Is There Evidence of Expansionary Austerity in Brazil?

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Resumo

Este artigo testa a hipótese de austeridade expansionista para o Brasil entre janeiro de 2000 e dezembro de 2020 por vias de modelos Autorregressivos com Defasagens Distribuídas Não Lineares (NARDL). Dentre os resultados foi verificada uma relação de longo prazo entre o PIB, a dívida pública bruta e líquida, os tributos totais, diretos e indiretos, além das despesas totais, obrigatórias e discricionárias. Já no que se refere à dinâmica de curto prazo, auferida pelos Modelos de Correção de Erro, verificou-se que os choques que acometem à economia brasileira se dissipam, entretanto, a dinâmica do ajuste é demasiadamente lenta para todas as variáveis fiscais testadas. Foi verificado, também, que o ajuste de curto prazo pelo lado da despesa é mais lento em relação aos tributos e a dívida. Finalmente, a análise dos multiplicadores dinâmicos reporta que políticas de austeridade no Brasil, empreendidas pelo lado das despesas, dos tributos ou da dívida são expansionistas.
Palavras-Chave: Austeridade, Política Fiscal, Crescimento, NARDL, Multiplicadores Dinâmicos.

Abstract

This article tests the expansionist austerity hypothesis for Brazil between January 2000 and December 2020 through Nonlinear Autoregressive Distributed Lags (NARDL) models. Among the results, a long-term relationship was verified between GDP, gross and net public debt, total, direct and indirect taxes, in addition to total, mandatory and discretionary expenses. With regard to the short-term dynamics, measured by the Error Correction Models, the shocks that affect the Brazilian economy dissipate, however, the adjustment dynamics is too slow for all the fiscal variables tested. It was also verified that the short-term adjustment on the expenditure side is slower in relation to taxes and debt. Finally, the analysis of dynamic multipliers reports that austerity policies in Brazil, undertaken on the expenditure, tax or debt side, are expansionist.
Keywords: Austerity. Fiscal Policy. Growth. NARDL. Dynamic Multipliers.

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Introduction

In the two decades between 2000 and 2020, Brazilian fiscal policy went through distinct moments. Throughout the 2000s there was economic growth reconciled with primary surpluses. However, from the mid-2010s on, the Brazilian economy saw its growth significantly reduce. At the same time, the country started to present countless fiscal difficulties, the primary result presented a long sequence of deficits, and the public debt expanded strongly. In this context, the authorities are faced with a difficult dilemma: to use fiscal policy to stimulate activity or preserve the country's fiscal position?

This paper has two objectives, the first is to analyze the short and long run effects of austerity policies on economic growth in Brazil between January 2000 and December 2020; the second is to investigate whether different austerity instruments have different effects on GDP. To this end, the effects of gross and net public debt, total direct and indirect taxes, and total mandatory and discretionary spending on GDP will be estimated using Nonlinear Autoregressive Models Distributed Lags (NARDL). The article is based on two hypotheses: i) that austerity policies can be expansionary and, ii) that different fiscal policy instruments, whose objective is to maintain the long-term equilibrium of public accounts, exert asymmetric effects on GDP.

The article's first contribution is its broad review of the austerity policies implemented in the country after the Plano Real. Furthermore, the results obtained from the estimations show: i) that there is a long-run relationship between the numerous fiscal variables used in the estimations and the Brazilian GDP. This shows that the successive crises that have befallen the country have always found corrective measures that have managed to keep the long-term trend of fiscal aggregates in relation to GDP balanced. ii) Still with regard to the long-term effects of fiscal policy, it was found that taxes exert long-term effects on GDP, but not on spending. Except for the case of discretionary spending, which has positive and significant effects on GDP.

As for the short-run dynamics, it was seen that shocks that deviate the variables from their long-run trend dissipate and the fiscal aggregates are able to return to their path. However, the dynamics of the adjustment have been too slow for all variables tested. It was also seen that the short-term adjustment dynamics on the expenditure side are slower vis-à-vis the tax and debt side. The explanation given for this lies in the normative arrangement of fiscal policy in which public spending is regulated by the Constitution, while taxes are regulated via infra-constitutional legislation. This makes the political effort to equalize public spending greater in relation to taxes and its adjustment slower.

As for the analysis of dynamic multipliers, an asymmetric relationship was found between fiscal variables and GDP, confirming the expansionary austerity hypothesis for Brazil. The estimates show that contractionary public spending shocks lead, after a short period, to GDP expansion. It was also found that tax expansions can lead, after a certain period, to an increase in economic activity and that this can be related to the specifics of taxation in the country. Finally, expansionary effects on GDP from negative shocks to public debt have been verified.

The article is divided into five sections starting with this introduction. In section 2 the literature will be presented. In section 3 the Brazilian case will be analyzed. Section 4 will present the empirical strategies. In section 5 the results will be presented and discussed. Finally, in the final section some concluding remarks will be made.

2. Literature

The hypothesis of expansionary austerity has recently been raised by the contribution of economists Alberto Alesina; Carlo Favero and Francesco Giavazzi through numerous contributions that culminated in the book Austerity: When It Works and When It Doesn't (Alesina *et. al.,* 2019). Austerity can be defined as a set of policies whose goal is to make fiscal policy sustainable, austerity policies can take three forms: i) tax hikes; ii) cutting public spending and, iii) some combination of both strategies. Such policies would be dispensable if governments used fiscal policy more assertively.

The authors studied 184 austerity plans comprised in a sample of 16 Organization for Economic Cooperation and Development (OECD) economies between 1981 and 2014. Of these, 57 plans were

undertaken predominantly on the revenue side, while 113 were predominantly on the expenditure side[1]. Exogenous episodes whose measures are identified by Romer and Romer's (2010) narrative approach are considered as austerity programs, Austerity episodes can be classified as both pre-announced and unexpected changes in the fiscal pattern.

In a traditional macroeconomic context, fiscal policy is subject to Musgrave and Miller's (1948) logic of construction under flexibility and exhibits compensatory movements in the face of swings in inflation and employment. Such an approach suggests that tax cuts and spending increases be adopted during periods of deflation and unemployment. For the remaining periods, taxes should go up and expenses should be cut. However, fiscal policy, unlike monetary policy, is more sensitive to influences coming from the political process (Breton, 1974) and politicians always have the incentive to run fiscal deficits even if macroeconomic conditions do not call for expansionary policies (Buchanan and Wagner, 1977).

This creates the so-called deficit bias of fiscal policy. According to Persson and Svensson (1989) and Tabellini and Alesina (1990), politicians in office have the incentive to accumulate public debt, forcing their successors to implement adjustment policies. Alesina and Drazen (1991), on the other hand, argue that fiscal reforms can be delayed by political disagreements regarding who should bear the burden of austerity policies. This causes a risk of imposing undesirable macroeconomic imbalances.

