

Haluska, Guilherme; Summa, Ricardo; Serrano, Franklin

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The bridge to stagnation: Government expenditure cap, reforms and the fall in the business investment share in Brazil (2015-2022)

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The bridge to stagnation: government expenditure cap, reforms and the fall in the business investment share in Brazil (2015-2022)*

Guilherme Haluska

Instituto Latino-Americano de Economia, Sociedade e Politica (ILAESP),
Universidade Federal da Integracao Lationo-Americana (UNILA)

Ricardo Summa

Instituto de Economia (IE), Universidade Federal do Rio de Janeiro (UFRJ)

Franklin Serrano

Instituto de Economia (IE), Universidade Federal do Rio de Janeiro (UFRJ)

Abstract:

The paper assesses the change in direction of economic policy in Brazil during the period from 2015 to 2022 towards fiscal austerity and neoliberal reforms, allegedly with the purpose of opening space for an acceleration of growth led by private investment and net exports, through reduction in the real interest rate and a more depreciated real exchange rate. Although the interest rate has fallen and the exchange rate has indeed depreciated, exports grew less and investment has not increased. Quite the contrary, we show that these policies directly led to a reduction in the absolute size of the internal market and, as a consequence, a decrease in the business investment share. Although a failure in terms of economic growth, the new policy regime was successful in achieving its actual political objectives: the reduction of the relative size of the State in the economy and the weakening of the bargaining power of workers and the associated decrease of the wage share.

Keywords: Brazilian economy; Demand-led growth; Economic policy.

JEL Codes: E11, E60, O11.

Corresponding author: Ricardo Summa, ricardo.summa@ie.ufrj.br

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1. Introduction

In the period 2015-2022, Brazil had three different presidents but a remarkable continuity in the direction of economic policy (apart from the brief ‘emergency Keynesianism’ of 2020, during the pandemic). The second term of President Dilma Rousseff was marked by a general contraction of aggregate demand with large cuts in public expenditures, a large exchange rate devaluation, sharp increases in public utility prices, an interest rate hike, and a contraction of credit supplied by public banks in 2015. This unusual shift towards neoliberal policies during a left-wing government was at the time justified by the authorities as the need to placate international credit rating agencies worried about a supposedly ‘unsustainable’ domestic public debt-to-GDP ratio.¹

A few months before Rousseff’s impeachment in mid-2016, the center-right party of the vice president Michel Temer, who later succeeded her as president, released a document titled, *A bridge to the future*, arguing for a structural fiscal adjustment that could generate large primary surpluses, which would first stabilize and then reduce public debt as a percentage of GDP. The new feature of this proposed fiscal adjustment is that it should be made basically on the side of expenditures, rather than through increases in tax revenues, since it was claimed that the tax burden in Brazil was already too high and could not be further increased. Therefore, the government and Congress should: i) impose new fiscal rules that guaranteed that government primary expenditures would grow less than the GDP; and ii) change the laws of the pension system in Brazil, such as the minimum age for workers to retire. This document also called for changes in the labor laws that would make the labor market more flexible. If these set of reforms were successfully implemented, the document argued, interest rates would fall permanently, stimulating business investment. Also, this would increase productivity and improve

¹ There were a number of problems with that justification, which are discussed in more detail by Serrano and Pimentel (2017). First, the country risk spread concerns the risk of a country (including both its public and private sectors) not to honor its commitments in foreign currency. Therefore, even if the rating agencies take into account the fiscal conditions, the risk of a country not honoring its commitments in foreign currency has nothing to do with the size of the public debt denominated in domestic currency. Thus, the country-risk spread is related to liquidity and sustainability conditions of these foreign currency external debt, and changes in these spreads usually precede, instead of following, changes in the ratings given by the rating agencies. Moreover, investors that must (or want) to follow the ratings of these agencies do not have a monopoly over international capital flows. In fact, when the country risk spreads are low and the balance of payments situation is comfortable and enough foreign investors want to invest in a specific country, often these agencies are forced by their clients and by the competition among them to upgrade the ratings ascribed to that country (as happened in Brazil in the 2000s). Interestingly enough, between the end of 2015 and in the beginning of 2016, the most important agencies downgraded Brazil’s rating, in spite of the major policy shift towards austerity. However, as can be seen in Section 3, these downgrades had no relevant effects in terms of increasing the financial fragility of the Brazilian external accounts.

competitiveness of Brazilian exports. The Brazilian economy growth would then be pulled by private investment and exports.

Although this document only came out in late 2015, the center-left party administration of Rousseff pursued the policies and reforms proposed in the *Bridge to the future* document since the beginning of 2015. The same can be said about the center-right and then extreme right administrations of Temer and Bolsonaro, respectively, between 2016 and 2022. The contraction in public expenditures and proposals for establishing legal limits on the expansion of government spending had already begun during Rousseff's administration,² and in 2017 a constitutional cap freezing the real value of federal government expenditures for 20 years was introduced, as well as a comprehensive reform of labor laws. Then in 2019, the pension system was reformed. These reforms and policies had all been suggested in that document.

In order to provide a critical evaluation of the actual results of these reforms and policies in the 2015-2022 period in terms of economic growth and the business investment share from a demand-led growth theoretical perspective, we apply the same methodology used in studies of the Brazilian economy for earlier periods (Serrano and Summa, 2012, 2015). The rest of this paper is organized as follows. Section 2 presents a brief overview of the performance of the Brazilian economy in terms of growth from 2004 to 2022. In Section 3 we examine the external financial conditions facing the economy over this period as well as the evolution of Brazilian imports and exports. We then analyze the economic policies introduced in the 2015-2022 period and their consequences. Section 4 discusses monetary policy as well as the evolution of credit in the domestic market, while Section 5 deals with fiscal policy. We then, in Section 6, discuss the growth of household consumption and residential investment, taking into account both the effects of the changes in income distribution as well as the effects of the monetary and fiscal policies on these two components of demand. Section 7 then examines the behavior of business investment during this period. Section 8 concludes with brief final remarks.

² For instance, Nelson Barbosa, who was planning minister and then briefly the finance minister during Rousseff's administration, wrote in an article published in 2015 (Barbosa-Filho, 2015, p.417, our translation) that the "the Brazilian population does not want and international competitiveness of the economy does not recommend an increase in the tax burden" (note that no source or reference is given in the text explaining how the author found out what the Brazilian population did not want), adding that the government should establish controls for the percentage of some types of expenditures in GDP.

2. Overview of Brazilian growth performance

The Brazilian economy stagnated in the period 2015-2022: output grew only 0.2% per year. The average rate of growth was much lower than in the previous periods, where the average rate of growth was 4.5% from 2004 to 2010, and 2.3% in the period 2011-2014 (Serrano and Summa, 2015).

Table 1: Rate of growth of GDP, average by period

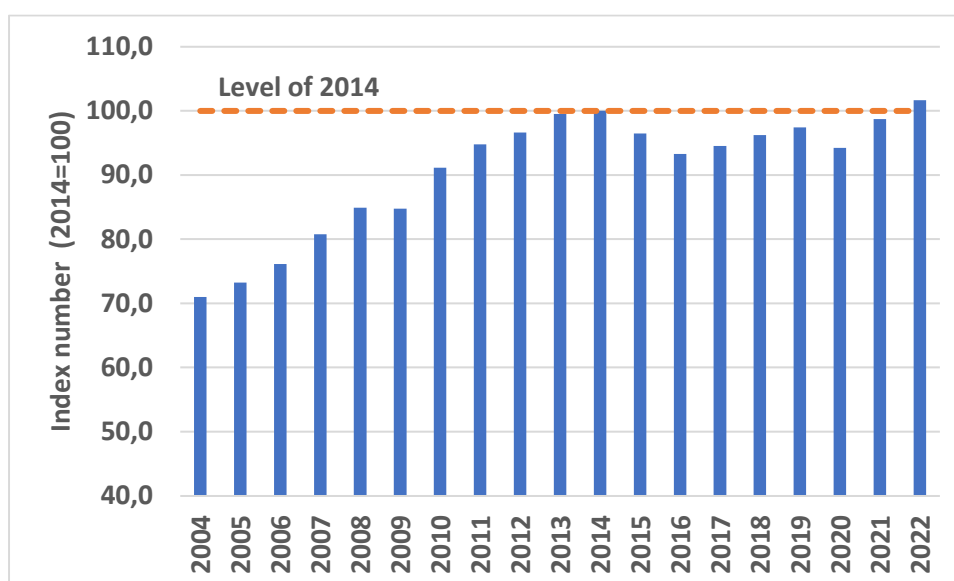
Period	Rate of growth (average)
2004-2010	4,5%
2011-2014	2,3%
2015-2019	-0,5%
2020-2022	1,4%

Source: IBGE. Elaborated by the authors.

This pattern can be decomposed into two sub-periods, as shown in Table 1. First, a strong contraction in GDP in the period 2015-16, followed by a slow recovery from 2017 until 2019. Second, the period marked by the Covid pandemic, the social distancing measures, and the macroeconomic policy responses in 2020-22. As can be seen in Figure 1, until the beginning of the pandemic, the level of GDP in real terms had still not recovered to the level of 2014. It was only in 2022, during the economic recovery from the pandemic, that the level of GDP surpassed the level from 2014. Table 3 in the Appendix summarizes most of the information about the rates of growth of the several components of aggregate demand presented in the paper.³

³ Some of the data regarding the components of demand in GDP used in this paper are more disaggregate than the ones released in the publication of the Brazilian System of National Accounts by the 'Instituto Brasileiro de Geografia e Estatística' (IBGE), the Brazilian official statistics institute. These variables were calculated from the data from IBGE and using the same methodology as in Haluska (2021) and Haluska (2023), with the real rates of growth of each component of demand being calculated using proper deflators. All the rates of growth presented are expressed in real terms.

