Economic Development and Stagnation in Brazil (1950-2011)

André Nassif*, Lucilene Morandi*, Carmem Feijo* and Eliane Araújo**

*Department of Economics, Fluminense Federal Fluminense, and **Department of Economics, State University of Maringá

andrenssif27@gmail.com

October, 2019

Abstract

Labor productivity growth in Brazil, after showing positive annual rates between 1950 and 1979, became stagnant after 1980. We decompose, calculate and analyze statistical evidence on the Brazilian labor productivity growth in the period 1950-2011, according to "structural change" and "within" components as proposed by McMillan and Rodrik's (2011) methodology. We refer to the stagnant period as one that is characterized by weak structural change. Since it is almost a consensus that the stagnation in the subperiod 1980-1994 is explained by the external debt crisis and chronic inflation rates, we regressed labor productivity growth as well as its two components on several microeconomic and macroeconomic variables in Brazil for the period 1995-2011. The results show that the stagnation of the Brazilian economy in the recent decades is explained by the overvaluation of the Brazilian currency, the reprimarization of the export basket, the low degree of Brazil's trade openness and the high real interest rates prevailing in the period.

Keywords: economic development; catching up; labor productivity growth; structural change.

JEL classification: 010; 011; 014; 047

Economic Development and Stagnation in Brazil (1950-2011)

1. Introduction

As traditionally stressed by the classical literature on development economics, the transition from developing economies to developed ones is a long-term process through which labor productivity growth is positive and explained by structural change over time.[1] Structural change, in turn, initially materializes through a sharp reallocation of resources (especially labor surplus) from the lower labor productivity sector (the primary sector) to the higher labor productivity sector (the manufacturing sector). In theoretical terms, structural change predominantly explains the average labor productivity growth over time until the average labor productivity gap observed between sectors (primary, manufacturing and service sectors) has been removed. As suggested by the theoretical and empirical literature influenced by Lewis (1954), Hirschman (1958) and Kaldor (1966), such changes occur, first, with a reallocation of labor from the primary to the manufacturing sector, as already stated, and after the country has reached a high per capita income level, from these latter sectors to the segments of high labor productivity in the tertiary sector.

The Brazilian experience of economic development, however, illustrates a case in which labor productivity growth, after showing sustained annual positive rates between 1950 and 1979, became stagnant (as did long-term economic growth) after 1980. The issue is that the economic stagnation started way before the country ever reached a high per capita income level. This suggests, as a possible hypothesis, that the long-term stagnation of the Brazilian economy was driven by premature deindustrialization, a process through which there has been either a sharp reallocation of labor from both the primary (the traditionally low productivity sector) and the manufacturing (the higher productivity sector) sectors to segments of low productivity and low skilled labor in the service sector (in this case, prematurely) or a significant drop of the share of manufacturing sector (measured in real value added) in total GDP.

[1] "Developing economies" here corresponds to the old term "underdeveloped economies" used by the classical tradition of development economics to refer to all countries with lowest per capita income levels in the world. However, we prefer to use the accepted term by the United Nations and other multilateral institutions of the present day.

Additionally, we will argue that, between 1950 and 1979, the overperformance of labor productivity growth was influenced by a fine coordination of economic policies (industrial and technological as well as macroeconomic policies) pursued by the governments at that time. We will also test another hypothesis that the period during which labor productivity became stagnant coincided with a weak harmonization between industrial policy and the macroeconomic regime, especially after 1999 when Brazil adopted a very orthodox arrangement of monetary, fiscal and exchange rate policies. With respect to the macroeconomic field, for instance, even after having stabilized chronic inflation rates in 1994, Brazil has shown a marked trend of very high real interest rates and overvaluation of its domestic currency in real terms.

In order to test those hypotheses, we will use the methodology proposed by McMillan and Rodrik (2011), who, influenced by the seminal empirical methodologies carried out by Kuznets (1957, 1979) and Chenery (1979), broke down the average labor productivity growth into two components: the "between effect" (or "structural change") component, and the "within effect" component. The between effect component is driven by a reallocation of labor from the primary to the manufacturing sectors (or, if it is the case, also to the higher labor productivity segments of the service sector), while the within effect component is explained by sectoral characteristics, such as the capital-labor ratio and technical progress. According to McMillan and Rodrik (2011), during the process of catching up, if a country's labor productivity growth is driven by structural change, it will be "growth-enhancing," whereas if a country's labor productivity growth is commanded by sectoral or within change, and not accompanied by significant "structural change", it will be "growth-reducing."

To address those concepts, the remainder of this paper is organized as follows. Section 2 analyzes the theoretical issues related to structural change, economic development and long-term stagnation in countries that suffer from premature deindustrialization. Section 3 presents a brief review on economic policies adopted in Brazil over the import substitution period (1930-1989) and after trade liberalization and other liberalizing reforms (1990-2018). Section 4 decomposes, calculates and analyzes statistical evidence on the Brazilian labor productivity growth in the period 1950-2011,[2] according to structural change and within components as proposed by McMillan and Rodrik's (2011) methodology. The same calculations are also replicated for the subperiods 1950-1979 (the growth period) and 1980-2011 (the stagnant period).

[2] At the time of carrying out this study, the compatible database ended in 2011.

By assuming that there is a relative consensus that stagnation in the subperiod 1980-1994 was explained by the external debt crisis and chronic inflation rates that practically paralyzed the working of the Brazilian economy, Section 5 specifically investigates the factors explaining Brazil's labor productivity stagnation since 1995. Also following McMillan and Rodrik's regressions, but adapting them to Brazil's specific economic context in the period, as discussed in Section 3, we then regress overall labor productivity growth as well as its "structural change" and "within" components on several microeconomic and macroeconomic variables between 1995 and 2011. Finally, Section 6 draws the main conclusions and policy implications.

2. Structural change, economic development and stagnation: some theoretical notes

One of the main goals of economics and economists concerned with social well-being is to analyze and indicate appropriate policies to overcome economic underdevelopment. Paradoxically, however, a country can overcome economic underdevelopment, but not necessarily catch up. This means that the process of economic development and catching up, which implies reaching high levels of productivity and per capita income near the average of those countries considered rich, will be successful if, and only if, the average growth rate of productivity over time is high enough to provide such catching up and is not reversed by harmful phenomena, such as the Dutch disease,[3] premature deindustrialization and recurrent balance of payments crises. In other words, a country can overcome underdevelopment, but can be locked-in at developing stage conditions for many decades or even forever. If this is the case, the country faces a long-term economic stagnation that is not the result of an "average income trap," but of inconsistent economic policies adopted for the decades to come.

That economic development is nothing more than securing positive and sustainable rates of productivity in order to reach levels of per capita income

[3] The Dutch disease (alluding to the real Dutch phenomenon of the 1970s) happens when a relative price change triggers an intense reallocation of resources to sectors producing tradable goods, concentrated in natural resources (such as oil) and, as a consequence, a boom in exports of these products. Due to the positive income effect, the process diverts domestic demand to non-tradable goods (e.g. traditional services) and thus inducing a real appreciation tendency of the domestic currency. In the long run, the main negative effect of the Dutch disease is to lead to premature deindustrialization, curbing the dynamism of developing economies. For a neoclassical model of this phenomenon, see Corden and Neary (1982), and for a structuralist discussion, see Bresser-Pereira (2008).

comparable to the average of developed countries has been a matter of fact among economists since Adam Smith. The problem is how to overcome the status of a poor country and enter the select club of the rich countries. Although economic development may be influenced by non-economic factors, such as historical, anthropological, sociological and cultural, economists abstract from these factors and focus purely on economic forces.

There are two general approaches to the phenomenon of economic development: (i) the neoclassical, according to which economic development results basically from the confluence of supply-side forces, such as the accumulation of physical and human capital and technological progress (Solow, 1956; Romer, 1986; Lucas, 1988; Grossman and Helpman, 1991) and (ii) the structuralist, according to which short- and long-term demand is the main driving force behind the process of development (Kaldor, 1966; Dosi, Pavitt and Soete, 1990).

However, depressed demand cycles, which reduce a firm's appetite for increasing investments and innovation, can be alternated by cycles in which firms, even in face of slowly increasing demand, may be willing to maintain the rate of innovation. This even includes radical innovations, as was the case with the huge investments made after the 2008 global crisis, which, according to UNCTAD (2018), led to the spread of the so-called digital technology industries, such as robotics and artificial intelligence, the Internet of things (IoT) and intelligent production with 3D printing. Thus, economic development should be understood as the result of the interaction of demand and supply side forces.

Within the framework of the structuralist approach, some effort has been made to formulate theoretical models of development in which the interaction of factors related to demand and supply explain the rate of productivity growth in the long run. Fazzari, Ferri and Variato (2017: 1), for example, present a development model that calls into question the "view that economic growth beyond the short term [that is, in the medium and long terms] can only be explained on the supply side." In this dynamic model, demand continues to be the main driving force of real output growth in the long run, but in such a way that the increase in supply tends to accommodate the growth in demand, driven, in turn, by the trajectory of autonomous demand and the Hicksian super-multiplier.[4] Unlike Kaldor (1966), for whom there would be no limiting factor of

[4] Anchored in the Keynesian hypothesis that capitalist economies tend to operate below full employment, and therefore with idle capacity, the super-multiplier model, originally formulated by Hicks (1950) and seminally modeled by Serrano (1996), states that the increase in autonomous expenditures,

development on the supply side,[5] Fazzari, Ferri and Variato (2017: 3) conclude that "while long-run economic growth is demand-led, the model demonstrates that supply-side constraints may limit the maximum achievable growth rate."

Understood, therefore, as a complex phenomenon arising from factors related to both supply and demand, economic development is characterized by nine stylized facts or empirical regularities (Ros, 2013; McCombie and Thirlwall, 1994). Taking a poor economy as its starting point, the first stylized fact is a process through which resources, notably labor, are gradually reallocated from the traditional agrarian sector of low productivity to the modern industrial sector (i.e., the manufacturing sector) which, by virtue of its high capital-labor intensity and greater power to generate and diffuse technological progress, is considered to have the highest productivity in the economy. In short, this stylized fact implies that economic development is a process of continuous diversification and structural change directed to the industrial segments of higher productivity and technological sophistication (Lewis, 1954).

The second stylized fact highlights that since the manufacturing industry as a whole – for reasons mentioned in the first stylized fact – is the only sector subject to static and dynamic economies of scale,[6] as it grows and diversifies, absorbing resources from the low-productivity sector, it tends to command and sustain the increase in the average rates of productivity in the economy as a whole whilst significant inter-sectoral productivity gaps persist.[7]

The third stylized fact states that even when a country has already reached a level of per capita income close to the world average, thereby reaching the status of a developing or an emerging country, productivity gaps persist between agriculture, industry and services. In this perspective, Kaldor (1966) conceptualizes economic

in relation to the increase in the degree of capacity utilization, is one of the most important driving factors, through expectations, for triggering long-term demand, and consequently, for accelerating the investment rate and economic growth itself.

[5] Kaldor (1966) argued that the only potential limiting factor for growth on the supply side could be the availability of workers, but he argued that capitalists, once faced with such an impediment, would tend to introduce labor-saving technical progress.

[6] Static economies of scale occur when the unit costs of a firm, within a segment or within the manufacturing industry as a whole, are reduced due to an increase in production scales in response to increased investments. Dynamic economies of scale occur when the unit costs of a firm, within a segment or within the manufacturing industry as a whole, are reduced due to an increase in production scales in response to increased technological capacity building.

[7] This is the so-called Kaldor-Verdoorn law, according to which the higher the growth rate of industrial output (in value added), the higher the growth rate of industrial productivity. Since productivity growth in the non-industrial sectors depends on productivity growth in the industrial sector, this is, in the end, the main determinant of the rate of change of the average productivity of the economy as a whole. See Kaldor (1966) and McCombie and Thirlwall (1994, chapter 2).

development as a process through which an economy transitions from a stage of "immaturity" to a stage of industrial "maturity."

The fourth stylized fact is that only when a country reaches the stage of industrial maturity does the tendency to reallocate resources from the agricultural and industrial sectors to the higher productivity segments of the service sector reflect a deindustrialization process that could be understood as beneficial and natural. And at this point, having the agricultural sector already mechanized and the productivity levels significantly higher than at the traditional or intermediate stage, inter-sectoral productivity gaps will have been reduced to levels close to zero (Kaldor, 1966).

The fifth stylized fact asserts that if the development process is interrupted by premature deindustrialization before reaching the stage of industrial maturity, the economy loses structural traction to continue growing with positive and sustainable productivity gains in the long run (Palma, 2005).

The sixth stylized fact points out that the premature reallocation of workers to the service sector will not be problematic as long as it generates a strong synergy with the manufacturing industry. This means having service sector growth driven by the higher productivity segments – the information technology industry, communications and other digital technologies – and not by the low productivity sectors, such as commerce, retail and domestic services (UNCTAD, 2018, chapters II and III).

The seventh stylized fact states that for the development process not to be repeatedly aborted by balance of payment crises, the country should have an export basket of goods and services with greater dynamism in global markets than its import basket. This does not mean development strategies are guided by mercantilist practices that curb import flows throughout the development process, but that this process is accompanied by structural changes that promote a diversification in the pattern of international trade such that the income elasticity of long-term demand for exported goods is greater than the income elasticity of long-term demand for imported goods.[8]

The eighth stylized fact maintains that throughout the process of economic development, it is crucial that the two main macroeconomic prices (real interest rate and real exchange rate) are maintained tendentiously at their respective correct levels.