A first imbalance caused by the misconduct of fiscal policy is the expansion in the size of the government that can occur on both the revenue and expenditure sides (Brennan and Buchanan, 2000). Expansions in the tax burden tend to drive part of the economy into informality, compromising the government's own revenue collection, as schematized in the Lafer curve (Winniski, 1978). Or even, on the expenditure side, as in Peacock and Wiseman (1961/1978), who demonstrate that episodes that demand a temporary increase in public expenditure cause a permanent increase in the tax burden.

There is also a *posteriori* expansion of the tax burden in Ricardian equivalence models (Barro, 1974/1979), which occurs when budget deficits in the present, financed by public debt, lead to tax increases in the future. For Ferguson (1964), financial burdens on public debt may not make the choices between taxation in the present and in the future equivalent. Budgetary overruns are also related to the loss of efficiency of monetary policy as a nominal anchor able to tame inflation (Sargent and Wallace, 1981). Chronic inflationary problems can cause perverse distributional effects through the incidence of the inflation tax (Cagan, 1956).

Because of these effects, austerity policies are commonly implemented. Sometimes institutional rules to delineate the space of political interference under fiscal management are instituted, according to Casals (2012) they can focus on revenue, expenditure, debt, or a combination of both. Going back to Alesina *et. al* (2019), austerity policies can comprise a single period, or span several years over the horizon, so that long periods characterized by several institutional reforms can be grouped together as a single austerity measure.

Austerity policies are not free from criticism. For Lucas and Stokey (1983) excessively rigid fiscal rules can make it impossible for fiscal policy to stabilize the economic cycle. Christiano and Eichembaum (1992), meanwhile, evaluate the effects of fiscal expansions in a Real Business Cycle (RBC) model framework whose positive spending shocks can encourage labor supply and output expansion; of employment. In a Keynesian[2] approach, fiscal expansions are important elements in expanding output. This model, however, privileges the multiplier effects of spending vis-à-vis taxes, since taxes affect disposable income and hence aggregate consumption, while spending is exogenous and affects all demand components and hence income as a whole.

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[1] For empirical purposes the authors draw on only 170 austerity plans out of the total 184 contained in their sample. This is because some austerity plans are not assessable as in Germany before unification.

[2] The Keynesian approach here should be read as the synthesis from the contribution of John Hicks (1939), because the postulates of the IS-LM model are not present in Keynes' General Theory (1936).

On this, Alesina *et. al* (2019) raise six points that need to be considered when dealing with expansionary or contractionary effects of fiscal policy:

i) **Phase of the economic cycle** – the authors argue that confusions can arise from the difficulties of estimating the effects of a fiscal shock separately from the economic cycle effects. They argue that fiscal contractions can occur at the apex of an economic boom, in which case it is difficult to know if what caused the recession was the fiscal contraction, or if this would be a natural movement of the cycle.

ii) **Expectations** – The simple Keynesian model is static, so that expectations do not interfere with the outcome of fiscal policy. When considering expectations, spending cuts can signal future tax reductions and increases in permanent disposable income (Friedman, 1953; Modigliani and Richard, 1954), in this case households increase their consumption in the face of fiscal contractions.

iii) **Other macroeconomic policies** – Austerity policies are rarely undertaken alone; they are usually accompanied by, or exert an effect on, monetary and exchange rate policy. In this sense, the authors argue that fiscal contractions can result in looser monetary policies and a more devalued exchange rate (Alesina *et. al,* 2002) that induces growth.

iv) **Supply side** – Although in the traditional modeling, fiscal policy is treated as a demand element, its effects also have repercussions on the supply side because it changes incentives. Daveri *et. al* (2000) argue, for example, that taxes on capital discourage investment. On the other hand, poorly calibrated social security expenses can discourage savings and have repercussions on capital accumulation.

v) **International context** – Adjustment policies can be adopted in periods of worldwide recession, or the opposite, expansions can be undertaken in periods of international growth. The net effect of this overlapping of factors is difficult to estimate.

vi) **Institutional Reforms** – the authors argue that austerity policies are usually undertaken together with institutional reforms that increase long-run productivity and can be expansionary.

When it comes to the empirical literature on the effects of fiscal policy on growth, the results are inconclusive. Lane and Perotti (1993) find, for a panel of OECD economies estimated between 1964 and 1993, evidence of recessionary effects stemming from fiscal expansions driven by government purchases. Perotti (1999) also studies OECD countries and concludes that fiscal consolidations in periods of high government debt tend to be more expansionary than in periods of low debt. Von Hagen *et. al* (2002) argue that the effects of expenditure-driven fiscal shocks on wages and transfers are more persistent. The authors argue, based on a panel of OECD economies, that fiscal consolidations involve a certain "consolidation fatigue" that influences their effectiveness. The variation in the multiplier effects of fiscal shocks on output led Leeper (2010) to call estimates of multiplier effects "alchemy."

Other authors have also focused on understanding whether austerity policies are always recessive. For example, Alesina and Ardagna (2010) argue that austerity policies can be expansionary as long as they are committed to the expenditure side. Perotti (2013), on the other hand, argues that adjustments conducted mostly on the expenditure side have less recessionary effects than those committed on the revenue side. Alesina *et. al* (2015) have no conclusive results about the effects of austerity policies, for these authors, the effects of fiscal consolidations on output can be recessionary or expansionary and are conditional on the instruments used. Contrary to these authors, Jordà and Taylor (2016) show that fiscal adjustment policies are always recessionary.

3. Austerity in Brazil

Austerity policies, in Brazil, have a much shorter history in relation to the countries analyzed by Alesina *et. al* (2019). The work of these authors covers episodes of austerity starting in 1980, In Brazil, the concern with the state's financial health only began to gain institutional contours after the 1988 Constitution. Historically in the country there has been a predominant principle that development would depend on a more active action by the State, this conception was behind the classic controversy over development in the 1940s between Roberto Simonsen and Eugênio Gudin (2010). In this controversy, Roberto Simonsen

defended the induction of development through a more active state action, aiming at structural changes in the economy. This would evidently come about through expansion of the public deficit and the monetary base.

This conception that the State had no financial restrictions since it had the capacity to issue money to finance its expenditures found theoretical support in the view on "functional finance" by Lerner (1943), for whom public spending has no restrictions and taxes are merely an instrument of inflationary control since they wipe money from the economy. In Brazil, this gained economic policy contours, as argued by Malan *et. al* (1977), the fiscal deficits of the 1940s and 1950s should be analyzed in the light of monetary and credit policy, especially since the creation of the Superintendency of Money and Credit (SUMOC). Vianna (1990) states that the Brazilian fiscal policy was in deficit during most of the decades from 1930 to 1950.