Figure 1: Level of real GDP, index number (2014=100)



Source: IBGE. Elaborated by the authors.

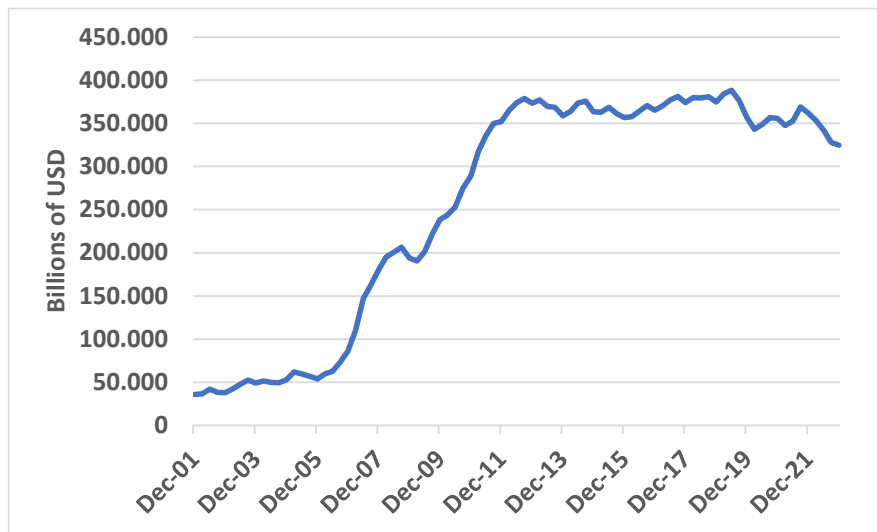
In the next sections, we will argue that the stagnation of the Brazilian economy in the period 2015-2022 can be explained overwhelmingly by the reduction in the level of the domestic demand, which was a direct result of the economic policies and reforms adopted, rather than due to changes in the external conditions.

3. Exports, imports and the external sector

3.1 Financial external conditions and the easing in the Balance of Payment constraint

In the 2000s, developing economies received large amounts of capital flows as a result of lower interest rates set by the Fed, increased south-south commercial flows, and higher commodity prices. Also, these countries improved the management of their Financial Accounts by increasing forex reserves and by managing the floating of their nominal exchange rates (Medeiros et al., 2016). The Brazilian Central Bank accumulated a considerable level of foreign exchange international reserves during this period and maintained it at a comfortable level from the 2010's, as shown in Figure 2.

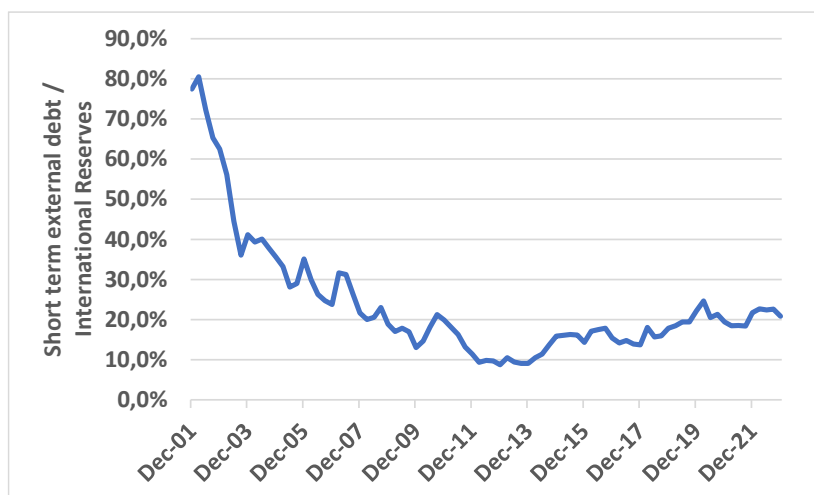
Figure 2: International Reserves



Source: BCB; Elaborated by the authors.

Moreover, besides the size of international reserves, the international liquidity situation of a country depends on the relative sizes of the external debt in foreign currency with short-term maturity (Medeiros and Serrano, 2001, 2006). The ratio between short-term external debt and international reserves showed a significant decline during the first decade of the 2000s and has remained stable around 20% during the recent period 2015-2022 (see Figure 3).

Figure 3: The ratio between foreign exchange international reserves and short-term external debt



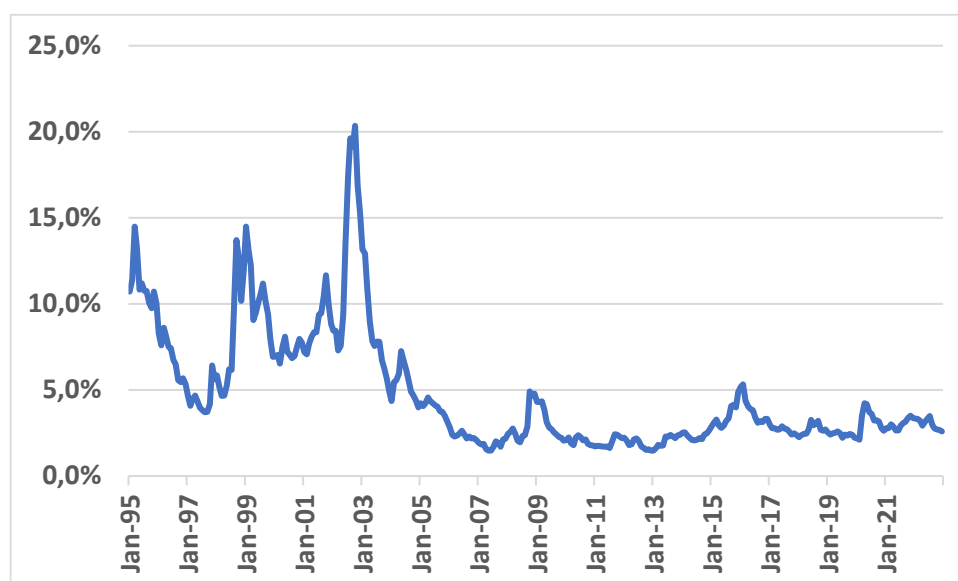
Source: BCB; Elaborated by the authors.

The structure of Brazil's gross external liabilities, released by the Brazilian Central Bank, also illustrates the comfortable external conditions (Biancarelli and Rosa, 2024;

Rosa and Biancarelli, 2024). By the end of 2022, 45.6% of Brazil's gross external liabilities consisted in direct investment where foreign firms own a share in the capital of domestic companies, a type of external liability less prone to suffering sudden capital flights. Additionally, the external debt denominated in foreign currency represented only 21.3% of gross external liabilities.⁴

This process of improvement in international liquidity, together with Brazil's financial external conditions, explains the large decreases in the sovereign spread, measured by the EMBI+ (Aidar and Braga, 2020; Antoni and Braga, 2023). As can be seen in Figure 4, from 2002 to 2005, Brazil's sovereign spread suffered a large decline and remained quite stable after that. Since 2005, there were only a few episodes in which the spread increased temporarily, such as during the Great Financial Crisis of 2008, the political turmoil that resulted in Dilma Rousseff's impeachment in 2016, and in the beginning of the Covid-19 pandemic in 2020. However, even in these episodes, the spread did not reach the pre-2003 average, let alone the peaks.

Figure 4: Brazil's country-risk, measured by the EMBI+



Source: JP Morgan. Elaborated by the authors.

We can thus see that Brazil faced quite comfortable financial external conditions and the economic stagnation since 2015 cannot be explained by any kind of shortage of foreign exchange that could have forced the government to reduce aggregate demand in order to decrease imports.

⁴ Data from BCB.

3.2 The evolution of the exports and of the imported content in aggregate demand

Moving to the direct impact of the external sector on the growth of aggregate demand, the average rate of growth of Brazilian exports decreased from 3.8% during the period from 2004 to 2014 to 2.7% during the period from 2015 to 2022. This decline in the rate of growth of exports can be largely explained by the decrease in the average rates of growth of the global trade of goods and services and of world GDP, as can be seen in Figure 5.