[8] In other words, to be successful, development must respect the so-called Thirlwall law, according to which the catching up of developing countries in the South relative to the developed countries of the North depends on the income elasticity of the former's exported goods being higher than the income elasticity of their imported goods. See Thirlwall (1979) and Cimoli and Porcile (2010).

This means that the average real interest rate should remain at a level below the average rate of return on capital and that the real exchange rate should keep the currency slightly undervalued. The need of keeping these two fundamental macroeconomic prices at their correct level is one of the central theses of the New Developmentalism, which was originally theorized by the Brazilian economist Luiz Carlos Bresser-Pereira.[9] In relation to the real interest rate, there is nothing to discuss since it determines, along with long-term expectations, business investment decisions (Keynes, 1936, chapter 11 and 12).

Yet the role of the real exchange rate has been the subject of considerable controversy in recent years. Some economists argue that the undervaluation of the domestic currency tends to worsen income distribution against the workers due to the fall in real wages.[10] However, as theoretically demonstrated by Krugman and Taylor (1978), Bresser-Pereira, Oreiro and Marconi (2014), and Ros (2013), this effect is only maintained in the short and medium term. In the mathematical model demonstrated by Ros (2013, chapter 11), and as demonstrated by Krugman and Taylor (1978) in their seminal paper, the effect of a real depreciation of the domestic currency is, in fact, to reduce real wages and, consequently, to negatively affect aggregate demand and economic growth in the short and medium term. However, the negative effect of the fall in real wages on growth is, according to Ros (2013, chapter 11), offset by the increase in the expected rate of profit, which in turn triggers capital accumulation and, consequently, boosts the average aggregate productivity of the economy in the long run.[11] The empirical literature is quite conclusive in this respect: assuming all else is held constant, overvalued currencies reduce long-run economic growth.[12]

[9] For details, see Bresser-Pereira (2016).

[10] This would occur because currency overvaluation helps depress domestic prices – either by reducing the costs of imported goods or by external competitive pressure – and, consequently, for a given nominal wage level, increases real wages. Laura Carvalho (2018: 62), a structuralist economist who calls into question the beneficial effects of currency undervaluation, says that, in the case of Brazil, "proponents of this strategy argue that, in the long run, labor productivity would grow faster thanks to development in more sophisticated sectors, which would also allow for faster wage growth in the future." And she concludes by saying that "the fact is we are not even close to that." However, her criticism has not caught on since the Brazilian currency (the *real*) remained tendentiously overvalued for most of the decade in which she focused her analysis on (2004-2014), and for the effects of a marginal undervaluation to be beneficial, it would have been necessary to maintain it in the long run.

[11] Note that one could argue that such a model runs counter to Keynes's hypothesis that investments do not depend on real wages (like the old "classicals" held and the "neoclassicals" still support). This is, in fact, true; however, the Ros model (2013, chapter 11) is in no way contrary to the Keynesian investment theory since the fall in real wages positively influences the expected long-term profit rate. In other words, it affects, indirectly and positively, the marginal efficiency of capital.

[12] See Razin and Collins (1999), Dollar and Kraay (2003), Williamson (2008), Rodrik (2008), Gala (2008), and Berg and Miao (2010).

The ninth and final stylized fact, according to Amsden (2001: 185-189), posits that there is no other instance after the Industrial Revolution – aside from the very rare exceptions of Hong Kong and Switzerland due to the historical specificities of the period in which they industrialized – where economic development has resulted from laissez-faire practices or unconditional adherence to free trade at bilateral, regional or multilateral levels.[13] In this respect, Chang (2003: 2) is adamant in stating that "developed countries could not be in their current position if they had used the same economic policies and institutions that they recommend to developing countries today" and that "most developed countries actively use industrial and trade policies that are considered 'bad policies' today," such as the protection of infant industries, export subsidies, among others that have practically been banned by multilateral agreements of the World Trade Organization (WTO)."

3. A brief review on Brazil's economic policies over the import substitution period (1930-1989) and after liberalizing economic reforms (1990-2018)[14]

Between the last quarter of the nineteenth century and 1930, the Brazilian economy was highly open to international trade and, despite the presence of a few infant low-tech industries, unable to show a vigorous industrialization process. In this period, Brazilian productive and export structures were strongly concentrated on coffee and other primary products of low income and low price-elasticity of demand. By depending on the export performance of these goods in the global markets, long-term economic growth in Brazil was driven by world markets and constrained by price volatility of its main exports. At the same time, in the absence of a vigorous manufacturing sector, a significant share of manufactured goods was imported (Furtado, 1959).

The dramatic crisis of the Brazilian primary export sector resulting from the Great Depression of the 1930s put an end to the previous development model and was responsible for the spontaneous process of industrialization based on import substitution (IS).[15] From the 1930s on, Brazil's long-term growth has been driven by

[13] See also Mazzucato (2015).
[14] Although our empirical estimates in Section 5 cover the period 1950-2011, it is important to briefly mention general economic history regarding the period 1930-1950. This section uses a part of the material written by one of us in another study (Nassif and Castilho, 2018).
[15] Furtado (1959).

the dynamism of the domestic market. However, the process of industrialization only gained momentum after 1950, especially under Getúlio Vargas's second-term (1950–1954) and Juscelino Kubistschek's (1956–1960) governments, which adopted several protectionist measures in favor of infant heavy industries.[16]

From the mid-1950s to 1979, industrial and trade policies maintained their essential elements. In each step of the IS process, governments targeted some industries as industrial policy priorities and combined high tariffs, import licenses and export subsidies (these latter especially after the 1970s) to protect the Brazilian manufacturing sector and boost exports of manufactured goods. In practice, the import license regime was only eliminated with trade liberalization in March 1990.[17] Even considering the two attempts at trade liberalization in 1966 and 1988, the economy maintained a very high protectionist structure — at least when compared to that adopted by the Asian Tigers at the height of their protectionist policies[18] — due to the prevalence of non-tariff barriers (NTB).[19] Another peculiarity of the industrial policy in Brazil is that the country has always been open to foreign direct investment (FDI) driven by multinational enterprises (MNE). Rather than focusing on technology transfer and technological spillovers, policies for attracting MNEs in Brazil targeted on the implementation of import substitution and, hence, aimed at reducing both technology and import dependencies related to balance of payments issues. Such a strategy contrasts with some Asian countries, such as Singapore and China, that were traditionally open to FDI inflows, but conditioned them to transfers of technology to local firms through joint-ventures, research and development (R&D) collaboration and other arrangements.

Although the protectionist policies are marked by several drawbacks, such as the absence of selectivity, excessive national content requirements and the survival of rent-seeking activities throughout the period 1957-1979, there was a fine harmonization between industrial and trade policies, in such a way that the latter was conditioned by the main goals of the several adopted National Development Plans. To a lesser extent, even the macroeconomic policy was coordinated with the instruments

[16] Tavares (1963).
[17] An import license as a sine qua non condition for an import to be approved lasted from 1947 to 1970, when the former was replaced by the "*guia de importação*" (an import document issued by the Foreign Trade Department, CACEX). Although the creation of this document has been justified for fulfilling statistical purposes, in practical terms it continued to work as an instrument of administrative import control. See Nassif (1995).
[18] See Amsden (2001).
[19] Nassif (1995).

and goals of industrial and trade policies. For instance, aiming at preventing overvaluation of the Brazilian currency comparatively to its main trading partners, the Brazilian government introduced a crawling-peg mechanism through which the domestic currency was almost monthly adjusted by the difference between Brazil's and those partners' inflation rates. This crawling-peg exchange rate regime lasted between 1968 and 1994, with the exception of short periods of interruption.[20]

Despite all the imperfections of the protectionist policies of the IS period, there is no doubt that they created the conditions for developing a diversified manufacturing sector in Brazil over time.[21] Although we recognize that such heavy protectionist measures have jeopardized the efficiency in the allocation of resources, it is clear that such static microeconomic inefficiencies were more than offset by the significant dynamic efficiencies of the Brazilian economy. In fact, between 1950 and 1979, labor productivity grew at 4.4 % per year, on average, while Brazil's real GDP boomed at 7.3% per year, on average, in the same period. Moreover, the labor productivity growth was accompanied by a sharp increase (3.3% per year, on average) in employment, also in the same period.[22]

Like most Latin American countries, Brazil's development strategies were highly dependent on foreign savings, especially through long-term foreign lending, which, borrowed under conditions of flexible international interest rates, was the main modality observed during the 1970s. The shock of international interest rates between 1979 and 1982 led Brazil and several other Latin American countries into a deep crisis (the external debt crisis) that lasted until the beginning of the following decade.

In fact, the eruption of the external debt crisis in 1980, which led to the collapse in international private capital flows to Latin American countries in 1982, meant a complete disconnection between industrial, trade and macroeconomic policies. These policies subsequently lost their most efficient tools for promoting catching up in Brazil. In fact, since a large amount of annual expenditures on external debt (principal plus interest expenditures) had to be paid, trade policies, especially import policy, became a powerful instrument for saving foreign exchanges — rather than being an industrial

[20] As Bonomo and Terra (1999: 413) remind us, despite "the frequency and size of exchange rate adjustments having changed over time, the choice of exchange rate adjustment procedure has been intentional, aiming at the desired real exchange rate path."

[21] For a comparison between Brazil and several developing countries, see Amsden (2001).

[22] Data on labour productivity growth were calculated by the authors, based on the Groningen Growth and Development Centre Database (https://www.rug.nl/ggdc/productivity/10-sector/). Access on January 8, 2019. Data on Brazil's real GDP growth was extracted from the Brazilian Institute of Geography and Statistics (IBGE).

policy tool. Despite a program of tariff reduction having been adopted in 1988, the prevalence of several non-tariff barriers implied that the effective protection in Brazil was practically unchanged (Kume, Piani and Souza, 2000). A definitive trade liberalization program would be only adopted in the early 1990s.

After a long period of industrialization driven by import substitution (1930-1989), Brazil adopted a unilateral trade liberalization reform between March 1990 and December 1994 together with other liberalizing reforms, such as financial deregulation and opening of the capital account. Trade liberalization was characterized by the elimination of most non-trade barriers (NTBs) and a relatively rapid tariff reduction.[23] Comparatively to other experiences of trade liberalization in developing countries during the 1980s and the 1990s, the Brazilian trade reform represented a deep microeconomic shock for three reasons: first, it was concluded in a relatively short period of time (around 4 years), differently from South Korea and India, whose trade liberalization reforms lasted around 5 (from 1983 to 1988) and more than 10 years (from 1991 on), respectively; second, contrary to the recommendations of trade liberalization literature, the elimination of NTBs and the reduction of import tariffs were jointly introduced, and trade reform was adopted together with the liberalization of the capital account as well as within a context of sharp overvaluation of the Brazilian currency;[24] and third, again, differently from South Korea and India, which preserved industrial policy together with their trade liberalization programs as a strategy for pursuing catching up, industrial policy practically disappeared from the government's policy focus in Brazil between 1990 and the early 2000s, even after the conclusion of trade reform.

Despite the negative microeconomic shocks, several studies show sound empirical evidence that between 1990 and 1998 labor productivity registered significant annual average growth rates in Brazil, reversing the low and stagnant annual average growth rates shown in the previous decade (the so-called "lost decade" of the 1980s, a period of external debt crisis and chronic inflation).[25] Additionally,

[23] Between 1989 and 1994, while the average nominal import tariff for all goods in Brazil was reduced from 39.6% to 11.2%, the standard deviation dropped from 14.6% to 5.9% in the same period. See Kume, Piani and Souza (2000: 11) and Abreu (2004).

[24] On the recommended sequence and speed for trade liberalization, see Bhagwati (1978) and Michaely, Papageorgiu and Choski (1991). For Brazil and South Korea, see Moreira (1995). For Brazil and India, see Nassif (2003; 2007).

[25] Since the early 1980s, Brazil was suffering from a chronic inflation process, which would only be definitively stabilized in 1994, with the Real Plan (*Plano Real*). The aggravation of this high inflation process throughout the 1980s and the early 1990s resulted from the inertia derived from the general indexation of the economy to past inflation and inflation expectations. Indeed, the original root of such

notwithstanding the use of different methodologies for measuring productivity, the labor productivity growth observed in the first half of the 1990s in Brazil was undeniable. In a panel data econometric model based on industrial plants, Nassif (2005), for instance, estimated that labor productivity in the manufacturing sector grew at 1.4% between 1988 and 1994, and 5.0% between 1994 and 1998. These results confirm similar empirical evidence of previous studies, which had also attributed such performance to the positive impacts of the Brazilian trade liberalization.[26] However, such efficiency growth was mainly due to a labor shortage as well as the renewal of machine & equipment through the import of capital goods, rather than to technical change diffusion (Feijo and Carvalho, 2002, Nassif, 2005, and Kupfer, 2005). In other words, unlike what had been observed between 1950 and 1979, the gains from productivity in the aftermath of the Brazilian trade liberalization resulted essentially from a static reallocation of resources, rather than from dynamic change.

