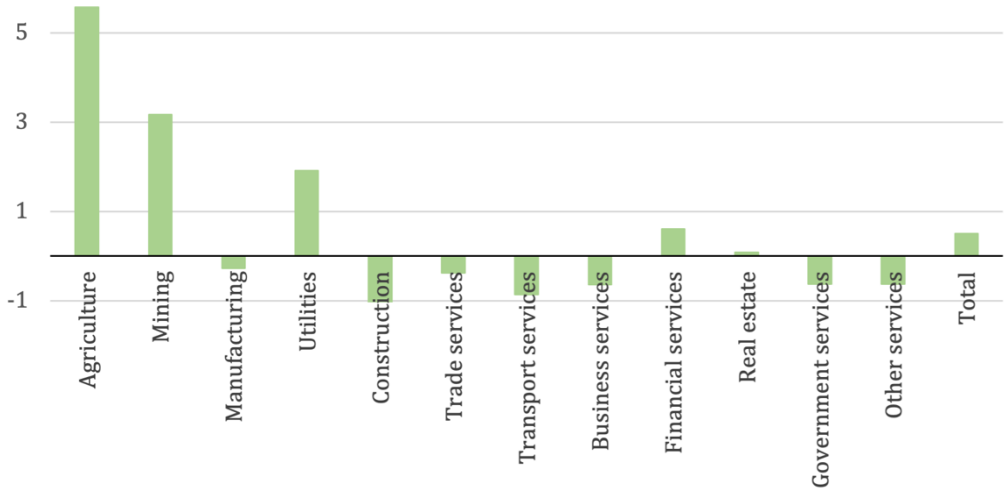
In sum, the recent evolution of the Brazilian trade balance confirms that the economic opening in the 1990s and the tripod of macroeconomic policies did not deliver the productive transformation needed to complete the industrialization process via the development of more technological sectors. On the contrary, economic opening and the asymmetrical insertion of the economy in the international financial markets has narrowed the policy space and perpetuated a high real interest rate and an appreciated real exchange rate, impairing long-term investment and encouraging specialization in the production of low technological goods and services.

Finally, figure 7 shows the average growth rate of labour productivity of total economy (0.5% per year) and in the main sectors activity for 2001-2018. The manufacturing industry, which has important static and dynamic economies of scale, performed negatively (–0.3% per year).[12]

As we have argued so far, the key to restoring the average competitiveness of the Brazilian productive sectors lies in efforts aimed at considerably increasing productivity growth rates. In this sense, the stagnation of the Brazilian economy is explained by premature deindustrialization, deterioration of the labour market and the regression in the exports basket, revealing an economy incapable of overcoming economic dualism. To illustrate the arguments presented thus far, the next section will present an econometric model to illustrate the cumulative causation process and the vicious growth cycle of the Brazilian economy.

[12] In 1950-1980, the growth rate of aggregate productivity was 3.8% per year, and from 1981 to 2019, it was 1.4% per year, according to the PWT10 database.

Figure 7 – *Brazil: average growth rate of labour productivity, 2001-2018 (%)*



Source: Groningen Growth and Development Centre, *Economic Transformation Database*, available at: https://www.rug.nl/ggdc/structuralchange/

3. The cumulative causation model and the Brazilian economy

As has been shown, the causality causation process can either lead to a virtuous or a vicious growth cycle. Kaldor (1970) describes the growth process as a chain-reaction between demand and supply-side conditions, through a logical scheme of circular and cumulative causation. This scheme indicates how developing economies can overcome the barrier imposed by the high degree of heterogeneity in the productive structure and the labour market and reach a growth path that will promote the catching up of per capita income of more advanced economies. Countries that have diversified the productive structure managed to relax their external constraints by increasing their growth rates to be compatible with balance-of-payments constraints (Thirlwall, 1979). The theoretical cumulative causality demand-led growth model developed by Dixon and Thirwall (1975) shows that demand stimulus by exports can lead to a structural transformation once aggregate productivity adjusts to the output growth rate. Productivity gains incorporated in the competitiveness of exports describe how structural change leads to increased exports, which pushes aggregate output.

This section outlines an empirical analysis used to identify periods when the export drive pushed the growth of the Brazilian economy (1950-2019) in line with the cumulative causation model as proposed by Dixon and Thirwall (1975).