Figure 5: Rates of growth of Brazilian exports, global trade and world GDP, average by period



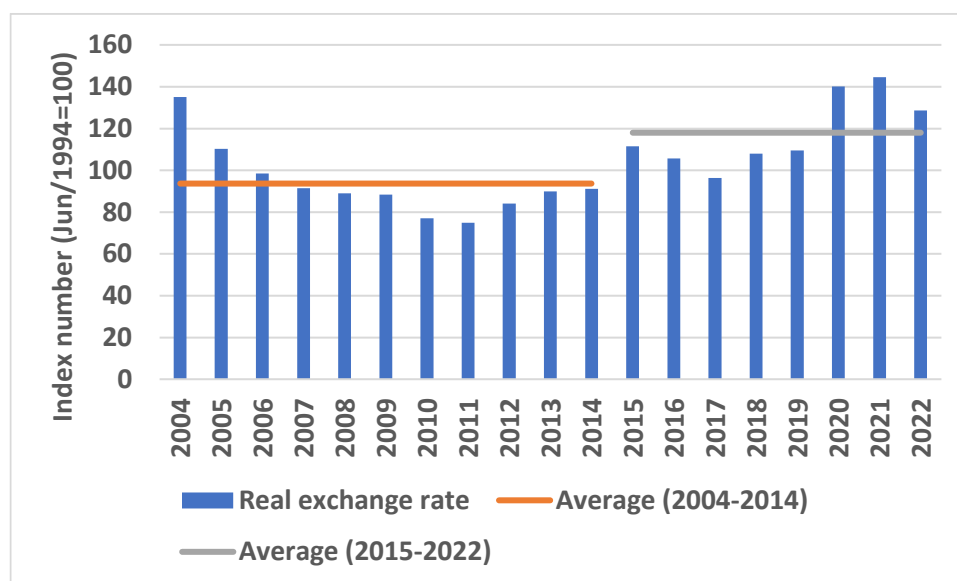
Source: IBGE and IMF. Elaborated by the authors.

In the period between 2015 and 2022, the real exchange rate was, on average, 26.1% more depreciated than between 2004 and 2014, as can be seen in Figure 6.⁵ However, during the 2015-2022 period, the process of ‘reprimarization’ of Brazilian exports has in fact increased (Lopes, 2020, p. 186), and the share of Brazilian exports that goes to China, which basically consists of commodities, increased considerably from 14.4% in 2011 to 31.3% in 2019 (Alves-Passoni, 2024, p. 144). Therefore, this more devaluated real exchange rate was not capable of preventing the decline in the rate of

⁵ We considered here the real effective exchange rate index, calculated using the IPCA – which is the price index for household consumption.

growth of exports, which confirms the fact that the price-elasticity of Brazilian exports is low, as shown by Padron et al. (2015).⁶

Figure 6: Brazil's real exchange rate



Source: BCB. Elaborated by the authors.

It is also important to mention that Brazil, a continental country, is naturally relatively closed to international trade, with exports accounting for about 15% of GDP. Therefore, exports are not capable of inducing high rates of growth of GDP in the absence of increases in other components of autonomous expenditures, such as government expenditures and consumption financed by new credit (Freitas and Dweck, 2013; Haluska, 2023; Campana et al., 2024).

Another possible negative effect on the GDP growth is an increase in leakages from aggregate demand to imports. In fact, the import content in aggregate demand did increase by 4pp from 2014 to 2022, measured at current prices. However, it did not increase much in this period in comparison to 2004-2014, and is unable to fully explain the Brazilian stagnation in the period because it can only explain a negative contribution to growth of -1.0 pp per year.^{7,8}

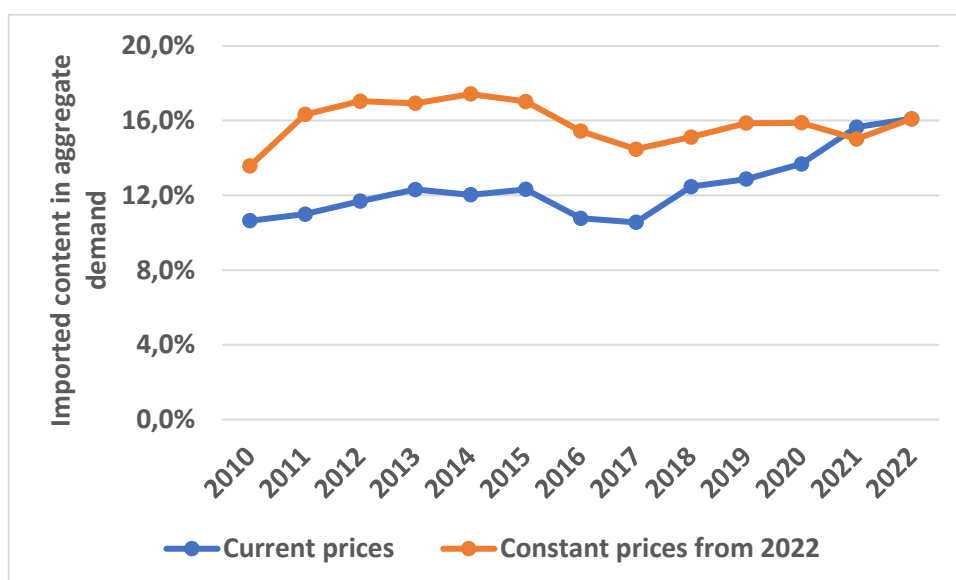
⁶ As pointed out by Padron et al. (2015), Brazilian exports are concentrated in goods such as agricultural products in raw or semi processed form, crude oil and iron ore. This low elasticity of exports in relation to the real exchange rate can be explained by the fact that i) the demand for these products presents a low sensitivity to prices; and ii) Brazil is price taker in most of the products it exports, so when there is a devaluation of the domestic currency, exporters increase their profit margins, but it does not necessarily makes the exporters sell more products in the international market.

⁷ This evidence is contrary to the claim by some authors (e.g. Marconi, 2022) that the aggregate demand leakages through imports are an important explanation for the low GDP growth of the Brazilian economy.

⁸ The contribution of import leakages to growth in the period 2004-2014 of -0.1 pp a year.

This increase in the import content was due to a price effect, as can be seen by the decrease of the import content measured at constant prices in Figure 7. The nominal exchange rate increased 119.5% in the 2014-2022 period, resulting in a higher deflator of imports than of GDP. The slight decrease of the import content in the constant prices indicator was a result of a lower growth of the volume of imports than GDP. In fact, not only the rate of growth of the imports was lower than the rate of growth of GDP during this period, but the volume of imports itself was actually lower in 2022 than in 2014. Between 2015 and 2022, the volume of imports decreased, on average, 0.9% a year, while GDP grew 0.2% a year.

Figure 7: Imported content in aggregate demand



Source: IBGE. Elaborated by the authors.

Thus, although the real exchange rate depreciated, the price-elasticity of imports is low in Brazil, according to Dos Santos et al. (2017). On the other hand, changes in the composition of aggregate demand certainly help to explain the low growth of imports. Each of the components of aggregate demand present a different imported content. As calculated by Fevereiro (2016), in Brazil, investment is the component of aggregate demand with the highest imported content, and it was also the component of aggregate demand with the lowest average rate of growth during this period (it fell at a rate of 1.2% a year, on average). Therefore, the weight of the component of demand with the highest imported content on aggregate demand decreased during this period, which helps to explain the observed decline in the level of imports.

We conclude this section by pointing out that Brazil faced quite comfortable financial external conditions and that the decrease in the rate of growth of GDP from 3.7% a year from 2004 to 2014 to 0.2% a year from 2015 to 2022 cannot be accounted for by the performance of the external sector. When taking together the contributions of the growth of exports and the changes in the degree of imported content in demand, the contribution of the external sector to the growth of GDP was, on average, 0.1 percentage points (pp) per year during the period from 2004 to 2014, and this contribution has actually increased during the period from 2015 to 2022, when the external sector had a contribution of 0.8 pp per year to the growth of GDP.^{9,10} As we will explain in the next sections, this decrease in the average rate of growth was caused by the reduction in domestic demand, whose contribution to the growth of GDP decreased from a positive contribution of 3.6 pp per year from 2004 to 2014 to a negative contribution of 0.6 pp per year from 2015 to 2022. This means that the contribution of domestic demand in the period 2015-2022 was negative, at a value of minus 0.6 percent per year. The internal market of the Brazilian economy has thus decreased in absolute terms over this period.¹¹ Let us now examine how the economic policies adopted produced this outcome.

4. Monetary policy

In order to reach its inflation target, as inflation stood near or above the upper limit, the Central Bank started to increase the base nominal interest rate in 2013, in a process that lasted until mid-2016. The base nominal interest rate increased from 7.25% to 14.25%. In 2015, inflation increased to up to 10% a year, which can be explained by

⁹ These contributions were calculated from a decomposition of growth based on the Sraffian Supermultiplier model, using a methodology like the one used in Haluska (2023). The contribution of the domestic demand is the sum of all the other contributions excluding the growth of exports and the changes in the degree of imported content, so it includes both private and public components of demand. In that paper, the author deflates each component of demand by specific deflators, while here, all the components of demand were deflated by the deflator of GDP, so the contributions include also the changes in relative prices. Anyway, if the results were calculated using the exact same methodology from Haluska (2023), the results would be very similar: the contribution of the external sector increases from -0.3 pp from 2004 to 2014 to 0.9 pp from 2015 to 2022, while the contribution of the domestic demand decreases from 4.0 pp from 2004 to 2014 to -0.7pp from 2015 to 2022.

¹⁰ Notice that for the same reason that the contribution to growth of the changes in the imported content measured at current prices was lower because of the relative deflators between tradable and non-tradables, the contribution of the exports was higher.