After the conclusion of trade reform and after the stabilization of high inflation in 1994 ("Real Plan"), Brazilian average import tariff remained practically unchanged, while industrial policy was almost completely absent. However, from 2004 on, during Lula da Silva's (2003-2010) and Dilma Rousseff's governments (2011-2014), industrial policy returned as one of the leading mechanisms for promoting activities considered strategic for accelerating structural change towards scale-engineering-and-knowledge-based industries as well as diversifying productive and export structures.[27] The three industrial policy program adopted in this period also aimed at boosting physical investment and innovation in the Brazilian economy. These plans, however, repeated old mistakes and well-known misleading policies that had prevailed during the time of the import substitution period: lack of selectivity and performance requirements from entrepreneurs who benefited from public incentives; an excessive use of public subsidies as the main instrument of governmental support, especially credit subsidies from the Brazilian Development Bank (BNDES); and, last but not least, a weak coordination between industrial, trade and macroeconomic policies.

As shown by Nassif, Bresser-Pereira and Feijó (2018), the main role of a

---

an inflationary process was linked to the beginning of the external debt crisis, especially after 1982, when the Brazilian government decided to purchase most of the private debt stock. This decision worsened the fiscal conditions and contributed to accelerating both inflation expectations and actual inflation. See Biasoto Jr. (1988).

[26] See Hay (1997), Bonelli and Fonseca (1998), Rossi Jr. and Ferreira (1999), and Bonelli (2002).

[27] For an analysis of the three programs of industrial policy adopted between 2004 and 2011, see Coutinho et al. (2012) and Castilho and Miranda (2017).

consistent macroeconomic regime is to widen the policy space for seeding good results from the industrial policy. Consistent macroeconomic policies create an environment favorable to capital accumulation, innovation and structural change oriented to economic development and catching up. However, the weak harmonization of industrial and trade policies with the macroeconomic policy in Brazil since the early 2000s can be explained by the peculiarity of the Brazilian macroeconomic regime, which albeit introduced in 1999, still prevails in the current economic environment. Such a macroeconomic regime, anchored in the so-called macroeconomic tripod (inflation-targeting regime, floating exchange rate regime and targets for primary fiscal surpluses), has been relatively successful at providing short-term price stability, but not for putting the economy in a sustainable long-term growth and catching up trajectory.

Specifically, as the inflation targeting regime has been managed in a very orthodox way in Brazil — e.g., a strong focus on the goal of keeping inflation expectations close to the inflation target, comparatively to the goal of reaching full-employment; the commitment of reaching the inflation target in just one calendar year; etc. —, 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.

Such trends have been aggravated by the country's high degree of openness to capital flows, which has not only reduced the autonomy of monetary policy, but also put the Brazilian economy in a vicious cycle. In fact, the following stylized fact has been characterizing the macroeconomic regime in Brazil since 1999: In the face of increasing inflation expectations or actual inflation, the central bank immediately reacts by driving short-term policy rates upwards. If other macroeconomic indicators are relatively sound (as of 2005 in Brazil), and given the absence of mechanisms for capital control,[28] the increasing differential between domestic and foreign interest rates attracts excessive net capital inflows. Consequently, the Brazilian domestic currency tends to appreciate in nominal and (given the unchanged price level in the very short run) real terms. As the main transmission of monetary policy in Brazil is through the real exchange rate,[29] inflation expectations and actual inflation tend to match the

[28] In 2009, Brazil introduced a 2% financial tax against short-term capital inflows, which was later increased to 6% in 2010. Such taxes, which would be eliminated in 2011, however, had been a desperate attempt at deterring a larger overvaluation of the Brazilian currency, rather than a policy aiming at providing a competitive real exchange rate in Brazil and helping to reduce the high volatility of the exchange rates in the Brazilian exchange markets.
[29] See Nassif, Feijó and Araújo (2019).

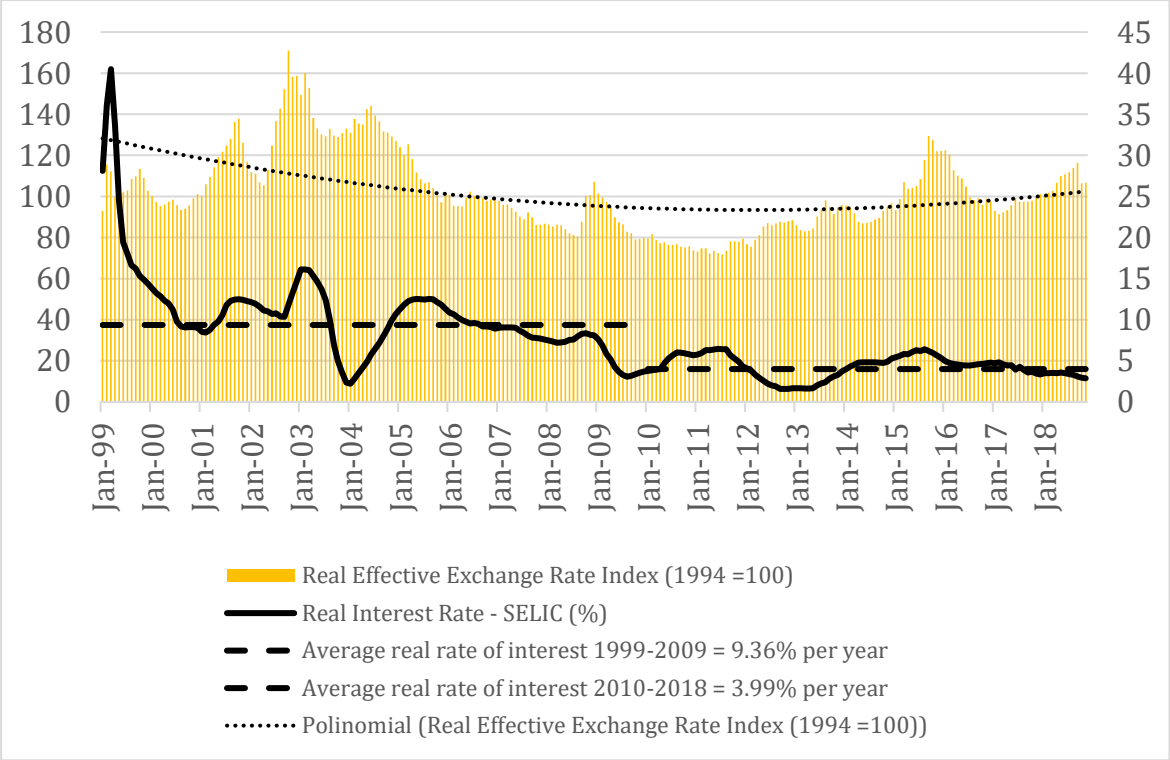
annual target, but in the meantime, if there is any domestic or external shock, the country faces capital flight and sharp nominal and real currency depreciation. To minimize the pass-through of the higher costs of depreciation to prices and deter capital flight as well, the central bank is obliged to increase nominal short-term policy rates again. In short, although the inflation targeting regime provides apparent short-term price stability, in the long run neither price stability nor economic growth is assured.

Figure 1 shows the movement of ex-post short-term real interest rates (in percentage on the right axis) and real exchange rates (in index numbers on the left scale) between 1999 and 2018.

Figure 1

Ex-post short-term real interest rates (in percentage) and real effective exchange rate indices in Brazil, 1999-2018

(1994=100)



Source: Central Bank of Brazil for short-term nominal interest rates and real effective exchange rate indices. Brazilian Institute of Geography and Statistics (IBGE) for consumer inflation rate (IPCA). Real interest rates (SELIC) calculated by the authors and deflated by IPCA.

Despite the real interest rate dropping to a historically low level at the end of 2018 (around 2.9% per year), the average that prevailed between 1999 and 2018 was very high (7.7% per year), compared with that which prevailed in developed and many

other developing countries. Figure 1 also shows that the average real interest rate (the broken lines) over the 2000s was much higher (9.4% per year between 1999 and 2009) than that of the 2010s (4% per year between 2010 and 2018). The Figure also clearly shows a marked trend of real appreciation of the Brazilian currency between the end of 2005 and the beginning of 2015 (the dotted line). In mid-2011, the level of overvaluation reached almost 30% in relation to the long-term real exchange rate equilibrium. As shown by Nassif, Feijó and Araújo (2017), this misalignment has only been corrected by the sharp depreciations observed in the aftermath of domestic or international shocks.

The most damaging consequences of the overvaluation trend of the Brazilian currency throughout the 2000s were not only the aggravation of Brazil's premature deindustrialization (Nassif, Feijó and Araújo, 2015; Nassif, Bresser-Pereira and Feijó, 2018), a phenomenon that had begun in the mid-1980s (Nassif, 2008), but also a sharp reprimarization of the country's export basket. Between 2000 and 2016, the share of manufactured goods in Brazil's total exports decreased from around 71% to 53%, while the share of primary goods in total exports increased from around 26% to 45% in the same period (Nassif and Castilho, 2018).

As mentioned before, between May and November 2018, Brazil's short-term nominal interest rate was kept at historically low levels (6.5% per year, corresponding to around 4.0% annualized in May and 2.9% annualized in November, in real terms). However, for such levels to become permanently the "new normal" will depend on the transformation of the inflation targeting to a more flexible regime in Brazil as well as the ability of the central bank to preserve the long-term balance of payments equilibrium. As Nassif, Bresser-Pereira and Feijó (2018) suggested, Brazil should mirror most countries that operate their monetary policy through an explicit inflation targeting regime and lengthen the time horizon to bring inflation back to target from one calendar year to two or three calendar years. This could amplify the policy space for keeping nominal and real interest rates at lower levels. Yet the long-term balance of payments equilibrium, assuming that the real exchange rate reaches a competitive rate (that is to say, a small real undervaluation), will depend on the ability of central bank to prevent new trends of real exchange rate appreciation. These trends can be avoided by adopting a mix of exchange rate policy mechanisms (e.g. interventions in spot and forward exchange markets, ad hoc capital controls, etc.), as suggested in several official documents of the International Monetary Fund (Blanchard et al. 2010,

2013; Ostry et al., 2012).

4. The breakdown of Brazil's labor productivity growth: has labor productivity behavior been growth-enhancing or growth-reducing?

Productivity is a measure of the efficiency of the economy's ability to transform inputs into outputs and is essential for the country's long-term growth. Productivity growth generates more products with the same production factors over time, and, due to the new investment opportunities, it also produces positive spillover effects on the economy as a whole. Cavalcante and De Negri (2014) argue that 30% to 50% of Brazil's per capita GDP growth over the last decade was a result of higher employment rates and greater participation in the formal labor market. Similar results were found by Bonelli and Fontes (2013). However, according to the demographic projections of the Brazilian Institute of Geography and Statistics (IBGE, in Portuguese), these rates will not have vigorous growth in the future. As a result, per capita GDP growth in Brazil will heavily depend on the country's long-term productivity growth.

In this section, we will use the methodology proposed by McMillan and Rodrik (2011). As mentioned in Section 1, the authors, influenced by the seminal empirical methodologies carried out by Kuznets (1957, 1979) and Chenery (1979), broke down the average labor productivity growth into two components: the between effect and the within effect. The between effect (or structural change) component is driven by a reallocation of labor from the primary sector to the manufacturing sector (or, if it is the case, also to the higher labor productivity segments of the service sector); and the within effect component is explained by sectoral characteristics, such as capital-labor ratio, technical progress, etc.

Data on real value added (expressed in 2005 US dollar) and employment were drawn from the Groningen Growth and Development Center (GGDC) database for the period 1950-2011. According to Timmer, de Vries and de Vries (2014:3), this "is the first database to provide long-term series on sectoral developments and is constructed on the basis of an in-depth study of available statistical sources on a country-by-country basis, covering data from Asia, Europe, Latin America and the US." Variables covered in the data set are value added, output deflators, and persons employed in ten broad sectors from 1950 onwards. The data, consistently organized and compiled from each country's official data, were originally available for ten sectors covering the

total economy.[30] However, since our empirical purpose is to analyze Brazil's economic development and stagnation under the lens of labor productivity growth in the period 1950-2011, they were grouped into five major sectors from which it is possible to implicitly capture those with lower or higher potential of spreading out their gains from economies of scale, as well as from labor productivity, to the economy as a whole. These five sectors were: Agriculture and Mining; Manufacturing; Construction and Energy Infrastructure (construction and utilities, including electricity, gas and water supply); Services of low skilled labor (trades, restaurants and hotels; government services; and community, social and personal services); and Services of high skilled labor (transport, storage and communication; finance, insurance, real state and business). The labor productivity *y* was estimated as the ratio of each sector *i's* value added (VA^i_t) in time *t* to the corresponding sectoral employment (EMP)^i_t, as follows:

$$y = (VA)^i_t/(EMP)^i_t \qquad (1)$$

Labor productivity was calculated for three subperiods: 1950-1979; 1980-1994; and 1995-2011. The first subperiod, 1950-1979, coincides with Brazil's rapid industrialization, with high and sustained investment rates and with GDP growth, as discussed in Section 3. The second subperiod, 1980-1994, was that in which the Brazilian economy, like other developing economies in Latin America, suffered from an external debt crisis, a shortage of international credit and very high inflation rates. On account of low investment rates and high inflation, this period marked the beginning of economic stagnation in Brazil. The third subperiod, 1995-2011, covers the period after the stabilization of high inflation under the Real Plan (Plano Real, 1994). This subperiod coincided both with China's economic boom as well as its positive impact on commodity prices, and with the 2008 global financial crisis and a sluggish world growth since then.