3.1. The general specification of the empirical model

The empirical exercise starts with the identification of the structural breaks. To capture the effects of structural breaks on the estimated parameters of the model we will employ the method of the nonlinear least-squares with breakpoints. The least-squares with breakpoints estimator is a linear multiple regression, with time T and m potential breaks. The breaks

inherent to the estimator can be determined by the tests of Bai (1997), Bai and Perron (1998) and related techniques based on adjustment criteria. The number of structural breaks m determines $m + 1$ linear segments of the function. The estimator can be divided into two regressors: X variables with fixed parameters and Z variables with nonlinear parameters between the function regimes, as represented by the following equation:

$$y_t = X'_t\beta + Z'_t\delta_j + \varepsilon_t$$

Once the model's temporal break points (m) are determined, a standard regression with $m + 1$ temporal regimes of the functional relationship is estimated. The fixed parameters β of vector X are estimated $\bar{\delta}_j = (\delta'_0, \delta'_1, \ \dots \ , \delta'_m)$ and also the nonlinear parameters of the vector of variables Z that interacts with the corresponding dummies at $m + 1$ regimes of the estimated function.

$$y_t = X'_t\beta + \bar{Z}'_t\bar{\delta}_j + \varepsilon_t$$

Test statistics of structural break are divided into two groups: global structural break maximizers and sequential breaks. The global maximizer tests by Bai and Perron (1998) determine the number of structural breaks that minimize the sum of squared residuals of the estimated regression. There are three methods of determining structural breaks: global breaks versus none (Bai and Perron, 1998); number of breaks based on information criteria (Yao, 1988; Liu et al., 1997); and the sequential versus global break test (Bai, 1997).

The Kaldorian circular cumulative growth model consists of an upward spiral of economic growth from a positive shock to exports. The empirical estimator of the export-led growth with breakpoints model for Brazil seeks to demonstrate how exports are associated with Brazilian growth in the different phases of development. The time horizon (1950-2019) comprises different phases of growth, ranging from the period of structuring investments of the 1950s-1970s, to the debt crisis and the high inflation period in the 1980s and early 1990s, to the period of economic opening and the expansion of the early twenty-first century pushed by the boom in the commodities price. For this reason, the least-squares with breakpoints model is the most suitable econometric method to estimate the parameters of the long-term growth model, taking into account the interaction of supply and demand forces throughout time.

The best specifications of the empirical model for Brazil were defined based on the estimator's adjustment criteria: adjusted R2, Akaike (AIC), and Schwarz (SIC). The estimator's global maximizing break test was the one that most adjusted the equations based on these criteria, according to the approaches with global break l versus none by Bai and Perron (1998); and sequential break $l + 1$ versus global l by Bai (1997). Looking for the best fits in the function of the structural break approaches, the equations were estimated as follows: the global break approach l versus none was used in the economic growth and price equations; while the $l + 1$ versus global l sequential break approach was used in the other equations of the model.

3.2. Equations of the model: an adaptation of Dixon and Thirwall's (1975) model for Brazil (1950-2019)

The specification of the model is as follows (all variables are growth rates):[13]

[13] All variables estimated are in direferencial, and according to the unit root tests they are integrated of order zero, I(0).

$$g_t = \bar{\delta}_{1j} x_t + \bar{\delta}_{2j} a_t + \epsilon_t$$

$$x_t = \bar{\delta}_{3j} p_t + \bar{\delta}_{4j} p^*_t + \bar{\delta}_{5j} e_t + \bar{\delta}_{6j}\, z_t + \varepsilon_t$$

$$p_t = \bar{\delta}_{7j} w_t + \bar{\delta}_{8j} r_t + \hat{t}_{jt} + \xi_t$$

$$r_t = r a_{jt} + \bar{\delta}_{9j} g_t + u_t$$

Where g stands for aggregate output; x for exports, a for domestic absorption, p and p^* for domestic and international price, respectively; e for exchange rate, z for world income, w for wage; r for labour productivity, t for the mark up (see appendix with the descriptions of the variables and the source).