The continuous public deficits allied with monetary expansion caused macroeconomic imbalances such as inflation and external deficits, such imbalances only found a solution with the reforms of the Government Economic Action Program (PAEG). The plan conceived, perhaps for the first time in an organized and successful way, a strategy for fiscal adjustment of the Brazilian economy, which occurred, according to Resende (1990), by expanding the tax burden. The increase in direct and indirect taxes caused the Brazilian economy's fiscal deficit to decrease from 4.2% of GDP in 1963 to 1.1% of GDP in 1966. However, decades later, under the effects of two international oil price shocks and the fiscal imbalances that permeated much of the 1970s, Brazil once again presented chronic macroeconomic imbalances, the conjunction of low growth rates with persistently high inflation characterized the 1980s as a lost decade.

Since the 1988 Constitution, and under the need to stabilize the hyperinflation that plagued the country, macroeconomic and fiscal policy gained new institutional arrangements, in the articles between 163 and 169 that deal exclusively with public finances. Article 167 item III of the constitutional letter, for example, determines that financing through National Treasury credit operations must not be used to pay for operating expenses and, therefore, must not exceed capital expenditures. This rule, popularly known as the golden rule, is intended to prevent the Brazilian government from going into debt to pay current expenses.

In the early 1990s, still under the imbalances of hyperinflation that caused significant budget distortions, the country's fiscal deficits remained repressed (Guardia, 1992). As Bacha (2012) points out, with the stabilization of the economy in 1994, the repressed deficits turned into potential deficits and by the end of the 1990s, into actual public-sector deficits that jeopardized the inflationary stabilization achieved with the Real.

In 1996, aiming to correct the fiscal deficits and simultaneously finance social services foreseen in the Constitution, the executive proposed Constitutional Amendment 12/96, which created a Provisional Contribution on Financial Transactions (CPMF), initially at a 0.2% rate. However, under the macroeconomic problems that followed, in 1999 the tax was extended and its rate increased to 0.38%. Other measures such as the increase of the Cofins rate from 2% to 3% also contributed to the fiscal consolidation of that year.

From then on, a new phase of rule-based fiscal policy began in Brazil. As recalled by Afonso (2016), in 1998, the federal government presented the draft of the Fiscal Responsibility Law (LRF). Such rule aimed to discipline public finances in Brazil acting on several fronts and can be considered a paradigm shift in Brazilian history, fiscal sustainability began to be seen, for the first time, as a conditioning factor for development. Therefore, the development model that prevailed in Brazil in the 50 years prior to the Constitution, rules were created to facilitate financing the development conducted by the State, from the 1990s on, rules started to be built to block non-fiscal sources of financing.

Still under the context of the macroeconomic turbulence suffered in the late 1990s and under the guidance of the International Monetary Fund (IMF), Brazil adopted a more flexible macroeconomic regime, characterized by a formalized floating exchange rate regime, as recalled by Salomão *et. al* (2021) by decree 6545/1999. The change in the exchange rate regime is of utmost importance due to the indexations in that

period of the public debt to the Dollar. The inflation targeting regime was also instituted in that period through decree 3088/99. Giambiagi and Além (2008) argue that the consecutive currency devaluations coupled with an excessively tight monetary policy produced considerable expansions of public debt causing suspicions about the long-term solvency of the Brazilian government. It was also in this context that the regime of primary surplus targets established by the 1999-2001 Action Plan emerged in Brazil. Primary surplus targets, however, are commonly criticized because they are too rigid rules, preventing the expansion of public spending to smooth out the economic cycle in a single fiscal year. In Brazil, changing the primary surplus target depends on the opening of supplementary credits that can only be authorized by the legislature.

Still in 2000, another important matter was proposed and approved in the fiscal field, the Untying of Union Revenues (DRU), regulated by Constitutional Amendment 27/2000. The Brazilian Constitution universalized a relevant set of social rights and created tax revenues that should be applied to this end. However, such restrictions caused excessive fiscal rigidity, making it very difficult to allocate resources. The approval of the DRU gave the Executive Branch freedom to handle, according to its priorities, up to 20% of its previously bound tax revenues.

Measures on the expenditure side were also taken in order to keep the budget balanced. The main target of corrective measures aimed at smoothing the trajectory of spending was social security. The Brazilian social security model contemplates, since its conception in the Constitution, four systems: i) the general system (RGPS); ii) the special system (RPPS); iii) the special system of the states and municipalities and; iv) the complementary system. In 1998 the executive presented to the Congress the PEC 20/1998 that aimed at correcting the trajectory of social security expenses. The proposal forbade the accumulation of retirement pensions for the workers of the statutory system, including military personnel. The initial project of welfare reform foresaw the adoption of a minimum age for CLT workers, but Congress vetoed such change on that occasion and, in a context of increasing life expectancy in the country, the executive was compelled to adopt measures that would postpone the request for welfare benefits by workers. Because of this, Law 9876/99 was sanctioned, instituting the social security factor. By this new rule, workers who applied for retirement were submitted to a factor that gave them higher pensions, the longer the period of contribution and the age of the applicant.

In 2003, social security returned to the macroeconomic policy scene and a new reform was approved through PEC 40/03. The target of this new reform was the public servants who lost, in practice, the right to parity in their pensions. Up to this date, public servants retired with the salary of the position they held while still working; the right to parity allowed that adjustments to workers still working were automatically granted to retired servants. This evidently imposed difficulties in financing pension benefits in the face of demographic changes. As of 2003, with the new rules, the workers that request retirement kept the right to full salary, but lost the right to parity.

During the transition from the 1990s to the 2000s, other measures such as state asset adjustment, financial restructuring of states and municipalities, and the use of non-recurring revenues were adopted to consolidate the Brazilian macroeconomic arrangement. Starting in 2004, still under the maintenance and deepening of the previous framework, Brazil's fiscal problems were mitigated by a long period of economic growth experienced by the country. Chart 1 shows the evolution of the primary result and the country's economic growth.