¹¹ The great importance of changes in domestic demand rather than external demand (plus change in important content) to GDP growth was already found in papers with samples that goes to 2019. (Haluska, 2023, Campana et al. 2024).

the large increase in monitored prices (especially fuels and energy) and by the nominal exchange rate devaluation.¹²

From 2016 until the beginning of 2021, the Central Bank promoted several cuts in the base nominal rate of interest, which fell to a historically low level of 2%. Many economists attribute this decline in the rate of interest to the economic reforms that were conducted since the impeachment of Dilma Rousseff. According to this view, this set of reforms (specially the ceiling for federal government expenditures and the reform in the pension system) would force the government to adopt sound fiscal policy and promote a large fiscal adjustment that would decrease the rate of interest.

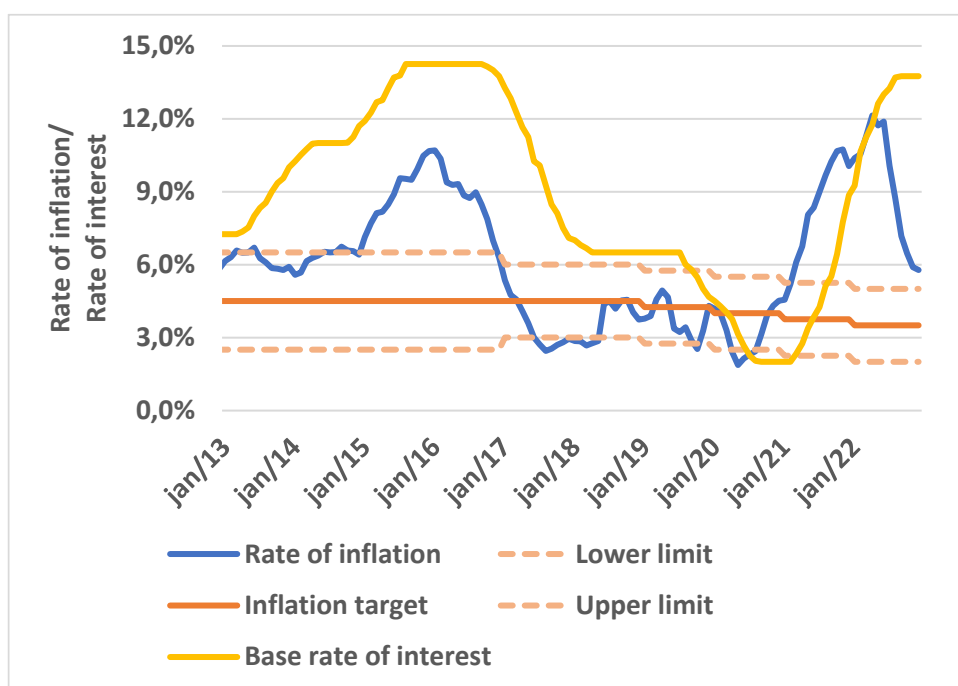
We have a different interpretation of this decline (Summa, 2024). From 2016 to 2019, the rate of inflation fell because during these years the effects of the shock of monitored prices and of the exchange rate devaluation that occurred in 2015 dissipated and the increase in the unemployment rate resulted in a decrease in the rate of change of the nominal wages. As a result, during most of these years, the rate of inflation remained between the lower limit and the center of the inflation target. Therefore, the Central Bank simply reacted to the low inflation by reducing the nominal rate of interest, without any connection to the economic reforms. The only way in which the fiscal policy and the economic reforms contributed to the decrease in the rate of interest was through an indirect channel. The recession caused by the contractionary fiscal policy resulted in an increase in the rate of unemployment which, together with neoliberal economic reforms, decreased the bargaining power of workers, resulting in a lower rate of change of nominal wages and a decrease in the rate of inflation. Therefore, these policies helped to decrease inflation to the extent that they reduced the capacity of workers to obtain increases in their nominal wages. From 2004 to 2014, nominal wages increased, on average, 9.0% a year, while from 2016 to 2019, it increased only 5.2% a year.¹³ This lower rate of increase in nominal wages made it easier for the Central Bank to keep inflation close to the target, making it possible to lower nominal rates of interest. This happened despite the depreciation of the real exchange rate.

Figure 8 presents the base nominal rate of interest, the rate of inflation as well as the inflation target and its upper and lower limits. Notice that the inflation targets were reduced four times since 2019, but were easily met before the pandemic.

¹² Regulated or monitored prices include public utility services whose taxes are administered and authorized by the government through its auditing agencies (telephony, energy, electricity, health insurance) and petroleum products that have Petrobras – a state-owned enterprise – as their pricing authority.

¹³ Calculated from the nominal income surveys (PNAD and PNAD-Continua) by IBGE.

Figure 8: Rate of interest, rate of inflation, inflation target and its lower and upper limits



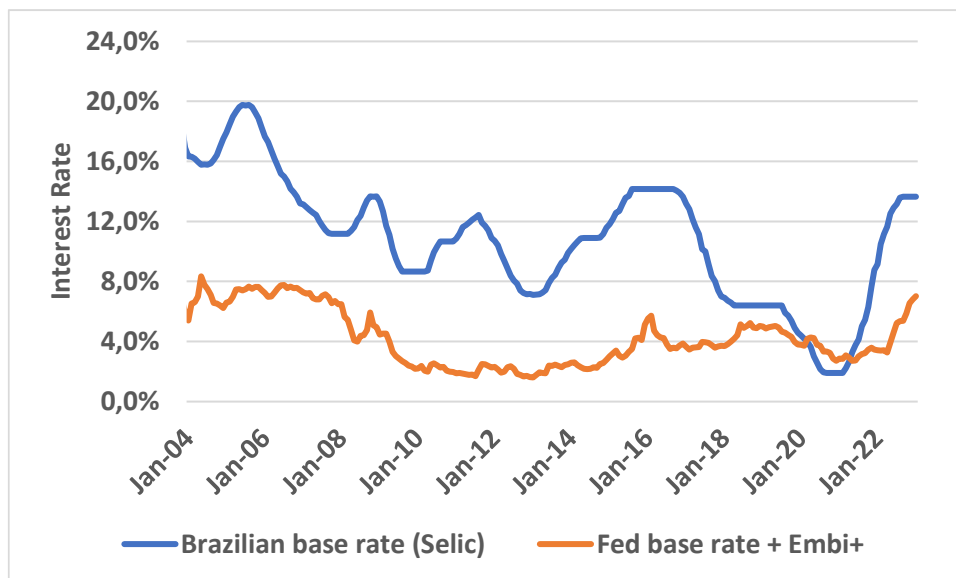
Source: IBGE; BCB. Elaborated by the authors.

The sequence of cuts in the nominal base rate of interest was not interrupted by the beginning of the Covid-19 pandemic, in a moment when investors tried to change their portfolios into assets considered safer, like assets denominated in US dollars or the US public debt itself. The practice of very low interest rates in that context had effects on the rate of inflation through the cost channel. As pointed out by Serrano, Summa and Aidar (2021), the interest rate differential between domestic interest rate and foreign interest rate plus sovereign spread is one of the elements that determine the rate of change of the exchange rate. Usually, the base rate of interest in Brazil is higher than the base rate of interest set by the Federal Reserve plus the Embi+, a proxy of the sovereign spread. However, during several months of 2020 and 2021, the interest rate differential remained negative. This fact, combined with the devaluation of most developing economies' currencies, contributed to an increase of 30.1% of the exchange rate from February 2020 until March 2021.¹⁴ It is important to note that the Brazilian currency devaluated more than the average of the currencies of the emerging economies during this period. Figure 9 compares the Brazilian base rate of interest with the Fed rate plus the Embi+, while

¹⁴ The risk of devaluation in the exchange rate due to the low rate of interest in that context was already pointed out by Braga and Serrano (2020).

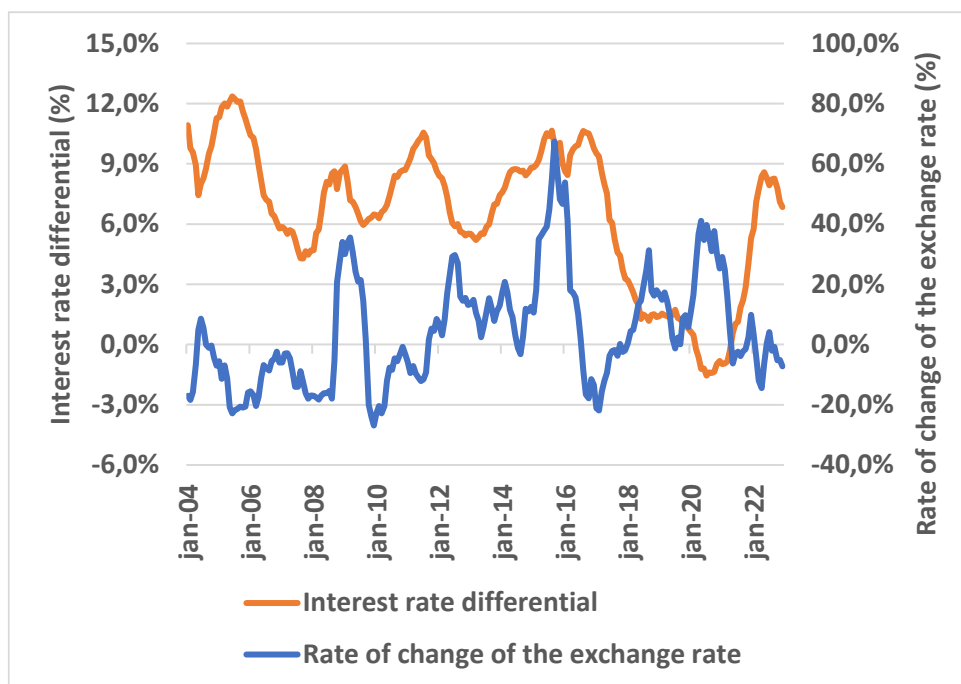
Figure 10 shows the interest rate differential and the rate of change of the nominal exchange rate in Brazil.