The tested hypothesis is that export growth (x_t) increases economic growth (g), which stimulates productivity (r) at competitive price (p), returning to the export growth cycle (x_{t+1}) in a cumulative spiral of economic growth. As represented below:

$$\frac{\partial g}{\partial x_t} > 0; \frac{\partial r}{\partial g} > 0; \frac{\partial p}{\partial r} < 0; \frac{\partial x_{t+1}}{\partial p} < 0 \cdots \frac{\partial g}{\partial x_{t+1}} > 0$$

The cumulative circular growth hypothesis has been tested against the alternative hypothesis of exports-led absence of virtuous growth. In this model, a vicious cycle will emerge if the sensitivity of productivity to export growth is low because the productivity-price relationship is weak. The alternative hypothesis, which is the object of our investigation, is that at least one of the links in the virtuous cycle may be broken, leading to a vicious growth model. We can represent the hypothesis in formal terms as follows:

$$\frac{\partial g}{\partial x_t} = \frac{\partial r}{\partial g} = \frac{\partial p}{\partial r} = \frac{\partial x_{t+1}}{\partial p} = \cdots \frac{\partial g}{\partial x_{t+1}} = 0$$

3.3. Results

Table 1 presents the four equations of the Dixon and Thirwall model, adapted to Brazil with different structural breaks. The last part of the table shows the result of a 10% shock in exports growth. The presence of a virtuous growth cycle should return exports to growth above 10% of the initial shock. However, the main result is no evidence of any virtuous cycle led by exports. The only statistically significant cycle of economic growth led by exports takes place between the 1950s and 1960s. Even so, the return of the initial 10% shock to export growth is negative (–0.5623). This result is due to the sensibility of the elasticities: a negative exports-growth relation (–0.0458**), a positive relation between productivity-price (115.2598**), and a negative contribution of the price differential to exports. This finding is coherent with the growth characteristics of the 1950s and 1960s: import substitution industrialization and a growth strategy towards the domestic market.

The model hypothesis is rejected in the other periods, favouring the null hypothesis of the absence of virtuous growth cycle led by exports. The results clearly show that the transmission mechanism of productivity gains to export prices is absent. This might be interpreted as a characteristic of the industrialization process that did not reduce structural heterogeneity in the labour market, as seen previously (figure 2). Rapid industrialization led to low productivity occupation in the urban services sector.

Furthermore, virtuous growth in Brazil led by exports is strongly constrained by the low elasticity of exports over economic growth, whose greatest sensitivity was registered between 1981 and 1990 (0.1626***), the period of the debt crisis in Latin America. It is no coincidence that the model registered that the productivity-price elasticity relationship was strong between 1983 to 1992 (–5,1018***). This result confirms the interpretation by Castro and Souza (2008), which described the Brazilian economy in the 1980s as being on a "forced march" due to external constraints. Domestically, the debt crisis was followed by the acceleration of the inflation and the fall in investment rates. GDP and productivity growth rates fell from the mid-1980s on.

As mentioned, the main explanation for the growth of the Brazilian economy in the whole period is domestic absorption. The model also reveals other relevant characteristics: first, the significance of the wage costs (w) in domestic prices (p), especially between 1974 and 1982 and 1983-1992, periods of acceleration of the inflationary process and the deepening of the indexation of contracts and, second, the importance of exchange rate (e), external price (p^*), and external income (z) to explain exports between 1982 and 1996.

The relevance of the relation between price-competitiveness of Brazilian exports appears mainly between 2007 and 2019 when the appreciation trend of the exchange rate (as described by the new developmentalism theory due to the foreign savings growth strategy) is significant and presents a negative sign to explain exports (–0.3667***). During this period, national exports respond to domestic (–3.9698**) and external (4,330**) prices.

In short, according to the econometric exercise, the price-productivity relationship – which in the cumulative causality model is key to explaining how export competitiveness can be the driver of an export-led growth dynamics – was negligible for most of the period analysed. As the industrialization process of the Brazilian economy is characterized by relatively low absorption of labour, the transmission mechanism of productivity gains to increase the competitiveness of tradables, as described in a virtuous cycle of growth, has not been strong. Another way of interpreting the limited relevance of the transmission mechanism of productivity gains to the prices of tradables is to observe that the period of rapid industrialization occurs with the economy very protected (high import tariffs) and closed. The rapid growth until the end of the 1970s showed that the economy could grow via the internal market, but accentuating the concentration of income and wealth,[14] inferred by the high informality in the labour market. Therefore, the main conclusion of the econometric exercise was to show the relevance of domestic absorption to the growth dynamics of the Brazilian economy. With the external debt crisis in the 1980s and the economy entering a 'forced march' phase, the limits of 'inward' growth became evident. Brazilian industry prospered while protected and closed, but it could not evolve its productive structure enough to endogenously achieve relative autonomy in the generation of technology. The Brazilian industrial process can be seen as incomplete, in the sense that the economy is highly dependent on imported technology. Once the import substitution period is exhausted, and the economy is exposed to increased competition from the 1990s on, it turns to its comparative advantages. Economic opening narrowed policy space and the negative impact of the real exchange rate appreciation