Graph 1 - Union Primary Result (% of GDP) and GDP Growth Rate (In % per year)

Resultado Primário — PIB
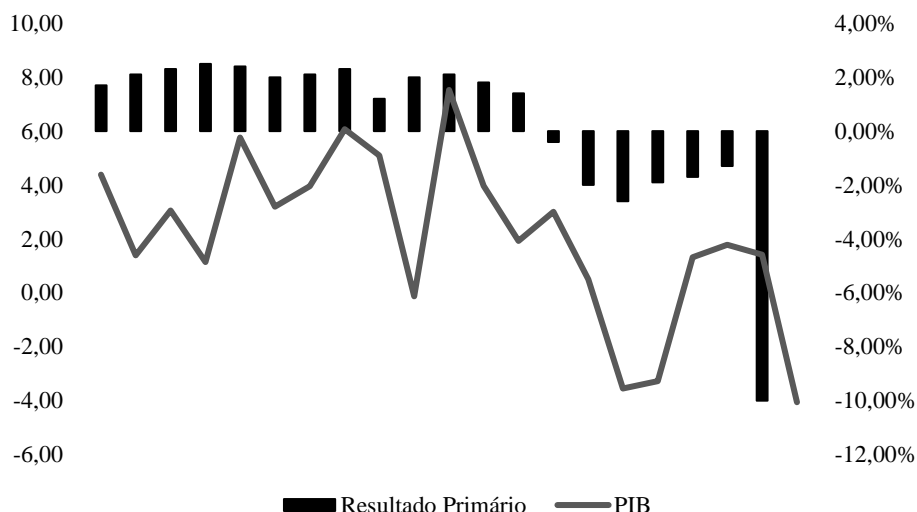
Note: Left axis - GDP Growth Rate (% per year); Right axis - Federal Government Primary Result (% of GDP). Source: National Treasury Secretariat (STN) and National Accounts System (SCN).

Even so, the country was not exempt from following through on its fiscal institutionality. According to Oreiro (2015), in 2006 there was a change in the method for determining primary surplus targets, which were previously disclosed as a percentage of GDP and as of 2007 would be disclosed in nominal values. At the end of 2007, Congress decided not to renew the CPMF tax; the absence of this tax would cause a loss, according to the National Treasury Secretariat, of R$78 billion in public accounts. This measure was offset by the 0.38 percentage point increase in the rates of the Tax on Financial Transactions (IOF) whose law 5143/66 empowers the National Monetary Council (CMN) to alter, also by raising the rate of the Social Contribution on Net Profits (CSLL) for the financial sector from 9% to 15%, which occurred through Provisional Measure 413/08 that altered article 3 of Law 7689/88.

As seen in Chart 1, throughout the 2010s there was a reversal of primary results from surpluses to deficits. In the middle of that decade, revenue growth began to show signs of exhaustion, but expenses maintained their trajectory of expansion, pressured by mandatory spending. On the revenue side, the situation was further aggravated by the progress of sectorial tax breaks given in the scope of Reintegra, a program instituted by Law 12546/11 within the Plano Brasil Maior (PBM). Initially aimed at exporting manufacturing industries and, as recalled by Garcia *et. al* (2018), aiming to increase the competitiveness of the industrial sector, this program granted tax benefits to exporting sectors, such as credits to be discounted from their tax liabilities related to taxes such as IPI, PIS and COFINS, and also exempted the social security contributions of these companies.

On the expenditure side, in Brazil, a set of fiscal rules have been implemented over the past decades, aiming to contain public spending. However, numerous other non-fiscal rules put pressure on the involuntary expansion of spending. An example of this is Law 12382/11, which imposed that the minimum wage should be adjusted by inflation measured by the INPC of the previous year, plus the GDP growth rate of two lagged years. A rule of this nature has a high fiscal impact, as it impacts budget items such as personnel and payroll taxes, social security, unemployment insurance and salary bonuses, continued benefit (BPC), among others.

This new context characterized by growth slowdown, tax cuts and compulsory expansion of public spending, led fiscal policy to strong difficulties that were further deepened by accounting maneuvers called by Gobetti and Orair (2017) as creative accounting. The trick was used by the government to meet the primary target approved in the Annual Budget Law (LOA), as the Treasury is a partner of public companies and banks, at the end of the fiscal year, the government needed to meet the primary target provided for in the LOA, in this case, in order not to contingent expenses, the Treasury did not transfer to official banks funds from programs such as Bolsa Família and Minha Casa, Minha Vida, forcing them to pay these

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expenses to the beneficiaries. This behavior made the Treasury meet the fiscal target of the LOA, but put the financial health of these banks at risk. This combination of factors led fiscal policy to a deficit condition, as can be seen in Graph 2. This deficit was caused by both the contraction of revenues and the trajectory of public spending.

Faced with such difficulties, new fiscal measures have since been proposed. Once again the social security system was the target of alterations, and a new reform was proposed based on the benefits of public servants. This reform, regulated by Law 12618/12, instituted the complementary social security system for public servants, ending the full retirement for those entering the public service, who are now subject to the same retirement cap as the INSS and giving them the option to complement their retirement via pension funds related to their careers: i) funpresp-exe for executive branch workers; ii) funpresp-leg for the legislative branch and; iii) funpresp-jud for judges and other judiciary careers.

Graph 2 - Federal Government Revenues and Expenditures (In R$)
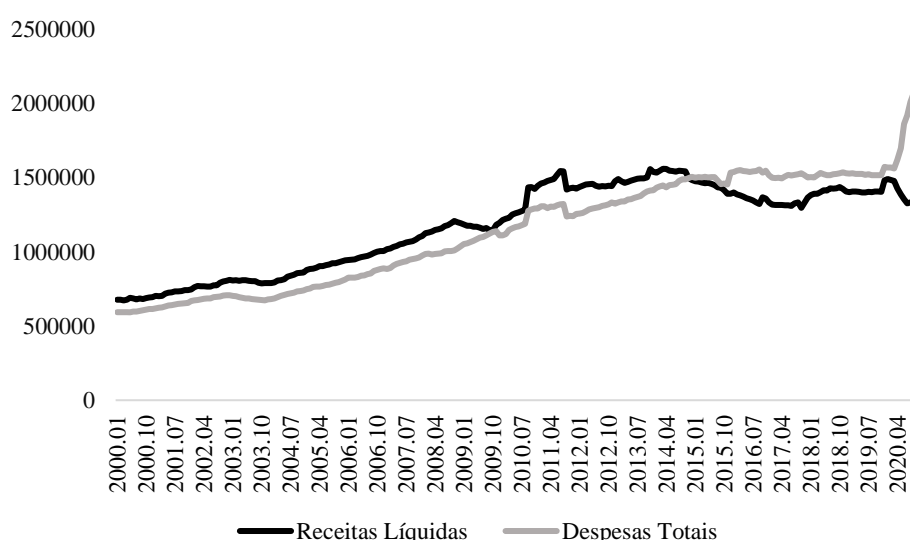
Note: Monthly data in R$ billion, accumulated in 12 months, deflated at constant December 2020 prices by the IPCA. Source: National Treasury Secretariat.

In 2015, again under major economic turbulence, the debate about austerity policies intensified, especially when unexpectedly the 2014 primary result was disclosed by the STN with a primary deficit of R$32 billion. For the first time since the creation of the primary target regime the primary result of the federal government was in deficit. Cavalcanti *et. al* (2019) attribute the intensity and duration of the 2014-16 three-year recession to the expectational shock caused by the 2014 and 15 primary deficit. They argue that agents did not expect deficits of that magnitude and this new information took them by surprise, deteriorating the confidence picture in the economy.