Figure 2 illustrates the share of sectoral labor in total employment in Brazil in the 1950-2011 period. According to McMillan and Rodrik (2011), if labor moves from lower-productivity to higher-productivity sectors, a convergence process will take place, reducing labor productivity differentials between poor and rich economies. However, contrary to well succeeded experiences of catching up, Figure 2 registers that, in Brazil, the labor reallocation occurred mainly by displacing employment from

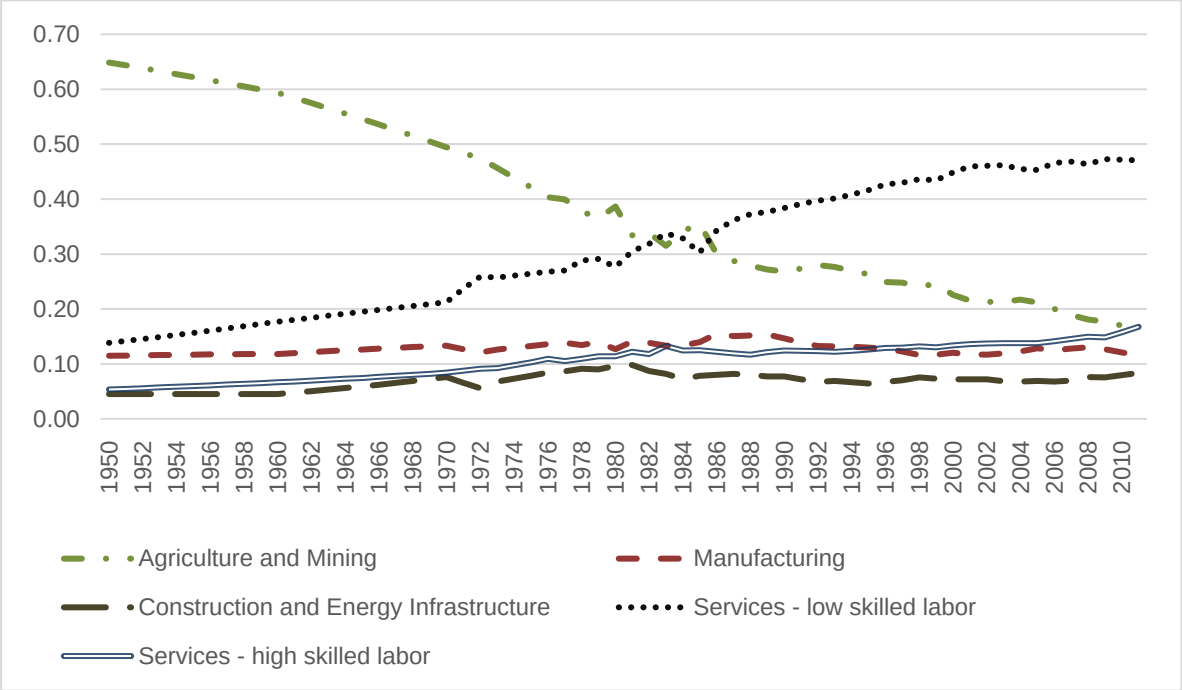
[30] For the GGDC 10-Sector Database, see the Groningen Growth and Development Center web page http://www.ggdc.net/databases/10_sector.htm. For more details on the database, see Timmer et al. (2014, 2015). Accessed on June 2, 2018.

Agriculture and Mining to the Services sector, especially to the segments of low skilled labor and lower productivity. The share of employment in Agriculture and Mining in total employment was almost 75% lower in 2011 compared to 1950, while the share of employment in Services (low and high skilled ones) increased 227% in the same period. With respect to the share of employment in Construction and Energy Infrastructure, this increased by 85%, and in the Manufacturing Sector this share was kept practically unchanged between 1950 and 2011. These perverse dynamics tend to put downward pressure on Brazilian labor productivity growth, increasing Brazil's productivity gap with rich countries.

Figure 2

Share of sectoral labor in total employment, 1950-2011

(in percentage)



Source: Groningen Growth and Development Center database.

Table 1 displays average growth rates of labor productivity in Brazil between 1950 and 2011. We can clearly divide the series into two marked subperiods. The first covers the decades of sustained economic growth observed between 1950 and 1979. During this subperiod labor productivity grew at 4.4% per year, on average, and Brazil's real GDP boomed at 7.3% per year, on average, as mentioned in Section 3. The second subperiod (1980-2011), on the other hand, was marked by long-lasting economic stagnation, during which annual growth of labor productivity stood at a

negative rate (-0.2% per year) and real GDP growth was sluggish (2.8% per year).[31] [32] These results are aligned with Kaldor's (1966) argument according to which labor productivity growth has a marked pro-cyclical behavior.

Table 1

Average annual growth rates of labor productivity in Brazil, 1950-2011

(in percentage)

	Agriculture and Mining	Manufacturing	Construction and Energy infrastructure	Services of low skilled labor	Services of high skilled labor	Total economy
1950-1979	3.2	4.1	2.2	1.1	3.6	**4.4 (*)**
1980-1994	1.6	-1.7	0.4	-2.2	-1.4	**-0.9**
1995-2011	4.9	1.2	-0.8	0.0	-1.1	**0.8**
1980-2011	4.0	-0.5	0.1	-1.6	-1.8	**-0.2**
1950-2011	3.7	2.0	1.2	-0.1	0.8	**2.1**

Note: (*) The higher growth rates for the total economy than those registered for each of the five groups described in Table 1, relative to the period 1950-1979, reflects the significant growth rates of the transport, storage and communication sector (5.9 per cent per year).Source: Calculated by the authors, based on Groningen Growth and Development Center database.

One could argue that the stability of the employment share of the manufacturing sector in Brazilian total employment between 1950 and 2011 contradicts the evidence of premature deindustrialization in Brazil. However, it is worth remembering that premature deindustrialization can emerge from either a drop of employment share in the manufacturing sector in the total employment (Rowthorn and Ramaswamy, 1999) or a significant decline of the manufacturing sector's value added share (measured in real terms) in total GDP (Kaldor, 1966; Rodrik, 2016), or even from a significant and early reallocation of resources from the Agriculture, Mining and Manufacturing sectors to the low skilled labor segments of the service sector (UNCTAD, 2003; Palma, 2005). In each one of these cases, the general consequence is that the average labor productivity growth becomes stagnant for a long period of time.

[31] Data on Brazil's real GDP growth was extracted from the Brazilian Institute of Geography and Statistics (IBGE).

[32] Based on the Brazilian Institute of Geography and Statistics (IBGE) and estimates from the Brazilian Institute of Economics (IBRE-FGV, in Portuguese), we estimated that the annual labor productivity growth for the period 2012-2018 in Brazil was negative (at -0.4%, on average). This means that, since the annual labor efficiency growth of the Brazilian economy was around 0% between 1995 and 2018 (indeed, 0.2% p.y., on average), these results reinforce our argument that Brazil was unable to escape from economic stagnation even after the stabilization of high inflation in the mid-1990s. However, as these databases are not compatible with the Groningen Growth and Development Center Database, we could not extend our statistical and econometric tests the most recent period.

.

In the case of the United States, for example, as shown by Baily and Bosworth (2014), its deindustrialization, which is far from being a premature phenomenon, has been predominantly characterized by a large drop in the absolute *level* of manufacturing employment, while the manufacturing output share of GDP has remained stable between 1960 and 2010. According to the authors, deindustrialization in the US has resulted from the accelerated technological change in recent decades in this country. In this case, deindustrialization is not seen as a damaging phenomenon. As Rodrik (2016:1-3) comments, while in the US "manufacturing value-added (MVA) has remained a constant share of GDP at constant prices – a testament to differentially rapid labor productivity growth in this sector (…), with some exceptions, confined largely to Asia, developing countries have experienced falling manufacturing shares in both employment and real value added, especially since the 1980s."

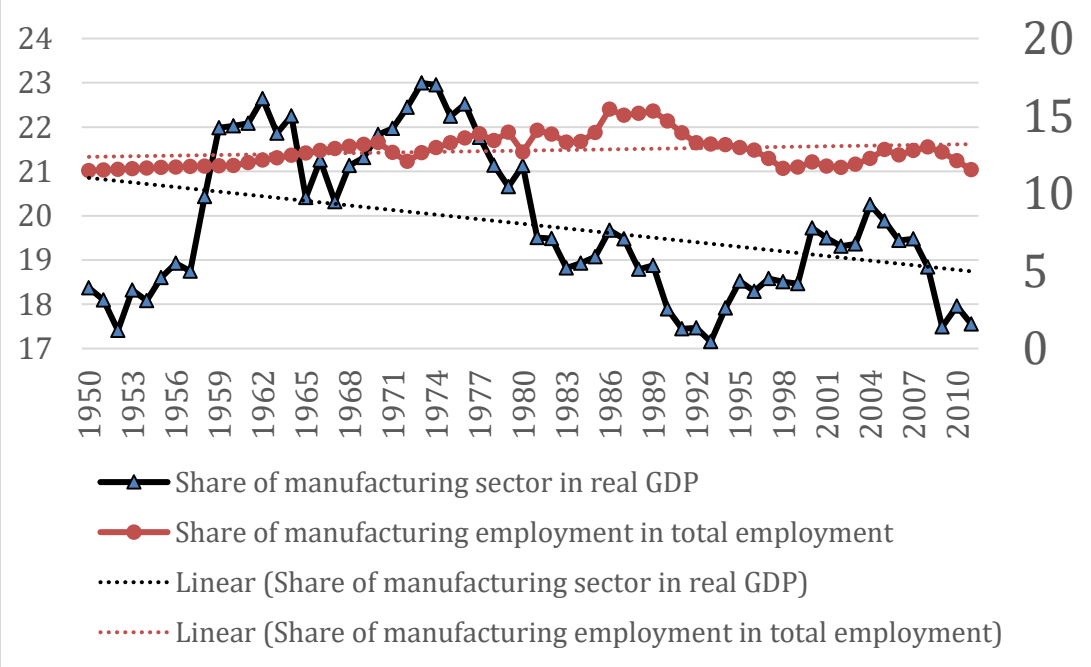
By comparing economic performances of Asian and Latin American countries since the 1990s, Paus (2018:73) stresses that "in Asia, production and employment shifted from lower- to higher-productivity sectors. But in Latin America, labor shifted to lower productivity activities." It is worth noting that since the end of the 2000s, some authors have frequently argued that economies experiencing very low rates of productivity growth have fallen into a middle-income trap. This expression was coined by Gill and Kharas (2007) to refer a situation in which a country, after reaching a per capita income level around the average of the world economy becomes unable to continue following its catching up trajectory. However, Bulman, Eden and Nguyen (2018: 43) showed convincing empirical evidence that "countries that grow fast continue to grow fast, and they do not get "stuck" at any particular middle-income level," signifying that there is, in fact, no natural trend to a middle-income trap. With consistent economic policies, developing countries can escape from becoming trapped in middle-income levels.

In the case of Brazil, as Figure 3 shows, premature deindustrialization has been a phenomenon characterized by a significant fall of the manufacturing sector's valued added share (measured in real terms) in total GDP. In 1973 and 1974, after the relative success of the import substitution strategy implemented since the 1950s, manufacturing output represented 23.0% of total output. It slowly declined over the 1980s and early 1990s, a period marked by high inflation and great imbalances on the external and internal debts. In 1993, the manufacturing sector's output share in total GDP had declined to 17.2%, the lowest figure in the series. Price stabilization in the

mid-1990s helped recover the share of the manufacturing industry, but during the mid- to late 2000s deindustrialization deepened, and by 2011 the share of the manufacturing sector was close to that registered in the early 1990s (17.6%). In contrast with the decline in the share of real value added, the share of the industrial employment in total employment had been rather stable (12.8% on average in the period). Actually, as seen in Figure 2, labor reallocation did occur from the Agriculture and Mining sector to the lower productivity segments of the Service sector, and not to the higher ones. Therefore, deindustrialization in Brazil, as measured by a declining share of the real value added of manufacturing sector in total economy, though keeping a stable share in total employment, is far from signalizing a virtuous structural change in the manufacturing sector. On the contrary, it clearly shows that the manufacturing sector has been losing competitiveness, indicating premature deindustrialization. This finding is in accordance with other empirical studies on this phenomenon in Brazil (see Nassif, 2008; Oreiro and Feijó, 2010; and Bacha, 2013).

Figure 3

The Brazilian manufacturing sector: share of real value added in real GDP and of employment in total employment, 1950-2011 (in percentage)



Source: Elaborated by the authors, based on Groningen Growth and Development Center database.

Indicators from Table 1 also call attention to the underperformance of the labor productivity growth rates of the Manufacturing group after the 1980s. Given the theoretical and empirical evidence that this sector is the main engine of a country's long-term growth, as discussed in Section 2, these results are worrying. In fact, in addition to the Brazilian Manufacturing sector showing negative annual growth rates of productivity labor between 1980 and 1994 (-1.7%), it has also exhibited, even after the stabilization of high inflation between 1995 and 2011, lower annual growth rates (1.2%) than traditional sectors, such as Agriculture and Mining (4.9%).

Inspired by the Structuralist literature, McMillan and Rodrik (2011) describe the process of structural transformation in two key dynamics. In the first step, a poor country has few modern industries in non-agriculture activities and, even though agricultural productivity level is very low, the productivity gaps between sectors are not large. In the second step, economic growth takes place through investments and capital accumulation in modern industries, urban areas, and activities of more technological intensity, widening the gap between traditional and modern sectors. At the same time, it is assumed that labor begins to move from traditional to modern activities and, after some time, this second force becomes dominant and the productivity levels begin to converge within the economy as a whole. According to the authors, "without the first [movement], there is little that propels the economy forward. Without the second, productivity gains do not diffuse in the rest of the economy" (p. 10).