[14] In an influential piece of research by Wells (1974) on income distribution and private consumption in Brazil in the 1960s and 1970s, the author concludes that "it can be tentatively asserted that .[…]. the results of the budget survey do not suggest that greater income concentration is the most rational way to sustain demand; in fact, the reverse is true. If the present expansion in the production of durables goods for consumption [in the 1970s] is limited to the top 10% of the population, which was the only decile to increase its relative income between 1960 and 1970, then the process tends to be limited…." (p. 41, our translation).

trend in the mid-2000s and 2010s was captured in the model. As the economy becomes more specialized in the production of commodities, labour market informality increases and the economy loses capacity to grow. Domestic absorption and exports lose the traction needed to promote the necessary structural change to increase long-term growth.

Table 1 – *Results of the estimates of the export-led-growth model with breakpoints*

Global brakpoints l	g_t			**Adjustment criteria**	
	x_t	a_t	**Constant**		
1951-1960	**–0.0458****	0.3608**	0.0428***	Adjust R^2	0.8733
1961-1970	0.0396**	0.8320***	0.0082		
1971-1980	0.0130	0.6634***	0.0302***	AIC	-5.4695
1981-1990	**0.1626*****	0.9673***	–0.0043		
1991-2009	0.0901**	0.2421***	0.0095***	SIC	-4.8866
2010-2019	–0.0619	0.4830***	0.0053*		
Sequential $l+1$	r_t			**Adjustment criteria**	
	g_t		ra_t		
				Adjust R^2	0.6735
1951-2019	0.8088***		–0.0189***	AIC	–4.7498
				SIC	–4.6851
Global brakpoints l	p_t			**Adjustment criteria**	
	r_{t-1}	w_{t-1}	$\hat{\tau}_t$		
1956-1964	**115.2598****	–114.4981**	2.6646**	Adjust R^2	0.2689
1965-1973	10.1621	–14.1854	0.5977		
1974-1982	1.3661	**2.9329*****	–0.1922**	AIC	-0.9250
1983-1992	**–5.1018*****	**4.1374*****	–0.1041**		
1993-2002	0.3119	0.2696	–0.0192	SIC	-0.3375
2003-2019	0.5597	–0.1617	0.0230		
Sequential $l+1$	x_t				**Adjustment criteria**	
	p_{t-1}	p^*_{t-1}	e_t	z_t		
1953-1960	**0.3879****	**–3.9419*****	0.0161	–1.3734	Adjust R^2	0.3976
1963-1981	–0.2122*	0.8753	0.0044	–0.1534		
1963-1981[a]	–0.2122*	0.8753	0.0044	–0.1534	AIC	-1.5504
1982-1996	–0.0439	**1.7964*****	**0.1287*****	**6.7926*****		
1997-2006	–1.4312	2.4112	–0.2055*	–2.5059	SIC	-0.7277
2007-2019	**–3.9698****	**4.3301****	**–0.3667*****	1.2515		
Intervals	**ELG cycle analysis with 10% shock in the x_t**				**Probability**	
1953-1960	**–0.5623**				Significant	
1963-1981	0.3405				Not significant	
1963-1981	–0.0617				Not significant	
1982-1996	0.6458				Not significant	
1997-2006	–0.8433				Not significant	
2007-2019	1.7920				Not significant	

Notes: ***, ** and * represent significant at 1%, 5% and 10%, respectively.

[a] The 1963-1981 period is repeated in the export equation and analysis of the ELG cycle to make the communication between the model's equations compatible in the different structural breaks. The export equation was the only one that exhibited a single stable economic cycle in this period.

4. Final remarks

This paper argues that the stagnation of the Brazilian economy for the last forty years is due to a vicious cumulative causation process characterized by the low dynamism of domestic absorption resulting from premature deindustrialization, the deepening of labour market duality, and specialization in exporting in low value-added goods.