Given these difficulties, new fiscal measures have begun to be considered. On the revenue side, Law 13169/15 increased the CSLL rate from 15% to 20% for companies in the financial sector, and also instituted a 17% rate for stock exchange and capital markets companies. The Provisional Measure 669/15 also recovered part of the social security rates unburdened in 2011 by the aforementioned Reintegra program. Taxes on cold beverages were also raised.

In 2016, in the face of political turbulence and acute macroeconomic imbalances, the government proposed a new fiscal rule, the public spending cap, regulated by Constitutional Amendment 95/2016. The rule, which came into effect in 2017, imposed as a ceiling for the growth of the Union's primary expenditure, the inflation verified until July of the previous year. The spending cap would prevent real growth in public spending and would be in force in Brazil for 20 years, and could be revised after the first 10 years of effectiveness with modifications via supplementary law. This measure, however, was subject to two criticisms: the first is that in a context of involuntary growth of mandatory spending, discretionary spending would be the adjustment variable (Salomão and Da Silva, 2021). The second criticism is that this is a rule

designed to work well in a context of low and stable inflation; in periods of high inflation, the ceiling is shifted upward, and may stimulate nominal growth in public spending.

In 2017, the Long-Term Rate (TLP) was instituted through law 13486/17 to replace the former Long-Term Interest Rate (TJLP). These interest rates are instruments for financing long-term investment via the National Bank for Economic and Social Development (BNDES). However, as the bank's main funding source is the National Treasury, which is financed via debt securities among which are the National Treasury Notes type B (NTN-Bs) that are indexed to inflation, with the TLP also indexed to inflation, the fiscal impacts of the bank's business were reduced, bringing funding costs closer to the rate charged on loans. Still under intense fiscal difficulties, in 2019 the social security came back on the radar of macroeconomic policy through EC 103/19 which, among other things, instituted the minimum age of 65 for men and 62 for women. Table 1 summarizes the set of austerity policies implemented in Brazil after the Plano Real.

The analysis of austerity policies summarized in Table 1 show some characteristics of the Brazilian economy. The first issue to note is that the legislative treatment of measures on the revenue and expenditure side is asymmetric. As it is possible to see, as a rule, measures that aim to discipline the behavior of public spending are addressed via constitutional amendment, while measures related to tax expansions are regulated via complementary law, or even via provisional measure. Given that constitutional amendments require a qualified majority for legislative approval and complementary laws require only a simple majority, in Brazil the political effort to adjust the budget via tax increases is lower than that for spending cuts. For no other reason, the national tax burden went from 27% of GDP in the second half of the 1990s to 34% today.

Table 1 - Austerity in Brazil between 1995 and 2020

Year	Description	Rule
1996	Creation of the CPMF	EC 12/96
1998	Increase of the COFINS tax rate	Law 9732/98
1998	Social Security Reform	EC 20/98
1999	CPMF Extension	EC 21/99
1999	Primary Surplus Targets	PA 1991 – 2001
1999	Social Security Factor	Law 9876/99
2000	Fiscal Responsibility Law	Law 101/2000
2000	Untying of Federal Revenues	EC 27/2000
2003	Social Security Reform	EC 40/03
2007	End of CPMF	-
2007	Increase of the IOF tax rate	Law 5143/66
2008	Increase of the CSLL rate	MP413/08
2011	Exonerations (Reintegra)	Law 12546/11
2012	Social Security Reform	Law 12618/12
2015	Increase of the CSLL rate	Law 13169/15
2015	Review of Exonerations (Reintegra)	MP 669/15
2016	Spending Ceilings	EC 95/2016
2017	TLP Reform	Law 13486/17
2019	Social Security Reform	EC 103/19

4. Method and Data

The empirical analysis begins with an evaluation of the data used in the estimations, which were performed with monthly data for a period between January 2000 and December 2020. All variables were accumulated over 12 months, deflated at constant December 2020 prices and logarithmically transformed. A detailed breakdown of the variables is available in Table 2.

Table 2 - Variables

Variables	Description	Source
GDP	Gross Domestic Product	BCB
DBGG	General Government Gross Debt	BCB
DLSP	Public Sector Net Debt	BCB
DespTot	Total Union Expenditure	STN
DespObrig	Federal Obligatory Expenditures	STN
DespDisc	Discretionary Union Expenses	STN
Trib	Total Federal Revenues	STN
TribDir	Direct Federal Tax Revenue	STN
TribInd	Indirect Tax Revenues	STN
FBCF	Net Investment	IPEA
Exchange	Terms of Trade Index	FUNCEX

Sources: BCB: Central Bank of Brazil; STN: National Treasury Secretariat; IPEA: Institute for Economic and Applied Research; FUNCEX: Foundation for Foreign Trade Studies. Note: Variables accumulated over 12 months and at constant prices of R$ billion in 2020.

Once the data is known, it is necessary to take into account the specificities of fiscal policy in Brazil, which is regulated by law 4320/64. On the expenditure side, they were segregated between mandatory, which consist of the items personnel and charges; social security and other mandatory expenses, in addition to discretionary, which consist of items subject to financial programming by the Treasury. On the revenue side, due to the infinite number of taxes, contributions and fees existing in the Brazilian tax framework, it was decided to aggregate several taxes into two distinct categories, direct and indirect taxation. The criteria for using these data followed Alesina *et. al* (2019) and are available in Table 3.

Table 3: Fiscal Variables

Variable	Headings
Direct Taxation	IRPF and PRPJ (Individual and Corporate Income Tax); CSLL (Social Contribution on Net Profit); CRGPS (Contribution on the General Social Security System).
Indirect Taxation	Tax on Imports; IPI (Tax on Industrialized Products); PIS (Social Integration Program); COFINS (Contribution for the Financing of Social Security); IOF (Tax on Financial Operations); CPMF (Provisional Contribution on Financial Transactions); CIDE.
Mandatory Expenses	General Regime of Social Security; Personnel and Charges; Other Mandatory Expenses.
Discretionary Expenses	Expenses under Financial Programming from the National Treasury.

Sources: BCB: STN: National Treasury Secretariat.

Once the data and its treatment are known, it is necessary to check its behavior regarding the presence of unit root, besides the order of integration. This will be done through three stationarity tests, The Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests have the null hypothesis of absence of unit root, while the KPSS test has null stationarity. The accepted estimates for 1% significance are contained in Table 4.