Following McMillan and Rodrik (2011), the decomposition of labor productivity growth can be expressed by:

$$\Delta Y_t = \sum_{i=n} \theta_{i,t-k} \Delta y_{i,t} + \sum_{i=n} y_{i,t} \Delta \theta_{i,t} \qquad (2)$$

where Δ refers to changes between the periods *t-k* and *t*; Y_t is the labor productivity of the economy as a whole; $y_{i,t}$ is the sectoral productivity in period *t* for each sector *i*; and $\theta_{i,t}$ is the share of employment in sector *i*. The first term is the within component of productivity growth, while the second term captures structural change effect. The decomposition of labor productivity growth may reveal whether its growth dynamics was achieved by labor reallocation from low to high productivity sectors (structural change component) or by technological progress (within component). The second term of equation (2) represents the inner product of productivity levels. If changes in employment shares between sectors are positively correlated with productivity levels,

this term will be positive, indicating that structural change will have contributed to increasing the economy's aggregate productivity growth.

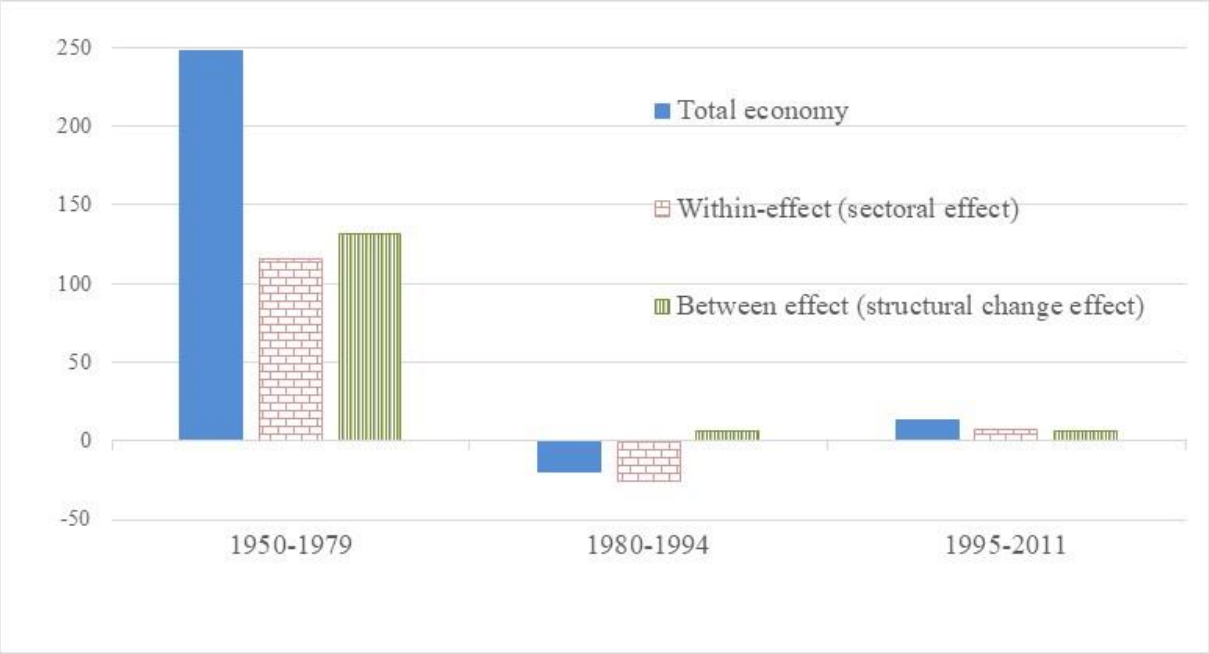
McMillan and Rodrik (2011) stress that, before a country has reached a level of productive maturity, if its labor productivity gains are predominantly driven by intra-sectoral effects (or "within" change), without having significant "between" effects (or structural change), such efficiency gains will be ***growth-reducing***. In contrast, a developing country that has not caught up with developed countries' per capita income levels is better positioned to have labor productivity gains that are ***growth-enhancing*** if these gains are translated into strong between effects (or structural change effects).

Figure 4 shows labor productivity growth (in accumulated percentage rates) in Brazil between 1950 and 2011. The results show that labor productivity behavior in Brazil between 1950 and 1979 was markedly growth-enhancing, for accumulated labor efficiency growth (around 247%) was commanded by the structural change effect (131 p.p.), although the within effect was also significant (116 p.p.). However, in the 1980s the economy suffered an inflection in the trend of productivity growth: the accumulated labor efficiency growth was negative in the period 1980-1994 (-19.5%), while it was only marginally positive in the period 1995-2011 (13.5%), when the within effect prevailed over the structural change effect. As shown in the previous results, from the 1980s on, the reallocation of labor in Brazil occurred mainly from the Agriculture and Mining sectors to the Services of low skilled labor. Such adverse dynamics represented a negative impact on long-term economic growth, undermining the possibility of Brazil reducing the productivity gap with developed economies. Summing up, while the Brazilian economy benefited from a growth-enhancing labor productivity change during the first three decades of industrialization (1950-1979), in the period 1980-2011 the underperformance of labor productivity was unequivocally growth-reducing.

Figure 4

Change and decomposition of accumulated rate of labor productivity growth in Brazil, 1950-2011

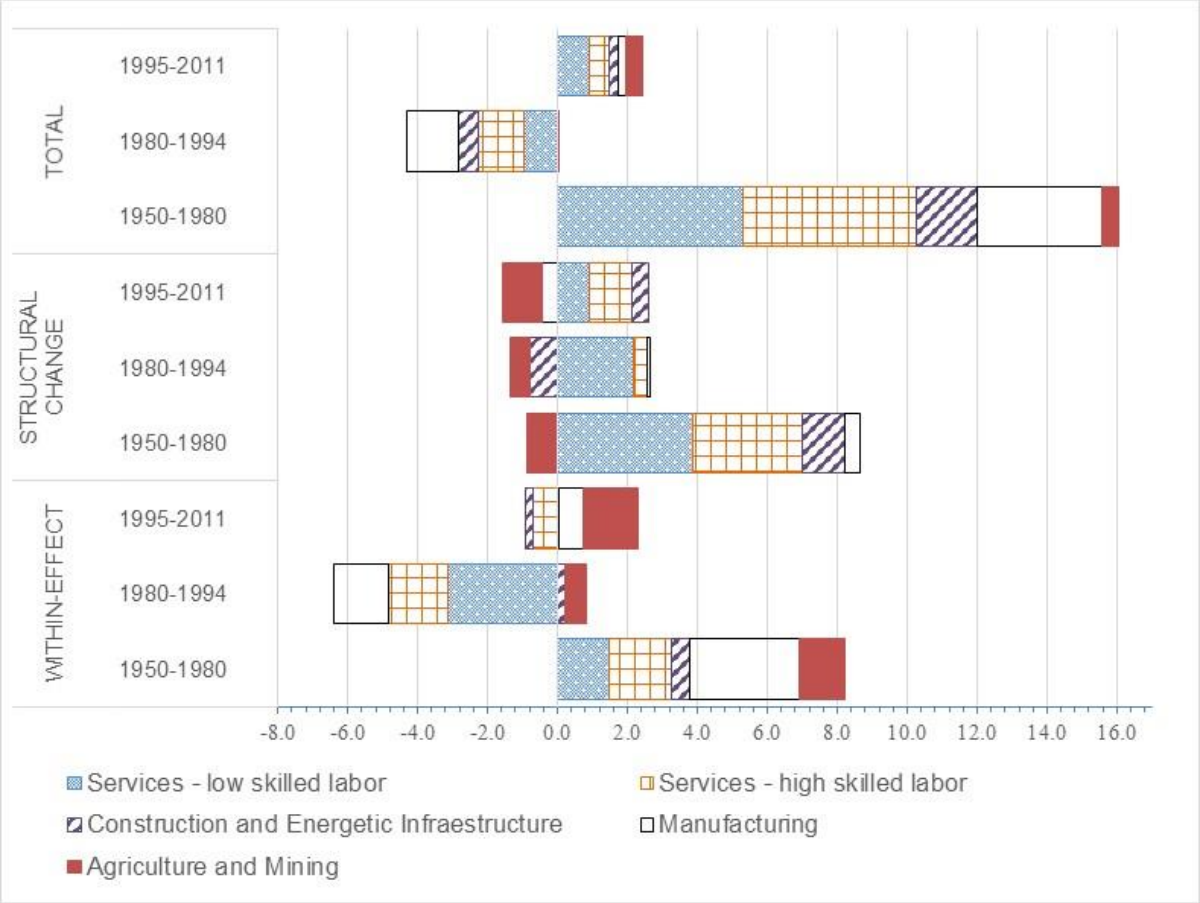
(in percentage)



Source: Calculated by the authors, based on Groningen Growth and Development Center database.

Figure 5

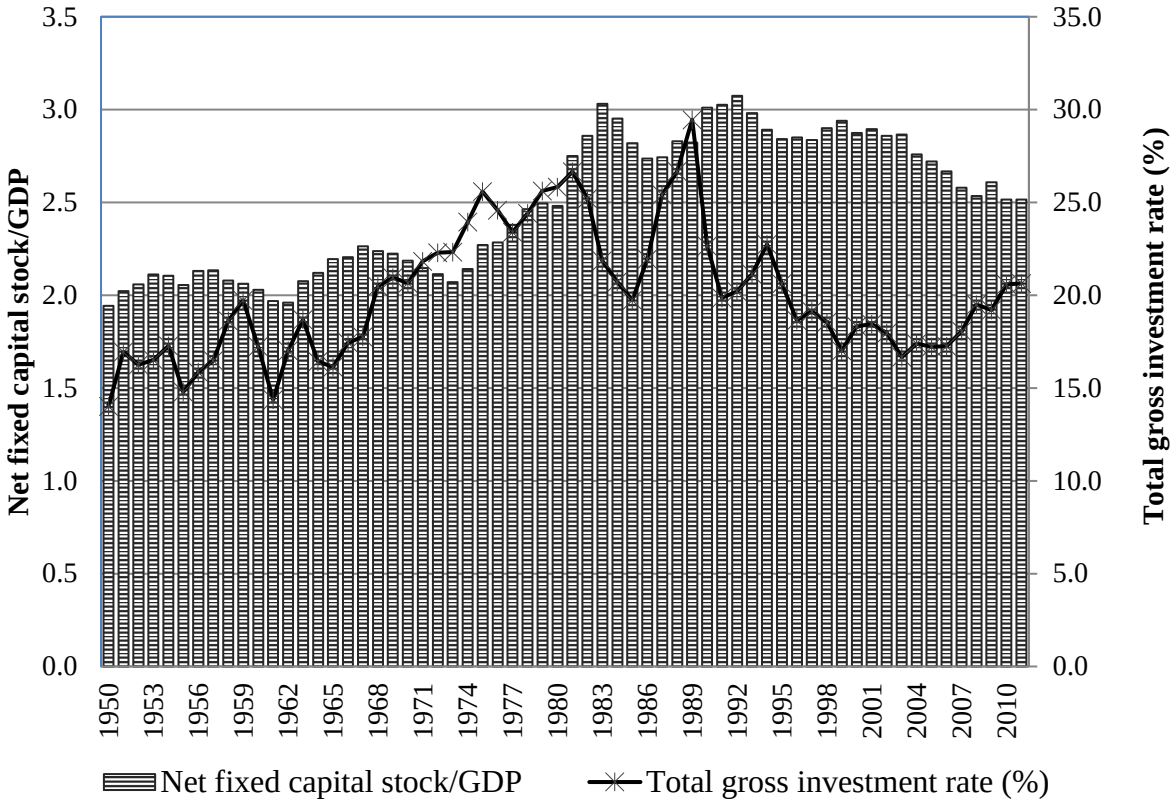
Sectoral labor productivity growth: within and structural change effects, 1995-2011; annual growth rates



Source: Calculated by the authors, based on Groningen Growth and Development Center database.

In Figure 5 we can see the disaggregation of labor productivity growth by sectors and periods analyzed. The structural change component of labor productivity growth was strongly positive in Services of both low and high skilled labor in all periods analyzed, positive in Construction and Energy Infrastructure sectors in the subperiods 1950-1979 and 1995-2011, and positive in Manufacturing in the subperiods 1950-1979 and 1980-1994. The results show that, even in the first period 1950-1979, productivity gains in the Manufacturing sector in the Brazilian economy resulted from the within effect rather than structural change. And since the 1980s, the most important structural change effects in the Brazilian productive sectors have not occurred in more technologically advanced activities or sectors which promote and sustain long-term economic growth, confirming the initial results that the labor productivity growth in the recent decades in Brazil has been toward a growth-reducing direction.