Figure 9: Brazilian base rate of interest and the Fed rate plus the Embi+



Source: BCB; FED; JP Morgan. Elaborated by the authors.

Figure 10: Interest rate differential and rate of change of nominal exchange rate



Source: BCB; FED; JP Morgan. Elaborated by the authors.

This large devaluation in the nominal exchange rate, combined with a strong increase in the international prices of several commodities (especially the energy commodities) in US dollars, resulted in an increase in the rate of inflation to the consumers, which reached 12.1% by the beginning of 2022. During this period, the inflation of monitored prices also increased, because Petrobras (the state-owned oil company) followed a rule for setting the prices of fuels according to the international prices. Due to this increase in the rate of inflation, the Central Bank initiated another process of increases in the rate of interest that lasted until the end of 2022, when the nominal rate of interest reached 13.75%.

The lower rate of change of nominal wages, as a result of stagnation and neoliberal reforms, had an important contribution to keeping inflation low, as it enabled the Central Bank to lower the rate of interest while keeping inflation on target. The external conditions also contributed to this process of decrease of the rate of interest, since the international rate of interest plus country-risk spread was relatively stable during this period, and when the process of cuts in the interest rate begun in 2016, the interest rate differential was large, so the Central Bank could reduce the interest rates while maintaining a positive interest rate differential (at least, until 2020). When inflation increased in 2021, the Central Bank was forced to increase interest rates again.

As a result, the real base interest rate in the period 2015-2022 was much lower than in the previous period of 2005-2014, reducing from an average of 5.9% to 2.3%.¹⁵ However, the rapid increase in the real base rate in 2022, that reached 7% at the end of this year, due to a response of the Central Bank to an increased imported inflation, points out that fiscal austerity and the reforms implemented in the period were unable to permanently reduce the real interest rate in Brazil. This shows that the interest rate in Brazil is dependent on the need to control nominal exchange rates, and through them, the rate of inflation.

5. Fiscal policy

Right after winning a tight election in 2014, Dilma Rousseff started her second term in 2015 doing the exact opposite of what she promised during her campaign, cutting public expenditures in an attempt to decrease the government primary deficit. As a result, government consumption expenditures decreased 0.6% on average during the years of

¹⁵ Calculated as the annual nominal base rate divided by the accumulated inflation of IPCA in the previous 12 months.

2015 and 2016. Non-financial government transfers to households¹⁶ kept increasing because Brazilian demographic trends resulted in an increasing number of beneficiaries, while the rule adopted by then to adjust the minimum wage still guaranteed real increases in the minimum wage.¹⁷ This was the only type of government expenditure that presented positive rates of growth during this period, growing, on average, 1.9% a year in 2015 and 2016, even though this represented a decline in the rate of growth of transfers, which grew, on average, 5% a year from 2004 to 2014.

The government had a peculiar response to the corruption probe mainly involving Petrobras: instead of following the normal practice of investigating (and eventually jailing) the suspects, it reacted by stopping the execution of ongoing investments and cancelling new investment projects. As result of this, investment by the government and state-owned enterprises also suffered large reductions, decreasing by 19.8% and 24.6%, respectively, on average a year, during 2015 and 2016,¹⁸ as shown in Figure 11 below.

In 2016, Dilma Roussef was removed from office before the end of her second term due to an impeachment process, being succeeded by her vice president, Michel Temer. In 2019, Jair Bolsonaro became president and stayed in chair until 2022. Both Temer and Bolsonaro promoted neoliberal economic reforms that aimed to reduce the rate of growth of government expenditures and to deregulate the labor market. Until 2016, the main fiscal rule that prevailed in Brazil was a target for the primary surplus of the government sector. That rule enabled government expenditures to grow at relatively high rates, especially when tax receipts also grew and when the tax burden increased as a percentage of GDP (Serrano and Summa, 2015). However, by that time, the discussion about fiscal rules changed and started focusing on limiting expenditures, instead of establishing targets for the primary result. This new type of rule began to be discussed during Roussef's government. A few months before Roussef was removed from office, the government sent a bill project to the congress with the purpose of establishing some limits for expenditures as a percentage of GDP. In this proposal, the share of wages of public employees should decrease as a percentage of GDP, while the weight of transfers

¹⁶ Transfers made by the government to households corresponds to approximately 18.0% of GDP in Brazil. Although transfers do not enter directly into the calculation of the expenditure measure of GDP, it is an important component of household disposable income, so it is important to explain household consumption (Haluska, 2023).

¹⁷ In Brazil, the values of several social benefits are indexed to the minimum wage, so increases in the minimum wage results in an increase in government transfers to households (Correa et al., 2015).

¹⁸ For the economic cost of this corruption probe (known as Lava-Jato), see De Paula and Moura (2021). See also Sanches and Carvalho (2022).

to households should stop increasing. By the end of 2016, when Michel Temer was already president, a new fiscal rule was implemented as a constitutional amendment, establishing that, during the next twenty years, the aggregate of the federal government primary expenditures could only be adjusted according to past inflation, without any real increase. In practice, this established a cap for federal government expenditures in real terms. This rule did not apply to states and municipalities.

The second important reform that affected government expenditures occurred in 2019 and consisted in changes in the Brazilian pension system that affected workers of both the public and the private sector. This reform tightened the rules for retirement, requiring workers to work more years before being able to retire, and changed the method used to calculate the value of the benefits in a way that reduced the value of the benefits. Another important change in the economic policy was that after 2019, the government stopped increasing the real minimum wage, which affected both the wages paid to the less skilled workers and the value of the transfers to households.

The cap for federal government expenditures combined with the neoliberal orientation of Temer's and Bolsonaro's administrations resulted in very low rates of growth of government expenditures during the period from 2017 to 2022. Government consumption increased, on average, 0.3% a year. From 2017 to 2021, investments made by the government remained very stable, growing only 0.2% a year. Only in 2022 these investments presented an exceptional growth of 50.3%, mainly due to the increases in investment made by regional governments.¹⁹ Although state-owned companies were not restricted by the government expenditures cap, their investments decreased, on average, 2.3% a year from 2017 to 2022.

Considering the entire period from 2017 to 2022, transfers grew on average 1.8% a year. However, the fluctuations of these expenditures deserve a more detailed explanation. In 2017 and in 2019, the government allowed workers to withdraw their

¹⁹ Investment made by the states and by municipalities grew 66.8% and 56.8%, respectively, in 2022. According to Braga, Araújo and Amitrano (2023), tax receipts of the federal government in Brazil are sensitive to the prices of commodities, especially the prices of crude oil. Therefore, the increases in commodity prices that occurred during 2021 and 2022 increased tax receipts through several channels, and a portion of these federal taxes must be transferred to regional governments. Also, the most important component of taxes receipts of the states are sales taxes which are imposed mainly on goods, so these receipts also presented a large increase due to the increase in commodity prices. All these factors increased states and municipalities discretionary budgets, which increased their investment. The fact that 2022 was an election year for state governors is also important, because governors usually boost investment to try their reelections. It is also important to stress that by 2021, public investment was at historically low levels, due to the series of decreases suffered since 2015.

FGTS (compulsory saving accounts)²⁰ under exceptional conditions (Bastos and Aida, 2017). This measure had no impact on government primary expenditures, so it enabled the government to boost aggregate demand without breaking the ceiling for expenditures. These withdrawals amounted to approximately 0.7% of the country's GDP in 2017 and 0.4% of GDP in 2019, contributing to increased household consumption.²¹

In 2020, after the outbreak of the pandemic, Bolsonaro's administration accepted that it was not possible to keep expenditures below the ceiling established by legislation and decided to temporarily break the fiscal rules to give a proper response to the extreme situation caused by the pandemic. In that year, the government paid benefits to households on emergency basis to mitigate the effects of the job losses caused by the social distancing measures that were being taken to slow down the spread of the virus (de Paula, 2021). The expenditures with this benefit amounted to 3.7% of the GDP²² and helped to reduce the economic effects of the pandemic, while total transfers made by the government to households (including all existing social programs, the payment of pensions, etc.) increased 24.9% in that year.²³ However, in 2021, the value of this emergency program was reduced. The argument provided by the economic staff was that the effects of the pandemic were coming to an end and that it was necessary to compensate the negative budgetary impact of the program, so total transfers to households decreased 24.4% in that year. In October of 2022, Jair Bolsonaro would try his reelection, but was facing low approval rates and standing behind his main opponent (Lula da Silva, who had been president for two terms, from 2003 to 2010) in the election polls. As the elections came closer, the value of the benefit of several social programs increased²⁴ to boost the economy and improve the popularity of the incumbent president among the low-income electors. As a result, transfers made to the households increased 4.5% in that year.