Table 4: Unit Root Tests

Discrimination	ADF	PP	KPSS	Order
GDP	-6,89	-7,05	0,71	I(1)
	[-3,99]	[-3,99]	[0,73]	
DBGG	-9,66	-16,3	0,16	I(1)
	[-3,99]	[-3,99]	[0,21]	
DLSP	-14,6	-14,7	0,09	I(1)
	[-3,99]	[-3,99]	[0,21]	
DespTot	-7,29	-11,08	0,08	I(1)
	[-3,99]	[-3,99]	[0,21]	
DespObrig	-6,81	-9,21	0,09	I(1)
	[-3,99]	[-3,99]	[0,21]	
DespDisc	-7,11	-14,1	0,08	I(1)
	[-3,99]	[-3,99]	[0,21]	
Trib	-5,15	-12,7	0,10	I(1)
	[-3,99]	[-3,99]	[0,21]	
TribDir	-11,4	-11,9	0,12	I(1)
	[-3,99]	[-3,99]	[0,21]	
TribInd	-5,92	-9,74	0,03	I(1)
	[-3,99]	[-3,99]	[0,21]	
FBCF	-22,5	-25,2	0,10	I(1)
	[-3,99]	[-3,99]	[0,21]	
Exchange	-18,8	-18,7	0,04	I(1)
	[-3,99]	[-3,99]	[0,21]	

Note: Variables in log. Values at 1% significance and critical values in brackets. ADF and PP: $H_0 =$ unit root; KPSS: $H_0 =$ stationarity. Estimates with constant and trend, except KPSS for "GDP", estimated only with trend.

Once the data and their respective behaviors are known, the estimations of the tests will be carried out by the method of nonlinear autoregressive models distributed lags (NARDL) of Shin *et. al* (2014) which are an extension of the ARDL models with cointegration analysis of Pesaran and Shin (1998) and Pesaran *et. al* (2001). Such estimations allow estimating short-run and long-run coefficients on the relationship between GDP and fiscal variables. The method contributes to the hypothesis of the article since it captures an asymmetric relationship of GDP from positive and negative shocks on revenues, expenditures and public debt.

In all, 8 models will be estimated, whose explained variable is GDP. Each of these models is adapted to the Brazilian fiscal reality. As stated, the nonlinearities will be given from the positive and negative shocks in the fiscal variables debt (gross and net); taxes (total; direct and indirect) and expenses (total; mandatory and discretionary), as represented in equations (1) and (2).

$$Desp_t^+ = \sum_{i=1}^{t} \Delta Desp_{i-t}^+ = \sum_{i=1}^{t} max(Desp_i, 0) \qquad (1)$$

$$Desp_t^- = \sum_{i=1}^{t} \Delta Desp_{i-t}^- = \sum_{i=1}^{t} min(Desp_i, 0) \qquad (2)$$

Equations (1) and (2) present the non-linearities from negative and positive shocks on total expenditures. For the purposes of the analysis proposed here, there is interest in estimating the effects on GDP from shocks in the most varied fiscal instruments. Therefore, expenditures can be replaced by any fiscal variable described in Tables 2 and 3. This is consistent with what was done by Alesina *et. al* (2019), the authors made use of different austerity plans and found that those undertaken on the expenditure side can be expansionary, while those undertaken on the revenue side are always recessionary. To estimate these effects, 8 models based on equation (3) will be tested:

$$\Delta PIB_t = \mu + \beta_0 t + \beta_1 PIB_{t-1} + \beta_2 Desp_{t-1}^+ + \beta_3 Desp_{t-1}^- + \beta_4 FBCF_{t-1} + \beta_5 Troca_{t-1} +$$
$$\sum_{i=1}^{p} \beta_6 \Delta(PIB_{t-i}) + \sum_{i=1}^{q} \beta_7 \Delta(Desp)_{t-i}^+ + \sum_{i=1}^{k} \beta_8 \Delta(Desp)_{t-1}^- + \sum_{i=1}^{r} \beta_9 \Delta(FBCF)_{t-i} +$$
$$\sum_{i=1}^{k} \beta_{10} \Delta(Exchange)_{t-i} + u_t \tag{3}$$

Equation (3) is the generic representation of Error Correction Models (NARDL-ECM), where the superscripts + and - indicate positive and negative shocks respectively. In them, μ is the intercept and t as a time trend. The family of coefficients β consist of the model's slope parameters. The variables accompanied by the summation indicator, meanwhile, are the long-run coefficients. Given this representation, the empirical models to be estimated are respectively:

- **Model (1)** – Dependent Variable "GDP" regressed by Gross Government Debt; Net Investment and Terms of Trade.
- **Model (2)** – Dependent Variable "GDP" regressed by Net Public Sector Debt; by Net Investment and by the Terms of Trade.
- **Model (3)** – Dependent Variable "GDP" regressed by Total Taxes; Net Investment and Terms of Trade.
- **Model (4)** – Dependent Variable "GDP" regressed by Total Expenditures; Net Investment and Terms of Trade.
- **Model (5)** – Dependent Variable "GDP" regressed by Direct Taxes; by Net Investment and by the Terms of Trade.
- **Model (6)** – Dependent Variable "GDP" regressed by Indirect Taxes; by Net Investment and by Terms of Trade.
- **Model (7)** – Dependent Variable "GDP" regressed by Mandatory Expenditures; by Net Investment and by Terms of Trade.
- **Model (8)** – Dependent Variable "GDP" regressed by Discretionary Expenditures; by Net Investment and by Terms of Trade.

5. Results

The analysis of the results begins with the diagnostic tests. Starting by checking for asymmetries between tax variables and GDP that justify the use of NARDL models. This was done via the Wald Test that tests for possible short-run and medium-run nonlinearities, the results are shown in Table 5. It is possible to verify long-run nonlinearities in models 3, 4 and 8. That is, in the long run, GDP reacts asymmetrically to shocks in total taxes, total expenses and discretionary expenses. In the short run, gross debt showed asymmetric behavior. With these results it is possible to notice that GDP reacts asymmetrically both to tax shocks and to expenditure and public debt shocks. The same is not verified, however, for taxes disaggregated between direct and indirect, or even for mandatory expenditures.

Table 5: Wald Test - Short and Long-Term Asymmetries

Discrimination	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Variables	DBGG	DLSP	Tribute	Expense	Direct	Indirect	Obrigato	Discricri
Asymmetry Short Term	7,25 [0,00]	1,28 [0,25]	0,99 [0,31]	0,002 [0,96]	1,66 [0,19]	0,007 [0,92]	0,10 [0,74]	1,95 [0,16]
Asymmetry Long Term	1,58 [0,20]	0,19 [0,65]	14,3 [0,00]	3,45 [0,06]	0,02 [0,86]	0,007 [0,92]	0,10 [0,74]	7,50 [0,00]

Note: P-value in square brackets. H_0: asymmetric relation.

Having analyzed the asymmetries, we must now move on to the diagnostic tests. Table 6 presents a detailed list of the estimations performed. Starting with the lags selected by Akaike's criterion (AIC). The LM test coefficients significant at 5%, indicate absence of autocorrelation in all estimated models, and eventual heteroscedasticity was corrected by White's method. Table 5 also presents an analysis of parameter stability using the Cumulative Recursive Sum of Residuals (CUSUM) and Cumulative Sum of Squared Residuals (CUSUMQ) as in Brown *et. al* (1975). The graphs for CUSUM and CUSUMQ are available in

the appendix. The tested models are stable, with the exception of the test for the CUSUM of models 4 and 7, where a small, localized instability was verified.