Figure 6: Net fixed capital stock as a proportion of GDP at 2010 prices, and investment rate at current prices (in percentage), 1950-2011



Source: Morandi (2016)

Figure 6, which presents the ratio of the Brazilian net fixed capital stock to GDP at 2010 prices and total gross investment rate (investment as a proportion of GDP at current prices) in the period 1950-2011, confirms such weak dynamics of the long-term labor productivity in Brazil. Investment rates, which had shown very high levels in the 1970s (23.7% on yearly average), experienced a sharp drop throughout the first half of the 1980s and, despite having a wave of recovery in the second half of that decade, have not since returned to levels necessary for sustaining a sound capital accumulation. Between 1990 and 2011, the annual average level of Brazil's investment rate stood at only 19.2% of GDP. In fact, as Figure 6 also suggests, the reduction in investment rates has negatively affected the Brazilian net fixed capital stock as a proportion of GDP (expressed in real terms), which has shown a downward trend after 1992. These results are similar to those for most Latin America countries, as estimated by Rodrik (2011) and Pagé (2010).

5. The main determinants of the economic stagnation in Brazil: econometric results

In this section we will present the results of our econometric exercise to discuss, in empirical terms, the determinants of labor productivity growth in the Brazilian economy during the period 1995-2011, the period when labor productivity growth was stagnant. There is a relative consensus that the stagnation of productivity growth in the subperiod 1980-1994 is explained by the external debt crisis and chronic inflation rates that dominated the macroeconomic scenario and imposed severe restrictions on economic growth.[33] Once price stabilization had been achieved in mid-1994, and the process of economic opening had been deepened, the expectation was that productivity growth would resume. However, as seen in the previous section, productivity growth continued to be stagnant. With the goal of investigating the main factors explaining such long-term economic stagnation, we ran econometric regressions as follows: first, we regressed the overall labor productivity growth during the period 1995-2011 to several explanatory variables (all expressed in logarithms); and second we replicated these regressions, taking as dependent variables the structural change and the within components, respectively. Particularly, the regressions using the former component as a dependent variable is especially important because, since the Brazilian economy has not already reached a maturity stage, the almost lack of structural change can be associated with stagnant labor productivity growth in the period under analysis, as suggested by Rodrik (2016) and by Castillo and Martins Neto (2016) for several Latin American countries, including Brazil.

Table 2 displays the explanatory variables as well as the expected signs of their respective estimated coefficients. In addition to the variables suggested by McMillan and Rodrik (2011), we added others adapted to Brazil's specific economic context in the period. Specifically, our explanatory variables and their respective justifications are described as follows: the *share of employment in the services of low skilled labor in total employment* reflects the fact that there has been a significant shift of labor from Agriculture and Mining to this segment of the service sector in Brazil since the early

[33] See Carneiro's book (2002), which presents a detailed analysis of this period and also quotes several other studies that support this conclusion.

1950s, and not to the Manufacturing sector or even to the high skill labor segments of the service sector, as already shown in Figure 2; the *share of primary goods export in total exports* were included because the sharp drop of the share of manufactured goods in the Brazilian total exports in the period 1995-2011 (from 77% to 61%) was replaced by a significant increase of the share of primary goods (from 21% to 35%), signalizing a deepening of the Brazilian specialization in commodities and other goods of low technological sophistication (Nassif and Castilho, 2018: 42); since high *real interest rates* and overvaluation of the domestic currency (*real effective exchange rate*) have been the general trend in Brazil since the mid-1990s (see Figure 1) – a situation that contributes to worsening the labor productivity growth, as discussed in Section 2 –, the inclusion of these two explanatory variables were essential to investigate probable causes of the Brazilian economic stagnation; and finally, the *average import tariff* and the *degree of trade openness* as explanatory variables were included to investigate if factors associated with the supply-side (external competition, access to global knowledge, and others) could also be significant to explain the underperformance of the Brazilian economy in the last decades, as conjectured by Bonelli and Fontes (2013), Bacha (2013) and Ferraz, Ornelas and Pessoa (2018).

Data sources are described in the Appendix.

Table 2

Explanatory variables of the econometric regressions: dependent variables- labor productivity growth, structural change component and within component

Abbreviation	Explanatory variable	Expected sign
Labor share	Share of employment in the services of low skilled labor in total employment	- (negative)
Prim exports	Share of primary goods export in total exports	- (negative)
Real interest	Real interest rate (Selic policy rate deflated by the consumer inflation index)	- (negative)
REER	Real effective exchange rate	+ (positive)
Tariff	Average import tariff	+/- (ambiguous)
Trade openess	Degree of trade openness (Exports plus imports/GDP)	+/- (ambiguous)

Source: Elaborated by the authors.

The variables *share of employment in the services of low skilled labor in total employment, share of primary goods export in total exports* and *real interest rate* are expected to present a negative sign. In the first case, the migration of workers towards low-skilled occupations has negative effects on productivity growth as high-skilled workers tend to perform their work at higher productivity levels. The second variable, the *share of primary goods export in total exports,* captures the country's dynamic engagement in the global markets. It would be expected that when exports of more technologically sophisticated products dominate total exports, productive structure is more technologically developed and, therefore, the structural component of productivity growth would be positive. Otherwise, it would be negative. These two

variables are related to the hypotheses raised in the previous sections to explain the stagnation of productivity growth in Brazil in the recent period, that is, the occurrence of premature deindustrialization through which there has been a sharp reallocation of labor from the primary sector to segments of low productivity and low skilled labor in the service sector.

The inclusion of the *real interest rate* captures a particularity of the Brazilian macroeconomic scenario, which is characterized by persistent high levels of the real interest rate when compared with other developing and developed economies. In this case, the expected sign is negative, given that high real interest rates, by adversely affecting the cost of real capital assets, inhibit long-term investment – the component of aggregate demand associated with the process of structural change – as well as the labor productivity growth.

Additionally, aiming at bringing to the model another specificity of Brazilian macroeconomic policy, we add the *real effective exchange rate*, which plays an important role in Brazilian monetary policy in the period, being its main transmission mechanism.[34] A positive correlation with both components (structural change and within) of the productivity growth would be expected here,[35] for, as suggested by the theoretical and empirical literature, a small undervaluation of domestic currency in real terms would accelerate both productivity and real GDP growth.

The last two explanatory variables added in the model are *average import tariff* and the *degree of trade openness* of the economy. The argument is that a greater exposure of the domestic economy to international competition is fundamental to boosting aggregate productivity growth; however, some empirical evidence has shown that lower tariffs and greater trade openness may not necessarily imply labor productivity growth.[36] Thus, the expected signs of these variables in the model are ambiguous.

[34] See on the topic Barbosa Filho (2015), Araújo et al. (2018), Nassif, Feijó and Araújo (2019), among many others.

[35] We define the exchange rate as the domestic price of a foreign currency (say, the Brazilian real per US dollar). Thus, an increase of the exchange rate means a depreciation of domestic currency, while a decrease means an appreciation.

[36] Edwards (1997) concludes that more open countries have indeed experienced faster productivity growth. Yet Gustafsson and Segerstrom (2008: 3) reach counterintuitive results: they show that "the overall effect of trade liberalization on productivity growth depends on whether intertemporal knowledge spillovers in R&D are relatively weak or relatively strong. When these spillovers are relatively weak, then trade liberalization promotes productivity growth in the short run and makes consumers better off in the long run. However, when these spillovers are relatively strong, then trade liberalization retards productivity growth in the short run and makes consumers worse off in the long run."

In order to identify the relationships between the explanatory variables and labor productivity growth as well as its two components (structural change and within effects), the correlations were estimated using the Ordinary Least Squares (OLS) methods. Since the series used in the model are stationary, the Ordinary Least-Squares model is appropriate for analyzing the relationship between variables (see Hamilton (1994), ch. 8, for more details).

Table 3 summarizes the results of the models in which the overall productivity growth and the structural change and within components are the dependent variables.

Regressions 1 specified in Table 3 are those in which the overall labor productivity growth is the dependent variable. Model 1, whose results are shown in Column 2 of Table 3, presents the results of all the explanatory variables suggested in Table 2. The variables *degree of trade openness* and *real effective exchange rate* were positive and significant to explain overall labor productivity growth, and the variables *share of primary goods export in total exports* and *real interest rate* were negative and also significant to explain our dependent variable in Regressions 1. As expected, these regressions capture well that the greater exposure of the domestic economy to international competition would be a key variable to boosting aggregate productivity growth through the structural change component and within component. In terms of exports of goods and services as a percentage of GDP, Brazil's degree of openness in 2017 was 12.5%. Thus, compared to other countries such as China (19.8%), India (19.1%), Russia (26.0%), South Africa (29.8%) and South Korea (43.1%), Brazil can be considered an extremely closed economy.[37]

The variables *average import tariff* and *share of employment in the services of low skilled labor in total employment* were not statistically significant.

[37] Data on trade openness of these countries were drawn from the World Bank database, https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS. Accessed on February 14, 2019.

Table 3

Determinants of Brazil's labor productivity growth: 1995-2011

	Regressions 1: Dependent variable Overall labor productivity growth			Regressions 2: Dependent variable Structural change effects			Regressions 3: Dependent variable Within effects		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**model 3**	**Model 1**	**Model 2**	**Model 3**
c	-1.73	-9.35*	-9.88***	-2.026	-2.87*	-2.085**	-0.23	-6.77	-7.92*
	[-0.12]	[-1.82]	[-3.08]	[-0.41]	[-1.64]	[-1.88]	[-0.01]	[-1.42]	[-1.88]
Labor share	-3.1			-0.343			-2.66		
	[-0.59]			[-0.18]			[-0.54]		
Trade openess	1.618*	1.90**	1.95***	0.556*	0.598**	0.524**	1.07**	1.32**	1.32**
	[1.82]	[2.66]	[3.32]	[1.84]	[2.45]	[2.56]	[1.30]	[1.99]	[2.61]
Prim exports	-2.55***	-2.62***	-2.64***	-0.738***	-0.745***	-0.725***	-1.82**	-1.88***	1.91***
	[-3.76]	[-4.40]	[-4.29]	[-3.12]	[-3.36]	[-3.40]	[-2.87]	[-3.11]	[-3.33]
Real interest	-0.52**	-0.53**	-0.53**	-0.16**	-0.161**	-0.163**	-0.36*	-0.37**	-0.37**
	[-2.38]	[-2.50]	[-2.60]	[-2.08]	[-2.20]	[-2.31]	[-1.78]	[-1.88]	[-1.94]
REER	3.47***	3.28***	3.31***	0.873***	0.853***	0.797***	2.62***	2.46***	2.54***
	[4.41]	[4.71]	[5.40]	[3.20]	[3.59]	[3.75]	[3.58]	[3.81]	[4.45]
Tariff	0.21	-0.10		0.192	0.157		0.04	-0.23	
	[0.22]	[-0.13]		[0.57]	[0.59]		[0.04]	[-0.31]	
R2	0.75	0.75	0.74	0.59	0.58	0.57	0.68	0.65	0.67
F test	5.06	6.64	8.69	2.41	3.15	4.07	3.61	4.57	6.15
Prob.	0.01	0.00	0.00	0.10	0.05	0.02	0.03	0.01	0.00
DW	2.29	2.23	2.22	1.99	2.02	2.12	2.17	2.13	2.16

Note: OLS coefficients, "t" statistics between brackets
***: significant at 1% level; **: significant at 5% level; *: significant at 10% level.
Source: Estimated by the authors according to the OLS model.

Also as expected, the undervaluation of the real exchange rate contributes positively to the overall productivity growth between 1995 and 2011, according to the results of Regressions 1 shown in Column 2 of Table 3. This finding is in accordance

with McMillan and Rodrik (2011). It should be mentioned that one of the most quoted papers that investigates the relationship between the real exchange rate behavior and labor productivity growth is Dollar's (1992). The author asserts that a more competitive real exchange rate encourages firms that operate in the tradable goods sector to invest and seek technological innovations, acting in the direction of boosting their static and dynamic efficiency. Another well-known paper is Popov and Polterovich's (2002), who elaborated a model to formalize the argument that competitive real exchange rates improve the productivity of the tradable goods sector. The authors assume that the export sector is dominant in the process of knowledge accumulation. Thus, by keeping the real exchange rate a bit undervalued, economic policy can increase and diversify the export of goods of higher income elasticity of demand, as well as generating technological spillovers to the economy as a whole. In the end, the country benefits from productivity gains and sustained economic growth.

Model 1 of Regressions 1 further shows that, again as expected, an increase in the *share of primary goods export in total exports* contributes to decreasing the overall productivity growth in Brazil between 1995 and 2011. McMillan and Rodrik (2011) also introduced in their model the share of primary products in total exports as an indicator of comparative advantage in most developing countries. This indicator registered a negative and high significant coefficient in our empirical model for Brazil, revealing a strong and negative association between the country's reliance on primary products and the rate at which structural change and sectoral effects contribute to productivity growth.

The negative sign of the *real interest rate* coefficient shows that the contractionary monetary policy conducted by the Brazilian Central Bank over a long period of time, by augmenting costs in real capital assets, contributed to reducing economic growth and the dynamics of labor productivity in the analyzed period. This reinforces the arguments stated in Section 3 that the adverse macroeconomic scenario was partly responsible for the stagnation of labor productivity of the Brazilian economy.

The variable *average import tariff,* like in McMillan and Rodrik's (2011) econometric exercise, was also not significant in Model 1 of Regressions 1. The variable *share of employment in the services of low skilled labor in total employment* was also not significant to explain Brazil's stagnant labor productivity between 1995 and 2011 in this same Model. Considering the non-significance of these two explanatory variables, we estimated two other models in Regressions 1: one without

the variable *share of employment in the services of low skilled labor in total employment* (Model 2) and another without both the variables *average import tariff* and *share of employment in the services of low skilled labor in total employment* (Model 3). In Model 2, average import tariff maintained no statistical significance. In both Model 2 and 3, all remaining explanatory variables kept their statistical significance, as in Model 1. This reinforces the results of the first model.