²⁰ Workers with formal labor contracts are obliged make monthly contributions to this fund. Until 2019, these deposits and all their accrued interest could only be withdrawn when a worker were fired, or retired or bought a house. In 2017, the government allowed workers to withdraw all their deposits that resulted from contributions made during previous occupations (i.e., labor contracts that had already been canceled but when the worker had not been fired). In 2019, workers were allowed to withdraw deposits that resulted from contributions of previous and current occupations. In that year, it was also established more flexible rules that allowed workers to withdraw their deposits from this fund once a year.

²¹ Data from FGTS.

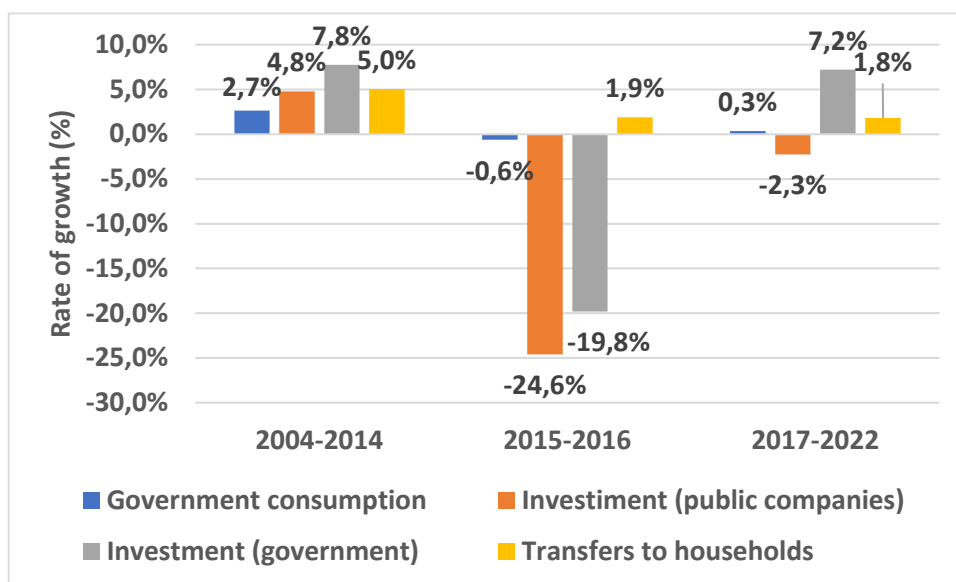
²² Data from "*Portal da transparência*", CGU.

²³ Calculated from the data of the System of National Accounts, from IBGE.

²⁴ The value of the benefits paid in the program called "Auxílio Brasil" (the emergency program created in 2020 and modified in 2021) increased by 50% in August of 2022, to 600 Brazilian Reais (114 US Dollars). Expenditures in other social programs increased as well, such as the payment of vouchers to low-income households destined to buy gas.

In summary, during this period of neoliberal governments under Temer and Bolsonaro, attempts to stimulate the economy using fiscal policy were usually made through increases in transfers to households; either allowing them to withdraw their deposits from FGTS accounts, or increasing the value of social benefits to low-income households. However, even though transfers to households were the only type of government expenditure that kept increasing during this period, the average rate of growth of transfers was lower than what it was during the period from 2004 to 2014. The erratic policy regarding the emergency payments makes it difficult to investigate the more persistent factors behind the growth of transfers. Therefore, it is difficult to measure the effect of the reform in the pension system after 2019, although the new rules will probably have a small effect on transfers in the first years after its implementation. However, it is safe to say that the absence of real minimum wage increases after 2019 explains the decrease in the rate of growth of public transfers. Figure 11 presents the average rate of growth of three types of government expenditures (consumption, investment, and transfers) and the rate of growth of investment by state-owned companies, divided by each subperiod we are using in our analysis.

Figure 11: Rates of growth of types of government expenditures and investment by state-owned companies, average by period



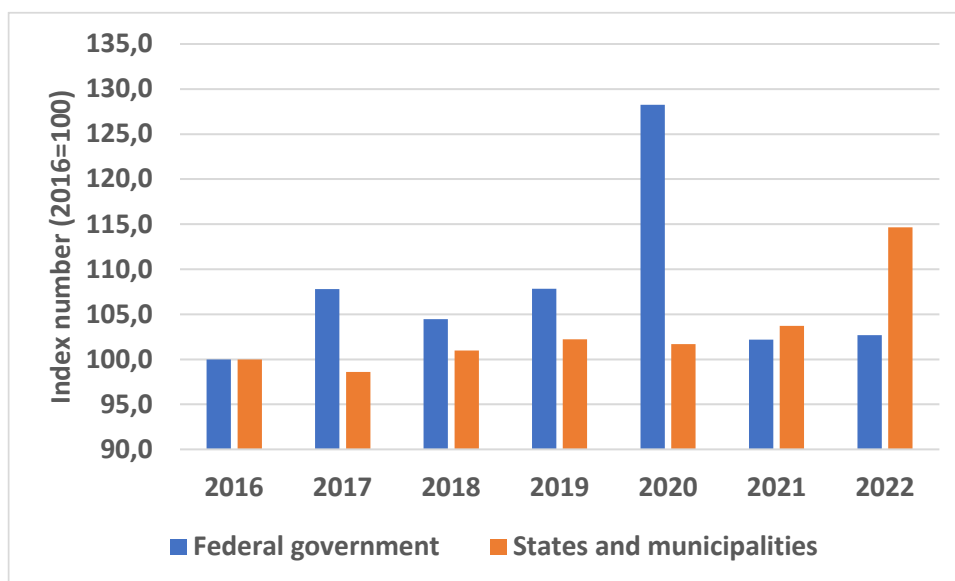
Source: IBGE; Miguez (2016); Miguez and Freitas (2019) and “Bulletin of federal public companies”. Elaborated by the authors.

As mentioned previously, the cap for the primary expenditures created in 2016 applied only for the federal government, while subnational governments were not

constrained by this fiscal rule. However, during most of the period under analysis, the expenditures of the local governments did not grow significantly more than federal government expenditures. Figure 12 presents the evolution of primary expenditures from federal government and from states and municipalities since 2016 – when the ceiling for federal government expenditures was created – to compare the cumulative growth of these expenditures. From 2017 to 2021, the rate of growth of the federal government expenditures was, on average, 0.4% a year, while the rate of growth of the expenditures of states and municipalities was 0.7% a year, only slightly above.²⁵ Tax receipts of local governments depend on the level of output and on the prices of commodities in local currency. The rates of growth of states and municipalities expenditures was low during these years because the tax receipts of local governments were affected by the recession from the years of 2015 and 2016 and by the subsequent period of low rates of GDP growth. In Brazil, states and municipalities usually are indebted with the federal government, and during the past years, many large state governments faced problems to pay their debts, being forced into making agreements with the federal government in which they compromised with expenditures cuts in exchange for better conditions for debt payments, such as enlarging the maturity of the debts. Only in 2022 states and municipalities managed to promote a large increase in their expenditures, which was possible because of the increase in commodity prices, that boosted their tax receipts (Braga, Araújo and Amitrano, 2023). As mentioned above, this increase in expenditure was made mainly through higher investment.

²⁵ To calculate the real rates of growth of the federal government and States and municipalities, it was necessary to assume that the deflators of government consumption, government investment and the deflator of transfers to households is the same for each of the levels of government.

Figure 12: Index number of primary expenditures of the federal government and states and municipalities



Source: IBGE; Miguez (2016) and Miguez and Freitas (2019). Elaborated by the authors.

6. Household autonomous expenditures and induced consumption

Other important components of aggregate demand are household autonomous expenditures and induced consumption.²⁶ By household autonomous expenditures, we mean the sum of autonomous consumption and residential investment which are sensitive to interest rates and credit conditions, and consumption out of public transfers (the latter was already discussed in section 5 above).²⁷

6.1 Household autonomous expenditures

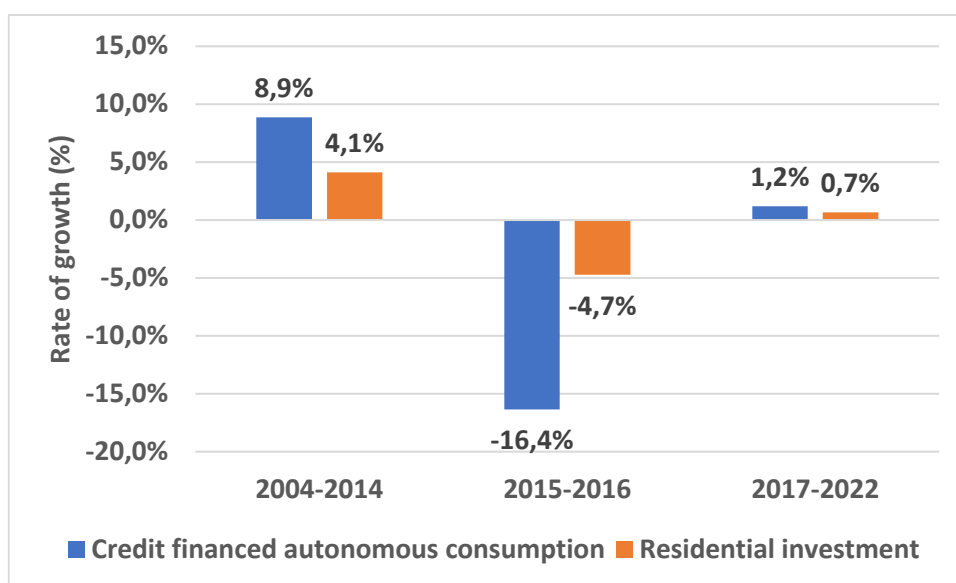
During the recession of 2015 and 2016, that coincided with a period of rising interest rates and cuts in credit by public banks, new credit flows decreased. As a result, credit-financed autonomous consumption declined 16.4% a year, on average, while residential investment declined 4.7% a year. However, the relatively long cycle with several cuts in the base nominal rate of interest, and the consequent fall in real interest

²⁶ For a theoretical discussion on the concept of autonomous demand and its relation with macroeconomic policies, see Serrano, Summa and Freitas (2023).