The NARDL models also rely on cointegration analysis (bounds testing approach) useful to find out whether the variables tested are related in the long run. Such tests are also shown in Table 3, indicating that the variables that make up the model cointegrate in the long run. This dynamic attests that, in the long run, the GDP of the Brazilian economy behaves in the same way as fiscal aggregates such as debt (gross and net), taxes (disaggregated between direct and indirect), and expenditures (disaggregated between mandatory and discretionary). This indicates that despite the numerous crises that have befallen the country over the period, many of them with a strong fiscal component, the numerous austerity plans reported above, together with institutional rules that have emerged, have maintained the relationship between fiscal aggregates and GDP in the Brazilian economy.

Table 6: Deflags, Diagnostic Tests, Cointegration Tests

| Discrimination | Mismatches | Diagnostic Tests | | Cointegration Testing *Bounds Testing* | | |
		LM Test Autocorrelation	Stability Tests CUSUM/CUSUMQ	Estat. F	Limit I(0)	Limit I(1)
Model 1	(2, 3, 2, 0, 2)	1,91 [0,14]	Stable/Stable	8,00	2,56	3,49
Model 2	(2, 3, 2, 0, 2)	0,55 [0,57]	Unstable/Unstable	6,80	2,56	3,49
Model 3	(4, 3, 1, 1, 2)	0,99 [0,37]	Stable/Stable	5,24	2,56	3,49
Model 4	(2, 0, 1, 2, 2)	2,76 [0,06]	Unstable/Stable	4,20	2,56	3,49
Model 5	(4, 3, 0, 0, 2)	0,75 [0,47]	Stable/Stable	5,70	2,88	3,87
Model 6	(2, 0, 0, 2, 2)	2,21 [0,11]	Stable/Stable	4,50	2,88	3,87
Model 7	(2, 0, 0, 1, 2)	2,56 [0,07]	Unstable/Stable	3,40	2,88	3,87
Model 8	(3, 0, 1, 1, 2)	1,58 [0,20]	Stable/Stable	6,19	2,88	3,87

Note: Estimates robust for heteroscedasticity. P-values in brackets.
LM Test: H_0 = non autocorrelation.

Table 7 presents the estimated long-run coefficients for positive and negative shocks of the fiscal variables on GDP. Starting with model 1, there was statistical significance at 10% in the negative shock of the gross debt on the GDP, showing that when there are drops in the gross debt, activity also retracts. There was also statistical significance at 10% and positive sign in the control variables concerning net investment and terms of trade, which positively influence the GDP. Model 2 did not present statistical significance.

Regarding the tax shocks presented in Table 4 in models 3, 5 and 6, which test respectively the effects of total, direct and indirect taxes, there was again statistical significance. Starting with total taxes, the estimated model shows a positive sign and significance at 10% for positive and negative shocks. Regarding direct taxes, there was statistical significance at 1% in the positive shock, all variables had a positive sign. Finally, with regard to indirect taxes, there was statistical significance at 10% in the positive shock and positive sign.

Unlike Alesina *et. al* (2019), who found a negative relationship of austerity plans undertaken on the tax side and activity dynamics, the results here point to a positive dynamic. At first glance this may seem counterintuitive, however, austerity plans may be accompanied by interest rate declines and exchange rate devaluations, they may also be associated with institutional reforms that stimulate growth. In the case of direct taxes, it is also possible to establish hikes with a view to increasing progressivity, which might not have detrimental effects on GDP dynamics.

This was done in models 4, 7, and 8, which tested the effects of total, mandatory, and discretionary spending, respectively. When it comes to total and mandatory expenses, there was no statistical significance

in any variable tested. This means that in the long run, these expenditure items do not influence activity. With regard to discretionary spending, however, there was a positive sign and statistical significance at 10% for the positive shock on output. Discretionary spending includes items considered by the literature to have a high multiplier effect, among which are public investments and transfers to households with high propensity to consume. Therefore, statistical significance and a positive sign were expected. In this specification, there was also statistical significance at 1% for net investment.

Table 7: NARDL Models - Long Term Results

Discrimination	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Dependent Variable	GDP	GDP	GDP	GDP	GDP	GDP	GDP	GDP
Debt (Positive)	-0,02 (0,08)	-0,01 (0,09)	-	-	-	-	-	-
Debt (Negative)	-0,49 (0,14)***	-0,22 (0,15)	-	-	-	-	-	-
Tributes (positive)	-	-	0,66 (0,10)*	-	0,50 (0,08)***	1,05 (0,54)*	-	-
Tributes (negative)	-	-	0,45 (0,21)*	-	0,18 (0,25)	1,01 (0,24)	-	-
Expenses (positive)	-	-	-	1,15 (0,97)	-	-	-4,68 [57,9]	1,01 (0,55)*
Expenses (negative)	-	-	-	1,19 (1,76)	-	-	-8,37 [97,9]	0,72 (0,54)
FBCF	0,30 (0,10)***	0,49 (0,13)***	0,12 (0,11)	0,11 (0,48)	0,21 (0,09)**	-0,16 (0,52)	3,05 [30,02]	-1,58 (1,10)
Terms of Exchange	0,44 (0,17)***	0,35 (0,26)	0,22 (0,22)	-1,29 (1,57)	0,21 (0,11)*	1,02 (0,85)	7,33 [82,3]	22,07 (5,95)***

Notes: Standard error in parentheses. ***Significance at 1%, **significance at 5%, *Significance at 10%. Model 1: Gross Debt Model 2: Net Debt Model 3: Total Taxes, Model 4: Total Expenditures; Model 5: Direct Taxes, Model 6: Indirect Taxes, Model 7: Mandatory Expenditures; Model 8: Discretionary Expenditures.

Once the long-term relationships are verified, it is necessary to pay attention, now, to the short-term dynamics that will be given by the analysis of the Error Correction Models (ECM), in Table 8. Given the aforementioned cointegration relationship verified above, short-term positive and negative shocks may cause temporary deviations from this trend, the ECM analysis shows how the short-term adjustment dynamics of the variables tested will occur. In all models tested, without exception, it is possible to verify an adjustment dynamic that is too slow. Starting with models 1 and 2, one sees that only 2% and 1% respectively of debt shocks on growth return to their long-run trend in the first month.