The intercept (the constant term) refers to the expected mean value of the dependent variable when all explanatory variables are zero. Since the values of the constant terms in all the models in the three Regression models are negative, this shows the negative trend in average aggregate productivity growth that has been observed in Brazil after the mid-1990s.

In terms of magnitudes of the coefficients, in the three models related to Regressions 1, it is observed that the *real effective exchange rate* is the most significant variable, followed by the *share of primary goods export in total exports*, the *degree of trade openness* and, finally, *the real interest rate*. To sum up, all the three models referred to by Regressions 1 showed that the stagnant labor productivity growth in Brazil between 1995 and 2011 was mainly explained by the overvaluation trend of the Brazilian domestic currency (the Brazilian real), followed by the high concentration of primary goods in the Brazilian export basket, then by Brazil's low degree of trade openness and, finally, by the high real interest rates that prevailed in the period.

We also replicated the econometric models for which the dependent variables were the structural change component (Regressions 2 in Table 3) and the within component (Regressions 3 in Table 3) and the results were unchanged. All these results suggest that the stagnant productivity growth in Brazil in the last decades is characterized by an almost lack of structural change (captured by the structural change component) and weak sectoral capital accumulation and technical progress (captured by the within component).

Therefore, we cannot agree with Firpo and Pieri (2016: 269), who, by replicating the same McMillan and Rodrik's (2011) methodology of decomposition of labor productivity growth in Brazil, concluded that "structural changes have become less important to explaining productivity growth in the Brazilian economy than in the past, mainly because Brazil is an emerging economy, with a relatively diversified industrial sector, but with a relatively low level of labor productivity." Indeed, taking into account

that Brazil has neither reached an economic maturity stage nor caught up with rich countries' high per capita income levels yet, our empirical results suggest that misleading economic policies (especially on the macroeconomic front) have been one of the most notable factors responsible for Brazilian labor productivity underperformance and long-term economic stagnation in Brazil in the recent decades.

6. Concluding remarks and policy implications

The Brazilian economy, once one of the fastest growing economies in the world after the Second World War, lost its vigor, defeated by the external debt crisis in the beginning of the 1980s and worsened by the high inflation process that lasted until the mid-1990s. The way out of the external debt crisis was found in the beginning of the 1990s, when the Brazilian economy joined the Brady Plan and adopted most of the Washington Consensus recommendations.

However, as argued in this paper, the process of economic development and catching up will be successful if, and only if, the average growth rate of productivity over time is sustained and is not reversed by harmful phenomena, such as the Dutch disease, premature deindustrialization and recurrent balance of payments crises. For Brazil, particularly, its economic development did reverse and its catching up trajectory was interrupted in the early 1980s.

As shown in this paper, the sharp change in economic policy orientation in the 1990s and onwards had a deep impact on the structural change process, leading to premature deindustrialization. In fact, while in the period 1950-1979, labor productivity increased 4.4% per year and employment 3.3% per year, during the period 1980-2011, labor productivity was negative (at -0,2% per year) and employment grew 2.2% per year. However, figures indicate that the reallocation of labor was sharply directed towards services of low skilled labor, even in the period of vigorous economic growth (1950-1979).

In the face of this insightful evidence, we can say that recent Brazilian economic history makes the country an interesting case of study for those interested in economic development, because while the economy had managed to overcome economic underdevelopment through the state-led industrialization after World War II and until 1980, it did not manage to catch up later on. The main reason, according to our interpretation, is because the industrialization process did not reach the maturity stage (in Kaldorian terms). In this sense, however successful in the promotion of positive

structural change after World War II and until 1980, the Brazilian industrialization process did not reach the stage of development to reap the benefits of static and dynamic economies of scale observed in the more technologically sophisticated productive structures. The long stagnation period of labor productivity even after the stabilization of high inflation in the mid-1990s clearly indicates that the economic policy choices since the adoption of liberalizing economic reforms did not favor the resumption of labor productivity in Brazil.

In light of this, our investigation took the following steps. First, we analyzed the theoretical issues related to structural change, economic development and long-term stagnation in countries that suffer from premature deindustrialization. Next, we presented a review on economic policies adopted in Brazil since the 1930s. Our empirical investigation in Sections 4 and 5 followed McMillan and Rodrik's (2011) methodology. In Section 4, we decomposed the Brazilian labor productivity growth in the period 1950-2011, according to structural change and within components. The exercise was reproduced for the subperiods 1950-1979 (heavy industrialization and sustained growth period) and 1980-2011 (the stagnant period). Our calculations showed that the structural change component was the most important to explain productivity growth in the period 1950-1979, and less important in the period 1995-2011, considering that in the period 1980-1994 productivity growth rate was negative. The sectoral component had a positive contribution in both the periods 1950-1979 and 1995-2011. Given the weak structural change observed in labor productivity growth between 1995 and 2011, we can conclude the labor efficiency behavior in this stagnant period was growth-reducing.

In Section 5, we use three econometric regression models to investigate the main factors explaining Brazil's labor productivity stagnation since 1995. Following McMillan and Rodrik's (2011) regressions but adapting them to Brazil's specific economic context in the period, we regressed overall labor productivity growth as well as its structural change and within components on several microeconomic and macroeconomic variables. Our econometric exercise showed that Brazil's weak structural change and economic stagnation since the mid-1990s have mainly explained by the overvaluation trend of the Brazilian domestic currency (the Brazilian real), followed by the high concentration of primary goods in the Brazilian export basket, then by Brazil's low degree of trade openness and, finally, by the high real interest rates that prevailed in the period.

Therefore, our empirical results suggest that misleading economic policies have been one of the most important factors responsible for Brazilian labor productivity underperformance and long-term economic stagnation. Two explanatory variables responsible for this underperformance (high real interest rates and real exchange rate overvaluation) are related to the macroeconomic policy. Especially with respect to the real exchange rate, our results are similar to those of several theoretical and empirical studies, which show that an overvalued real exchange rate for a long period of time tends to reduce labor productivity and long-term economic growth in developing countries (see Missio et al., 2015, and Missio, Araújo and Jaime Jr, 2017, for a panel of developing countries; and Oreiro et al., 2019, for the Brazilian case). This means that the period during which the labor productivity growth became stagnant coincided with a weak harmonization between industrial policy and the macroeconomic regime, especially after 1999, when Brazil adopted a very orthodox arrangement of monetary, fiscal and exchange rate policies. In summary, in our view, Brazil's stagnant labor productivity growth and sharp de-industrialization process are both, mainly, a macroeconomic phenomenon.

References:

Abreu, M.P. (2004). "Trade liberalization and the political economy of protection in Brazil since 1987". Working Paper-SITI-08B. Buenos Aires: Institute for the Integration of Latin America and the Caribbean (IDB-INTAL).

Amsden, A. H. (2001). *The rise of "the Rest": challenges to the West from Late-Industrializing Economies*. Oxford: Oxford University Press.

Araujo, E.; Araujo, E. L.; Ferrari-Filho, F. (2018). "Monetary institutions and macroeconomic performance in Brazil after the inflation targeting regime: theoretical aspects and empirical evidence". *Investigación Económica*, Vol. LXXVII, nº 304, Abril-Junio/2018, pp.72-101.

Bacha, E. (2013). Bonança externa e desindustrialização e desindustrialização: uma análise do período 2995-2011. In: E. Bacha and M. B. de Bolle (orgs). O Futuro da

Indústria no Brasil: Desindustrialização em Debate. Rio de Janeiro: Civilização Brasileira:97-120.

Baily,M.N. and Bosworth,B.P. (2014). US manufacturing: understanding its past and its potential future. Journal of Economic Perspectives. Vol. 28, no.1, Winter: 3-26.

Barbosa-Filho, N. H. (2015). “O desafio macroeconômico de 2015-2018”. *Brazilian Journal of Political Economy*, Vol. 35, no. 3 (140): 403-425.

Berg, A. and Miao, Y. (2010), “The real exchange rate and growth revisited: the Washington Consensus strikes back?”, IMF Working Paper n° 10/58. Washington: DC: International Monetary Fund.

Bhagwati, J. (1978). *Anatomy and Consequences of Exchange Control Regimes.* Cambridge, MA: Ballinger Pub. Company.

Biasoto Jr., G. (1988). “A estatização do endividamento externo e o crescimento da dívida do setor público na primeira metade da década”. 16º Encontro Nacional dos Cursos de Pós-graduação em Economia (Anpec). Belo Horizonte, MG. Anais da Anpec, Vol. 3.

Blanchard, O., Dell-Ariccia, G. and Mauro, P. (2010). ‘Rethinking macroeconomic policy, IMF Staff Position Note SPN 10/03. Washington, DC: International Monetary Fund.

Blanchard, O., Dell-Ariccia, G. and Mauro, P. (2013). ‘Rethinking macro policy II: getting granular, IMF Staff Discussion Note SDN 3/03. Washington, DC: International Monetary Fund.

Bonelli, R. (2002). “Labor productivity in Brazil during the 1990s”. Texto para Discussão no 906. Rio de Janeiro: Instituto de Pesquisa Econômica Aplicada (IPEA).

Bonelli, R., and Fonseca, R. (1998). “Ganhos de produtividade e de eficiência: novos resultados para a economia brasileira”. Texto para Discussão nº 557. Rio de Janeiro: Instituto de Pesquisa Econômica Aplicada (IPEA).

Bonelli, R., and Fontes, J. (2013). “Desafios brasileiros no longo prazo”. Texto para Discussão. Instituto Brasileiro de Economia (IBRE). Rio de Janeiro: Fundação Getúlio Vargas, Maio.

Bonomo, M. and Terra, M.C. (1999). “The political economy of exchange rate policy in Brazil: an empirical assessment”. Revista Brasileira de Economia, Vol.53 (4). Available at https://www.researchgate.net/publication/5025232_The_Political_Economy_of_Exchange_Rate_Policy_in_Brazil_an_Empirical_Assessment. Accessed on January 8th, 2019.

Bresser-Pereira, L. C., Oreiro, J. L. and Marconi, N. (2014). *Developmental macroeconomics: new developmentalism as a growth strategy*. London: Routledge.

Bresser-Pereira, L.C. (2008). “Dutch disease and its neutralization”. *Brazilian Journal of Political Economy*, Vol. 28, no.1 (109): 47-71.

Bresser-Pereira (2016). “Reflecting on new developmentalism and classical developmentalism”. *Review of Keynesian Economics*, Vol.4, no.3, Autumn: 331-352.
Carneiro, R. (2002). *Desenvolvimento em crise: a economia brasileira no último quarto do Século XX*. São Paulo: Editora UNESP.

Bulman, D., Eden, M. and Nguyen, H. (2018). Transitioning from low-income growth to high-income growth: is there a middle-income trap? In: Bihong Huang, Peter J. Morgan, and Naoyuki Yoshino. Middle-income trap in Asia: the role of trade, manufacturing and finance. Tokyo: Asia Development Bank.

Carneiro, R. (2002). *Desenvolvimento em crise: a economia brasileira no último quartel do século XX*. São Paulo: Editora Unesp.

Carvalho, L. (2018). *Valsa brasileira: do boom ao caos econômico*. São Paulo: Ed. Todavia.

Castilho, M. and Miranda, P. (2017). “Tarifa aduaneira como instrumento de política industrial: a evolução da estrutura de proteção tarifária no Brasil no período 2004-2014 e sua comparação com outros países”. Brasilia: Instituto de Pesquisa Econômica Aplicada (IPEA), unpublished paper.

Castillo, and Martins Neto (2016). Premature deindustrialization in Latin America. CEPAL Series Production Development 205. Santiago de Chile: United Nations Economic Comission for Latin America and the Caribbean (ECLAC).

Cavalcante, L. R., and De Negri, F. (2014). “Produtividade no Brasil: Uma análise do período recente”. Texto para Discussão no. 1955. Rio de Janeiro: Instituto de Pesquisa Econômica Aplicada (IPEA), Abril.

Chang, H.J. (2003). *Kicking away the ladder: development strategy in historical perspective*. London: Anthem Press.

Chenery, H. (1979). *Structural Change and Development Policy*. New York: Oxford University Press.

Cimoli, M. and Porcile, G. (2010). “Specialization, wage bargaining and technology in a multigoods growth model”. *Metroeconomica,* Vol. 61:1: 219-238.

Corden, W.M. e Neary, J.P. (1982). “Booming sector and de-industrialization in a small open economy. *Economic Journal*, 92:825-848.

Coutinho, L., Ferraz, J.C., Nassif, A. and Oliva, R. (2012). “Industrial policy and economic Transformation”. In: J. Santiso and J. Dayton-Johnson. Oxford: Oxford University Press:100-132.

Dollar, D. (1992). “Outward-oriented developing economies really do grow more rapidly: evidence from 95 LDCs, 1976-1985”. *Economic Development and Cultural Change*, Vol. 40: 523-544.

Dollar, D. and Kraay, A. (2003), “Institutions, trade and growth”, *Journal of Monetary Economics, V*ol. 50, n° 1, Amsterdam, Elsevier: 133-162.

Dosi, G., Pavitt, K. and Soete, L. 1990. *The economics of technical change and international trade*. London: Harvester Wheatsheaf.