²⁷ We are using the consumption of durable goods as a proxy for the portion of autonomous consumption that is sensitive to credit conditions. Induced consumption, by its turn, depends on the sum of wages and gross mixed income net of taxes. Gross mixed income is the income of self-employed workers, from which it is not possible to distinguish profits from wages. Since own-account workers usually have low value added per worker, it is reasonable to use the hypothesis that the pattern of consumption of these own-account workers is the same as the rest of the workers who receive wages and that they tend to consume all (or almost all) of their income.

rate, did not result in an expressive credit expansion. The slight recovery in credit after 2017 was thus very modest when compared with the pace of expansion observed during the period from 2004 to 2014. From 2017 to 2022, credit-financed autonomous consumption and residential investment grew, respectively, only 1.2% and 0.7% a year, on average, as shown in Figure 13.

Figure 13: Rates of growth of consumption of durable goods and residential investment, average by period



Source: IBGE. Elaborated by the authors.

Some factors other than the rates of interest are important to explain these low rates of growth of credit. First, in 2005, when the cycle of credit expansion was at its beginning, the level of household indebtedness was 21.3%, while by 2016 (when a new cycle of decreases in the base rate of interest begun), the level of indebtedness had already reached 45.8%.²⁸ Therefore, the higher indebtedness precluded new loans from growing at higher rates even during periods of low interest rates (Martins, Sarno and Feijó, 2024). Second, in Brazil, having a job with a formal labor contract is an important condition to have access to credit. From 2004 to 2014, the number of formal jobs increased at a higher rate than the total number of jobs, making a larger share of workers eligible for new loans and contributing to the credit expansion. From 2016 to 2022, an opposite trend was observed, with the number of formal jobs growing less than total jobs (Amitrano et al., 2023). Third, in 2009, the government created a housing program, called '*Minha Casa*,

²⁸ Data from BCB.

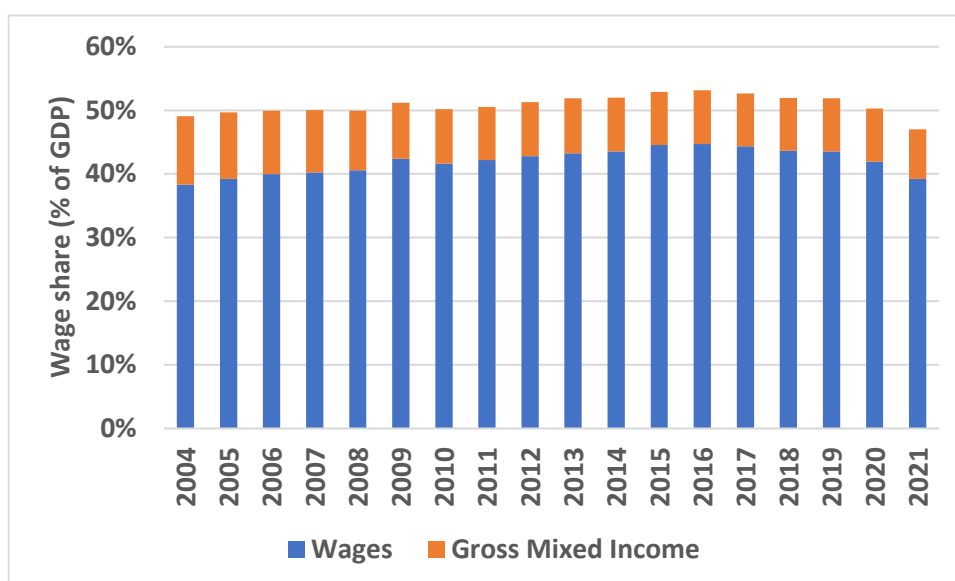
Minha Vida’, with the purpose of building new houses for low-income households with subsidized credit. This program contributed to the relatively high rate of growth of residential investment until 2014. From 2015 on, the budget for this program was also reduced, together with its effects on the volume of residential investment.

6.2 Induced consumption

During the period from 2004 to 2014, the share of wages in GDP presented a clear rising trend, increasing from 38.3% to 43.5%. Summa and Serrano (2018) point out three main factors that can explain this change in income distribution during those years. First, the declining rate of unemployment, combined with increases in the real minimum wage, increases in the coverage of unemployment benefits and other types of social programs, as well as a decrease in labor informality, resulted in an improved bargaining power of workers during those years. Second, the government changed the rules for adjusting some monitored prices (such as fuels, electric energy rates, and public transportation fares), resulting in a lower rate of inflation of monitored prices. Third, the appreciation of the Brazilian currency during those years (especially from 2004 to 2010) was also important to mitigate the effects of increases in commodity prices in dollars. The share of Gross Mixed Income in GDP decreased from 10.8% in 2004 to 8.5% in 2014, which is explained mainly by the decrease in the informality in the economy. Figure 14 presents the share of wages and Gross Mixed Income in GDP.²⁹

²⁹ Figure 14 presents data until 2021 because by the time this paper was submitted, there was still no data on functional income distribution available for 2022. Updated estimates provided by Alessandro Miebach, based in Miebach and Marquetti (2023), shows that the wage share also decreased in 2022 (Summa, 2024).

Figure 14: Share of wages and gross mixed income in GDP



Source: IBGE. Elaborated by the authors.

This increasing trend observed for the wage share had stopped and was reversed after 2017, with the wage share falling to 39.2% by 2021. It is worth mentioning that not only the share of wages in national income decreased, but the level of real wage was also 3.6% lower in 2022 than it was in 2014.³⁰ The share of Gross Mixed Income in GDP also fell to 7.8%. To explain these facts, we can look at the same variables that Summa and Serrano (2018) use, i.e.: the bargaining power of workers, the policy of the government for monitored prices, and the inflation of commodities expressed in domestic currency. The rate of unemployment increased from 6.9% in 2014 to 12.8% in 2017, and after that it started falling at a slow pace (with exception for the year of 2020, when unemployment increased because of the effects of the pandemic). During these years, the portion of formal jobs in total jobs was reduced, and the government stopped increasing the real minimum wage. The policy for adjusting some monitored prices also changed,³¹ resulting in average inflation of monitored prices of 7.9% a year from 2015 to 2022, higher than the average inflation (which was 6.1%). The accumulated increase of 119.5% in the nominal exchange rate combined with the increases in the prices of commodities in US dollars resulted in an average rate of inflation of commodities of 14.8%. It is worth

³⁰ Data from PNAD-Contínua, IBGE.

³¹ Perhaps the most important change in the policy for setting monitored prices was in the rule for determining the prices of fuels. Until 2014, the prices of fuels remained stable for long periods and the government tried not to pass-through the increases in international prices to the domestic market. However, this policy changed after 2016, when the company started to fix its price according to the price of fuels in the international market, adjusting its prices much more often and automatically whenever there was a change in international prices or in the exchange rate.

remembering that the policy of the Central Bank to maintain a negative interest rate differential during 2020 and 2021 contributed to the large devaluation of the domestic currency.

The labor reform of 2017 made the labor market more flexible and worsened the labor conditions for the workers. Among the most important changes in these rules, firms were now able to make some types of agreements with workers even if the conditions established in these agreements were worse (for the workers) than the ones established by the legislation. Moreover, the rules for the labor court were changed in a manner very favorable to employers, increasing the risks and costs of litigation for the workers. This new law also allowed for more flexible contracts regarding, for example, the number of days and hours worked and the duration of break times. Therefore, this reform also contributed to the decrease in the share of wages in income.

The share of induced consumption in GDP depends not only on the wages share, but also on the taxes over wages, which reduces the disposable income of workers. Nevertheless, there have not been any relevant changes in the taxes over wage bills or over household incomes that could have offset the effects of the decrease in the share of wages over induced consumption. The share of social contributions on wages has remained around 22%, while income taxes to households (including all types of incomes) as a percentage of GDP had a slight increase from 2.9% in 2014 to 3.3% in 2021.³²

As it was previously discussed in the fifth section, transfers were the only type of government expenditure that presented systematically positive rates of growth during the period under consideration – although its rate of growth was smaller than it was from 2004 to 2014 – and the weight of transfers in GDP increased from 15.8% in 2014 to 17.3% in 2021. Therefore, the increase in government transfers partially offset the negative effects that the changes in income distribution had on household consumption.

7. Business investment

Finally, we get to the discussion of the behavior of business (non-residential private) investment.³³ So far, we have demonstrated in the 2015-22 period that i) the rate of growth of exports has decreased, despite the depreciated exchange rate; ii) the degree of imported content in aggregate demand has increased; iii) the rate of growth of

³² Data from the National Accounts, IBGE.