We started the paper by arguing the importance of the manufacturing sector for long-term growth. Through a circular cumulative causation model, Kaldor demonstrated how supply and demand forces could interact either to generate a virtuous cycle of sustained growth or a vicious cycle of low growth. Hence, capital accumulation and structural change dynamics are central to understanding why some economies succeed in catching up with developed economies and others fall behind. These dynamics depend on how short-term economic policies impact the productive structure. That is the contribution of the literature on new developmentalism, which shows that a short-term economic policy that is consistent with long-term pro-development policies is essential in order to increase capital accumulation in more dynamic sectors, which ultimately helps competitiveness. When a strategy to grow with foreign savings is adopted, the policy space to implement developmental policies is narrowed.

In our interpretation, in the case of the Brazilian economy, the strategy to grow with foreign savings – which was deepened in the 1990s with the opening of the economy – narrowed policy space and led to a process of premature deindustrialization. Since the economic opening in the mid-1990s, price stability has been the main objective of short-term macroeconomic policy, and a combination of high real interest rates and an appreciation trend of the exchange rate negatively affected structural transformation. In this sense, the high informality in the labour market and low productivity growth since the 2000s clearly points toward the 2020s being another 'lost decade'.

In the last part of this paper, we show an econometric exercise to capture the dynamics of the circular cumulative causation model for the Brazilian economy since 1950. Domestic absorption is the primary driver of Brazilian growth. Brazilian growth soared as domestic absorption increased due to the state-led development strategy, based on import substitution within the context of a highly protected economy. The imported substitution period promoted structural change and improved productivity gains. This driver loses strength in the 1980s due to the external debt crisis, the acceleration of the inflationary process, and deindustrialization. The high heterogeneity in the labour market was not overcome during the fast industrialization period, and it deepened afterward. As described in the cumulative causation model, the productivity-price relationship is weak in the Brazilian case, and therefore, exports lose competitiveness once the economic opening is imposed in the 1990s. Therefore, the Brazilian industrialization trajectory shows the limits of domestic absorption as the economy's main driver when a strategy of growth with foreign savings is adopted. The fast industrialization period (1950-1980) ended when external financial conditions changed. In the 1990s, economic opening and the deepening of the foreign savings growth strategy led to deindustrialization and the Brazilian economy is back to the specialization in the exports of low value-added commodities.

In sum, since the debt crisis in the 1980s, the Brazilian development process has been an example of premature deindustrialization heavily caused by low aggregate demand dynamism (that is to say, low incentives from the macroeconomic policy focused on price stabilization) and real exchange rate misalignment, resulting from a strategy of growth with foreign savings.

Duality in the labour market has increased along with the loss in the relative weight of the value-added in the manufacturing industry, and informality is a major characteristic of employment in the services sector.

Appendix

Variables	Description	PWT 10 codes	Period
g_t	Real GDP at constant 2017 national prices (in mil. 2017US$)	rgdpna	1950-2019
x_t	Share of merchandise exports at current PPPs and Real GDP at constant 2017 national prices (in mil. 2017US$)	csh_x* rgdpna	1950-2019
a_t	Real domestic absorption, (real consumption plus investment), at current PPPs (in mil. 2017US$)	cda	1950-2019
p_t	Price level of exports, price level of USA GDPo in 2017=1; for Brazil, domestic prices	pl_x Brazil	1950-2019
p_t^*	Price level of exports, price level of USA GDPo in 2017=1; for USA for external prices	pl_x USA	1950-2019
e_t	Exchange rate, national currency/USD (market+estimated)	xr	1950-2019
z_t	Real GDP at constant 2017 national prices (in mil. 2017US$) for USA+ Real GDP at constant 2017 national prices (in mil. 2017US$) for China	rgdpna USA + rgdpna China	1950-2019
w_t	Share of labour compensation in GDP at current national prices and Real GDP at constant 2017 national prices (in mil. 2017US$)	labsh* rgdpna	1950-2019
r_t	Ratio between Real GDP at constant 2017 national prices (in mil. 2017US$) and number of persons engaged (in millions) multiplied by the average annual hours worked by persons engaged	rgdpna / emp*avh	1950-2019
ra_{jt}	Constant for the productivity equation assuming that $g_t = 0$	constant	1950-2019
$\hat{\tau}_{jt}$	Constant for the price equation assuming that $r_t = 0$ and $w_t = 0$	constant	1950-2019

Source: Penn World Table version 10.0, available at https://www.rug.nl/ggdc/productivity/pwt/?lang=en

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