Edwards, S. (1997). “Openness, productivity and growth: what do we really know?” NBER Working Paper Series WP 5978. Cambridge, MA.: National Bureau of Economic Activity.

Fazzari, S, Ferri, P. and Variato, A. (2017). Demand-led growth and accommodating supply. Paper presented at the 2017 Macroeconomics and Macroeconomic Policy Conference, FMM, Berlin, Germany.

Feijo, C and Carvalho, P. G. (2002). “Uma interpretação sobre a evolução da produtividade industrial no Brasil nos anos noventa e as 'leis'de Kaldor”. *Nova Economia*, Vol. 12: 57-78.

Ferraz, L.P.C., Ornelas, E.A. R.,Pessoa, J.P.C.N. (2018). “Política comercial brasileira: estratégias de inserção internacional”. São Paulo: Escola de Economia de São Paulo, not published.

Firpo, S. and Pieri, R. (2016). “Structural change, productivity growth, and trade policy in Brazil. In: M.McMillan, D. Rodrik, and C. Sepúlveda. *Structural change, fundamentals, and growth: a framework and case studies*. Washington, DC: International Food Policy Research Institute: 267-292.

Furtado, C. (1959). *Formação econômica do Brasil.* 18a. ed. Rio de Janeiro: Cia. Editora Nacional, 1982.

Gala, P. (2008), “Real exchange rate levels and economic development: theoretical analysis and econometric evidence”. *Cambridge Journal of Economics*, Vol. 32, n° 2, Oxford University Press:273-288.

Gill, I., and Kharas, H. 2007. *An East Asian Renaissance: Ideas for Economic Growth*. Washington, DC: The World Bank.

Grossman, G. M. and Helpman, E. (1991). *Innovation and growth in the global economy*. Cambridge, MA: The MIT Press.

Gustafsson, P. and Segerstron, P. (2008). “Trade, liberalization and productivity growth”. Stockholm School of Economics. Unpublished paper.

Hamilton, J.D. (1994) Time Series Analysis. Princeton University Press, Princeton.

Hay, D. A. (1997). “The Post 1990 Brazilian trade liberalization and the performance of large manufacturing firms: productivity, market-share and profits”. Texto para Discussão n. 523. Rio de Janeiro: Instituto de Pesquisa Econômica Aplicada (IPEA), outubro.

Hicks, J. (1950). *A Contribution to the theory of the trade cycle*. Oxford: Clarendon Press.

Hirschman, A. (1958). *The strategy of economic development*. New Haven: Yale University Press.

Kaldor, N. (1966). *Causes of the slow rate of economic growth of the United Kingdom*: *An Inaugural Lecture*. Cambridge, UK: Cambridge University Press.

Keynes, J. M. (1936). *The general theory of employment, interest and money*. San Diego: Harcourt Brace Jovanovich, Publishers, 1953.

Krugman, P. and Taylor, L. 1978. “Contractionary effects of devaluation”. *Journal of International Economics*, Vol. 8: 445–56.

Kume, H., Piani, G. and Souza, C.F.B. (2000). “A política brasileira de importação no período 1987-98: descrição e avaliação”. Rio de Janeiro: Instituto de Pesquisa Econômica Aplicada (IPEA), unpublished paper.

Kupfer, D. (2005). “Tecnologia e emprego são realmente antagônicos?” In: J. Sicsú, L.F. de Paula e R. Michel. *Novo Desenvolvimentismo: Um projeto nacional de crescimento com equidade social*. São Paulo: Ed. Manole.

Kuznets, S. (1957). “Quantitative aspects of the economic growth of Nations: II. Industrial distribution of National Product and Labor Force”. *Economic Development and Cultural Change* 5 (July): Supplement.

Kuznets, S. (1979). “Growth and structural shifts”. In: W. Galenson (ed.). *Economic Growth and Structural Change in Taiwan: The Postwar Experience of the Republic of China*. Ithaca, NY: Cornell University Press.

Lewis, W. A. (1954). "Economic Development with Unlimited Supplies of Labor". The Manchester School, Vol. 22 (2): 139–91.

Lucas Jr., R. E. (1988). “On the mechanics of economic development”. *Journal of Monetary Economics*, vol. 22, 3–42.

Mazzucato, M. (2015). *The entrepreneurial state: debunking public vs. private sector myths*. New York: Public Affairs.

McCombie, J. S. L. and Thirlwall, A. P. (1994). *Economic growth and the balance-of-payments constraint*, London: St Martin’s Press.

McMillan, M.S. and Rodrik, D. (2011). “Globalization, structural change and productivity growth”. NBER Working Paper Series 17143. Cambridge, MA: National Bureau of Economic Research.

Michaely, M. M., Papageorgiu, D., e Choski, A. (1991). *Liberalizing foreign trade: lessons of experience in the Developing World*. Vol.7. Cambridge, MA: Basil Blackwell.

Missio, F., Jaime Jr., F.G, Britto, G., and Oreiro, J.L. (2015). “Real exchange rate and economic growth: new empirical evidence”. Metroeconomica, Vol. 66, Issue 4, November: 686-714.

Missio, F., Araújo, R.A., and Jaime Jr., F.G. (2017). “Endogenous elasticities and the impact of the real exchange rate on structural economic dynamics”. Structural Change and Economic Dynamics, Vol. 42: 67-75.

Moreira, M.M. (1995). *Industrialization, Trade and Market Failures: The Role of Government Intervention in Brazil and South Korea.* London: Macmillan Press.

Morandi, L. (2016). “Novas estimativas do estoque de capital fixo brasileiro – 1950-2014”. Séries Históricas, Instituto Brasileiro de Economia, Fundação Getúlio Vargas (IBRE/FGV).

Nassif, A. (1995). *"Política industrial e proteção no Brasil: o papel da* CACEX". M.Phil. Dissertation. Niterói, Brazil: Universidade Federal Fluminense.

Nassif, A. (2003). *Liberalização comercial e eficiência econômica: a experiência brasileira*. Ph.D. Dissertation. Rio de Janeiro, Brazil: Instituto de Economia, Universidade Federal do Rio de Janeiro.

Nassif, A. (2005). “As fontes de mudança da eficiência técnica da indústria brasileira após a liberalização comercial: uma estimação econométrica por dados de painéis. *Economia Aplicada* Vol. 9 (1): Abril-Junho: 301-324.

Nassif, A. (2007). “National Innovation System and macroeconomic policies: Brazil and India in comparative perspective”. UNCTAD Discussion Papers no. 184. Geneva: United Nations Conference on Trade and Development.

Nassif, A. (2008). “Há evidências de desindustrialização no Brasil?”, *Revista de Economia Política*, vol. 28, N° 1, São Paulo.

Nassif, A. and Castilho, M. (2018). “Trade patterns in a globalized world: the case of Brazil”. Working Papers 126. Rio de Janeiro: The Brazilian Development Bank (Banco Nacional de Desenvolvimento Econômico e Social – BNDES), November.

Nassif, A., Bresser-Pereira, L.C. and Feijó, C. (2018). “The case for reindustrialisation in developing countries: towards the connection between the macroeconomic regime and the industrial policy in Brazil”. *Cambridge Journal of Economics,* Vol. 42: 355-381.

Nassif, A., Feijó, C. and Araújo (2019). “Macroeconomic policies in Brazil before and after the 2008 global financial crisis: Brazilian policy-makers still trapped in the New Macroeconomic Consensus guidelines”. Cambridge Journal of Economics, forthcoming.

Nassif, A., Feijó, C. and Araújo, E. (2017). “A Structuralist-Keynesian model for determining the “Optimum” Real Exchange Rate for Brazil’s economic development process: 1999-2015”. CEPAL Review 123. December: 188-208.

Nassif, A., Feijó, C., and Araújo, E. (2015). “Structural change and economic development: is Brazil catching or falling behind?”. *Cambridge Journal of Economics*, vol. 39, *no*. 5: 1307-1332, 2015.

Oreiro, J. L. and FEIJÓ, C. (2010). Desindustrialização: Conceituação, Causas, Efeitos e o Caso Brasileiro. Brazilian Journal of Political Economy, Vol. 30, nr. 2: 100-115, Jan-Mar:219-232.

Oreiro, J.L., Gala, P., Ferreira Filho, H.L., and Silva, L.P. (2019). “Taxa real de câmbio e mudança estrutural: teoria e evidência para o caso brasileiro”. Boletim do Observatório da Indústrial, no. 3. Rio de Janeiro: Centro Internacional Celso Furtado de Políticas Públicas para o Desenvolvimento, forthcoming.

Ostry, J. D., Ghosh, A. R. and Chamon, M. 2012. 'Two targets, two instruments: monetary and exchange rate policies in emerging market economies', IMF Staff Discussion Note 11/06, Washington, DC: International Monetary Fund.

Pagé, Carmen (ed.) (2010). The age of productivity: Transforming economies from the bottom up. New York: Inter-American Development Bank Palgrave Mcmillan.

Palma, G. 2005. Four sources of de-industrialisation and a new concept of the Dutch disease. *In* Ocampo, J. A. (ed.), *Beyond Reforms*. Palo Alto: Stanford University Press: 71–116.

Paus, E. (2018). "The middle-income trap: lessons from Latin America". In: Bihong Huang, Peter J. Morgan, and Naoyuki Yoshino. Middle-income trap in Asia: the role of trade, manufacturing and finance. Tokyo: Asia Development Bank.

Popov, V.; Polterovich, V. (2002). "Accumulation of foreign exchange reserves and long-term growth". Moscow: *New Economic School*, unpublished paper.

Razin, O. and Collins, S.M. (1999), "Real exchange rate misalignments and growth". In: A. Razin, A and E. Sadka (eds.). *The economics of globalization: policy perspectives from public economics*. Cambridge: Cambridge University Press.

Rodrik, D. (2008), "The real exchange rate and economic growth". *Brookings Papers on Economic Activity*, Vol. 39, n° 2. Washington, DC: The Brookings Institution.

(2011). "The future of economic convergence". Working Paper 17400, NBER, September.

Rodrik, D. 2016. "Premature deindustrialization". *Journal of Economic Growth*, Springer, Vol. 21(1): 1-33, March.

Romer, P.M. (1986). "Increasing returns and long-run growth". *Journal of Political Economy*, Vol. 94: 1002-1037.

Ros, J. (2013). *Rethinking economic development, growth, and institutions*. Oxford: Oxford University Press.

Rossi Jr., J. L. e Ferreira, P. C. (1999). “Evolução da produtividade industrial brasileira e abertura comercial”. Texto para Discussão no. 651. Rio de Janeiro: Instituto de Pesquisa Econômica Aplicada (IPEA).

Rowthorn, R. and Ramaswamy, R. (1999). Growth, trade and de-industrialazition. IMF Staff Papers nr. 46, 1. Washington D.C.: International Monetary Fund.

Serrano, F. (1996). The Sraffian supermultiplier. PhD. Dissertation. Faculty of Economics and Politics, University of Cambridge.

Solow, R.M. (1956). “A contribution to the theory of economic growth”. *Quarterly Journal of Economics*, Vol. 70: 65-94.

Tavares, M. C. (1963). “Auge e declínio do processo de substituição de importações no Brasil”. *In*: M.C. Tavares. *Da substituição de importações ao capitalismo financeiro. ensaios sobre a Economia Brasileira.* 10ª ed. Rio de Janeiro: Zahar Editores.

Thirlwall, A. P. (1979). “The balance of payments constraint as an explanation of international growth rate differences”. *Banca Nazionale del Lavoro Quarterly Review*, Vol. 128, 45–53.

Timmer, M. P., De Vries, G. J., and De Vries, K. (2014). Patterns of structural change in developing countries. Groningen Growth and Development Centre Research Memorandum 149. Groningen: University of Groningen, July.

Timmer, M. P., De Vries, G. J., and De Vries, K. (2015). “Patterns of structural change in developing countries”. In: J. WEISS, and M. TRIBE (eds.). Handbook of Industry and Development. Routledge: 65-83.

UNCTAD (2003). Trade and Development Report 2003: capital accumulation, growth and structural change. New York and Geneva: United Nations Conference on Trade and Development.

_____(2018). . Trade and Development Report 2018: power, platforms and the free trade Disillusion. New York and Geneva: United Nations Conference on Trade and Development.

Williamson, J. (2008), “Exchange rate economics”. Working paper n° 08-3, Washington, DC.: Peterson Institute for International Economics.

Appendix

Description of data sources of estimated regressions on Section 5

Explanatory variables	Sources
Share of employment in the services of low skilled labor in total employment	Groningen Growth and Development Center database.
Share of primary goods export in total exports	COMTRADE database
Real interest rate (Selic policy rate deflated by the Consumer Inflation Index - IPCA)	For Brazilian nominal policy interest rate (SELIC): Central Bank of Brazil; For Brazil's Consumer Inflation Index (IPCA): Brazilian Institute of Geography and Statistics (IBGE)/*Sistema Nacional de Índices de Preços ao Consumidor (SNIPC)*
Real effective exchange rate	Brazil's Instituto de Pesquisa Econômica Aplicada (IPEA) – Monthly *Serie Taxa de Câmbio Real Efetiva – Exportações*/Average of 2000=100
Average import tariff	Brazil's Foreign Trade Department (SECEX)
Degree of trade openness (Exports plus imports/GDP)	World Development Indicators, 2017/The World Bank.