³³ These investments consist mainly of investments in machinery and equipment, but also include construction structures, software, research and development and cultivated biological resources. Most of these investments are made by private firms, but it also includes investment by self-employed workers.

government expenditures has decreased; iv) the reduction in the base rate of interest was not capable of making credit-financed autonomous consumption or residential investment to grow significantly; and v) the set of policies regarding the management of monitored prices, the exchange rate, the minimum wage, and the labor reform from 2017 all contributed to the decrease in the wage share and consequently, in the share of induced consumption in GDP. All these factors have contractionary effects if taken in isolation. Therefore, the only way in which all these factors could end up being expansionary for the economy is if it somehow opened space for business investment to growth at higher rates in a way that could offset all the other contractionary effects.

However, firms invest to adjust the size of their productive capacity to the expected levels of demand, to make the average degree of capacity utilization during the economic life of the equipment compatible with the normal or planned degree of capacity utilization. According to the flexible accelerator mechanism, business investment is induced by the level of demand, and not the other way around.

When the trend rate of growth of GDP increases, firms tend to increase the rate of growth of their productive capacity, which requires the rate of growth of investment to increase more than the increase in the rate of growth of GDP. Consequently, i) changes in the rate of growth of GDP tend to result in larger changes in the rate of growth of investment; and ii) thus lead to a positive relation between the rate of growth of GDP and the share of non-residential private investment in GDP.

It is difficult to examine the behavior of business investment in each year of the period under analysis because there were several economic and statistical effects that make this series suffer several oscillations. We opted to make our analysis based on the averages of the periods we are considering.³⁴ Table 2 presents the averages of the rate of growth, the share of business investment, and the share of total investment in GDP during the period from 2004 to 2014 and from 2015 to 2022. This relationship between

³⁴ First, due to the pandemic, there were oscillations caused by the pandemic and its following economic recovery. Second, as can be seen in Figure 15, the share of business investment in GDP presented a large increase in 2021. However, we believe that it does not represent an actual increase in the propensity to invest. Due to tax incentives, until 2018, Petrobras usually produced oil platforms, sold them to a subsidiary abroad and paid rent for this subsidiary, although these platforms never left the country and produced oil in Brazil. After 2018, tax rules changed and the company started to nationalize these platforms, which was registered in the National Accounts as imports destined to investment, even though these platforms have already been producing for several years. These values were particularly relevant in the year of 2021. Therefore, in the National Accounts, there is large a register of investments in 2021 which does not represent the purchase of new machines or equipment. Third, trucks produced after 2023 should meet stricter rules about the emissions of pollutants, which raised production costs and prices. Therefore, several companies anticipated their purchases of new trucks in 2022, contributing to a temporary boost in investment in that year.

investment and GDP is what would be expected according to the flexible accelerator model: the decrease in the rate of growth of GDP resulted in a decrease in the rate of growth of business investment and in the share of these investments in GDP (Avancini, Freitas and Braga, 2015; Braga, 2020).³⁵ Moreover, as residential investment was negatively affected by the recession, by the credit conditions, and by the dismantling of the main government housing program, and since public investment and investment made by state-owned enterprises also suffered large cuts, the share of total investment in GDP also decreased.

Table 2: Average rate of growth, share of business investment in GDP and share of total investment in GDP, by period

	2004-2014	2015-2022
GDP growth rate	3,7%	0,2%
Business investment/GDP	10,1%	8,9%
Total investment/GDP	19,2%	16,3%

Source: IBGE and Ministry of Economy (2022). Elaborated by the authors.

It is important to note that during the period under analysis, the decrease in the wage share would be related to an increase in the normal rate of profits on new investments. Additionally, as we saw, real interest rates decreased from 2016 to 2021. However, these factors were not capable of stimulating firms' investments (in fact, the level of business investment in 2022 was lower than in 2014). The reason for that is that capitalists will only invest to build new productive capacity if there are increases in aggregate demand, seen as persistent by them. If firms increase their investments due to a decrease in the rate of interest and/or due to an increase in the rate of profit, but without an increase in demand, the new productive capacity will remain idle and it will end up discouraging other investments in the subsequent periods (for more a more detailed discussion on this issue, see Serrano, 2001; Serrano and Summa, 2022).

³⁵Avancini, Freitas and Braga (2015) and Braga (2020) perform empirical tests of the accelerator mechanism for the case of Brazil to look for the causality between these variables. In these papers, the authors demonstrate that the rate of growth of GDP explains (in the Granger sense) the share of investment in machinery and equipment and that the rate of growth of final demand (i.e., aggregate demand excluding investment in machinery and equipment) Granger causes the rate of growth of investment in machinery and equipment.

The economic reforms carried on in Brazil following the agenda put forth by the *Bridge to the future* relied on a substantial long run decline in the interest rate, and the consequent growth led by private investment. However, that was not what happened: given the set of contractionary policies adopted, business investment declined because there was no expansion of the internal market.

8. The bridge to stagnation

As we have seen, the very low rates of growth in the Brazilian economy observed from 2015 to 2022 cannot be attributed to the external sector. In fact, Brazil faced quite comfortable external financial conditions, with a large amount of foreign international reserves and a large portion of its external liabilities denominated in its own domestic currency. So, there was clearly no binding external constraint to growth in this period. Moreover, in terms of generating demand, not only did the external sector have a positive contribution to growth, but the average annual contribution of the external sector to the growth of GDP was actually larger during the period from 2015 to 2022 than in the previous period (2004 to 2014).

The main cause of the stagnation must necessarily be explained by the evolution of domestic demand. The stagnation of the domestic market came initially by the large cuts in government expenditures in 2015 and in 2016; later by the effects of neoliberal economic reforms that aimed to reduce the rate of growth of government expenditures and the worsening of the bargaining power of workers through changes in labor market laws. One of the alleged purposes of these reforms was to make a fiscal adjustment that would result in a sustainable decrease in the base rate of interest, which would stimulate private investment, changing the pattern of economic growth to a pattern led by private investment. The real interest rate in fact decreased from 2016 to 2021, but that occurred mainly because inflation remained below the target for several years. The latter was a result of a lack of large commodity price shocks, while the stagnation itself and the labor law reforms significantly reduced the rate of increase of nominal wages.

As a result, the share of wages in income stopped increasing and started to fall, having a negative effect on household induced consumption. The lower base real rate of interest, by its turn, was not capable of stimulating aggregate demand. First, because it was not capable of generating high rates of growth of household autonomous consumption nor of residential investment. Second, since investment by firms in machinery, structures, and so on are mainly induced by the trend of expected and actual

effective demand; these investments were negatively affected by the decrease in the rate of growth of GDP during this period. Low real rates of interest cannot stimulate aggregate new investment in the absence of expectations of persistent increases in demand. To make matters worse, the particularly low nominal rates of interest observed during 2020 and 2021 (which resulted in negative interest rate differentials) resulted in a large devaluation of the domestic currency. Since the exchange rate elasticity of imports and exports in Brazil is quite low, this devaluation ended up having a contractionary effect on demand, as it contributed to increase inflation, reduce the real wages, and consequently, reduce household consumption.

In sum, the strategy of reducing the rates of growth of government expenditures, that supposedly would open space for the Brazilian economy to grow based on exports and private investments, has failed, resulting only in a large reduction in the average rate of growth of the economy and of the business investment share. In fact, the real exchange rate devaluated, and the real interest rate decreased in the period, without leading to higher growth rates of exports and business investment.³⁶ This experiment has thus produced results very contrary to what was expected by many Post-Keynesians and New Developmentalists, namely, that growth would arise from the right management of the “macro prices” (Bresser Pereira, 2017; Marconi, 2017).

However, this bridge to stagnation was actually quite successful in terms of its real political objectives, that were the reduction of the relative size of the State in the economy and of the bargaining power of workers (Serrano and Melin, 2016; Serrano and Summa, 2022).

³⁶ Some authors such as Feijó (2024, p. 224) and Arestis et al. (2021, p. 5) acknowledge that the lower real rate of interest observed since 2016 and the more devaluated real exchange rate during the recent past were not successful in increasing the share of business investment in GDP and in increasing the rate of growth of GDP. However, they do not offer an explanation for this.

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Appendix

**Table 3: Rate of growth of the GDP and of components of aggregate demand;
averages by period**

Demand component	2004-2014	2015-2016	2017-2022	2015-2022
GDP	3,7%	-3,4%	1,4%	0,2%
Household consumption	4,6%	-3,5%	1,5%	0,2%
Household consumption of services and non-durable goods	4,3%	-2,6%	1,6%	0,5%
Credit-financed autonomous consumption	8,9%	-16,4%	1,2%	-3,5%
Government consumption	2,7%	-0,6%	0,3%	0,1%
Gross fixed capital formation	5,8%	-13,0%	3,0%	-1,2%
Government investment	7,8%	-19,8%	7,2%	-0,3%
State-owned companies investment	4,8%	-24,6%	-2,3%	-8,4%
Residential investment	4,1%	-4,7%	0,7%	-0,7%
Business investment	6,5%	-14,3%	4,2%	-0,8%
Exports	3,8%	3,8%	2,3%	2,7%
Imports	9,8%	-12,3%	3,2%	-0,9%
Transfers to households	5,0%	1,9%	1,8%	1,8%

Source: IBGE; BCB; Miguez (2016); Miguez and Freitas (2019) and Ministry of Economy (2022). Elaborated by the authors.

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