Table 8: Short-Term Dynamics - Error Correction Mechanism (ECM)

| Specification (Variable)	ECM (-1) [Prob]	Statistically Significant Variables
Model 1 (Gross Debt)	-0,02 [0,00]	GDP (-1), Positive GDGB (0, -1, -2), Negative GDGB (0, -1), Terms of Trade (0, -1)
Model 2 (Net Debt)	-0,01 [0,00]	GDP (-1, -2), DLSP Positive (0, -1, -2), DLSP Negative (0, -1), Terms of Trade (0, -1)
Model 3 (Total Taxes)	-0,02 [0,00]	GDP (-1), Tax Positive (0, -1, -2) Tributes Negative (0), GFCF (0), Terms of Trade (0, -1)
Model 4 (Total Expenses)	-0,007 [0,000]	GDP (-1), Negative Expenditure (0), GFCF (0, -1), Terms of Trade (0, -1)
Model 5 (Directs)	-0,03 [0,000]	GDP (-1, -2, -3), Positive Direct Taxes (0, -1, -2), Terms of Trade (0, -1)
Model 6 (Indirect)	-0,01 [0,000]	GDP (-1), GFCF (0, -1), Terms of Trade (0, -1)
Model 7 (Mandatory)	-0,0008 [0,000]	GDP (-1), GFCF (0), Terms of Trade (0, -1)
Model 8 (Discretionary)	-0,01 [0,000]	GDP (-1, -2), Discretionary Negative (0), GFCF (0), Terms of Trade (0, -1)

Note: P-values in parentheses.

On the tax side, a slow dynamic of adjustment was again verified. Starting with model 3 that tests the shocks of total taxes on activity, only 2% of the tax shocks return to their trend in the first month. In direct taxes, reported in model 5, only 3% return to their long-run trend in the first month. Finally, indirect taxes, checked in model 6, have the slowest adjustment dynamics, only 1% of indirect tax shocks return to trend in the first month.

On the expenditure side, the dynamics are even slower than on the tax side. Only 0.7% of total expenditures verified in model 4, return to the trend in the first month. As for mandatory expenditures, described in model 7, the adjustment is even slower, so that only 0.08% of the shocks on mandatory expenditures return to the long-term trend in the first month. This high rigidity of mandatory spending already pointed out by Salomão and Da Silva (2021) is related to specific aspects of the Brazilian economy, whose set of rules provides for the involuntary growth of mandatory spending. Finally, as for discretionary spending there is a less slow adjustment in relation to the other items on the expenditure side, about 1% of the shocks of discretionary spending on output return to their trend in the first month.

It is absolutely understandable that the dynamics of adjustment of expenditures in relation to GDP are slower than the dynamics of taxes. As seen in section 3, expenditures in Brazil are regulated in a constitutional instance, while taxes are regulated infra-constitutionally, by complementary laws or provisional measures. This difference means that in critical moments, adjustments on the tax side can be made more quickly, since, as a rule, infra-constitutional matters only depend on a simple majority for approval in the Brazilian Congress, while expenses depend on amendments to the Constitution, which, as far as it concerns, are only approved by a qualified majority of two-thirds of the members of both the House and the Senate.

The NARDL models also include an analysis of the dynamic multipliers, presented here in Figures 1, 2 and 3. Beginning with Figure 1, which depicts models 1 and 2 that test the effects of gross and net public debt on GDP, the analysis of Figures 1a and 1b brings some evidence: first, positive asymmetry was verified in the case of gross debt and negative in the case of net debt. Second, positive shocks in debt, both gross and net, are recessive after a few months. Furthermore, negative debt shocks are recessive at first, but expansionary after a few months. When comparing the effects of negative debt shocks on GDP, it can be seen that in the case of gross debt, expansionary effects occur more quickly and to a greater extent than net debt effects. Reductions in gross debt lead to GDP expansion after the 5th month, while reductions in net debt lead to GDP expansion in twice as long.

Figure 1 - Dynamic Multipliers of Models 1 and 2
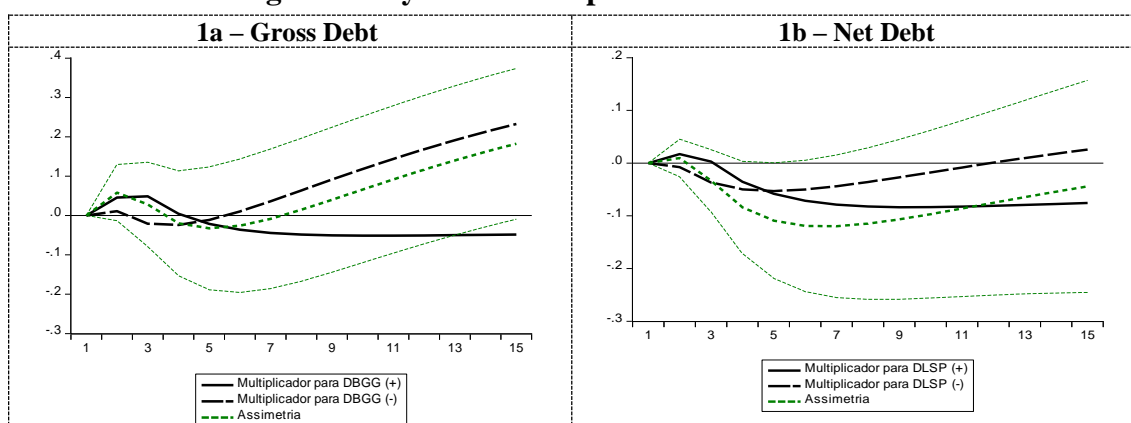
When analyzing the effects of taxes on economic activity, the dynamic multipliers reported in Figures 2a, 2b, and 2c show a quite heterogeneous behavior among the estimated models. Starting with total taxes (Figure 2 a), it was verified negative asymmetry and that negative shocks have high recessive effects on GDP, while positive shocks are recessive at the first moment, but expansionary after the 9th month. As for direct taxes, the estimated asymmetry is again negative, becoming positive after one year. It can be seen that reductions in direct taxes are recessive and expansions of the same are recessive in the first moment and expansionary after 9 months. Finally, Figure 2c shows the effects on activity from shocks in indirect taxes, this time symmetrical behavior was verified, and negative shocks in these taxes are recessive,

while positive shocks are expansionary. With these results, in Brazil, one can say that there is evidence of expansionary austerity on the tax side.

This result is distinct presented by Alesina *et. al* (2019) for whom austerity undertaken on the revenue side are always contractionary. However, this is related to some specificities of the Brazilian economy. Starting with direct taxes, in Brazil they are levied on individuals with high monthly incomes and on legal entities. In this case, cuts in personal income tax may not stimulate consumption, but rather savings allocated to assets with no bearing on the activity, such as real estate or government bonds. In the case of legal entities, many are framed in special tax regimes such as Simples Nacional, or Presumed Profit, direct tax breaks for these companies do not necessarily mean new or increased investments, but may mean, again, accumulation of resources in cash or increases in *mark ups*.

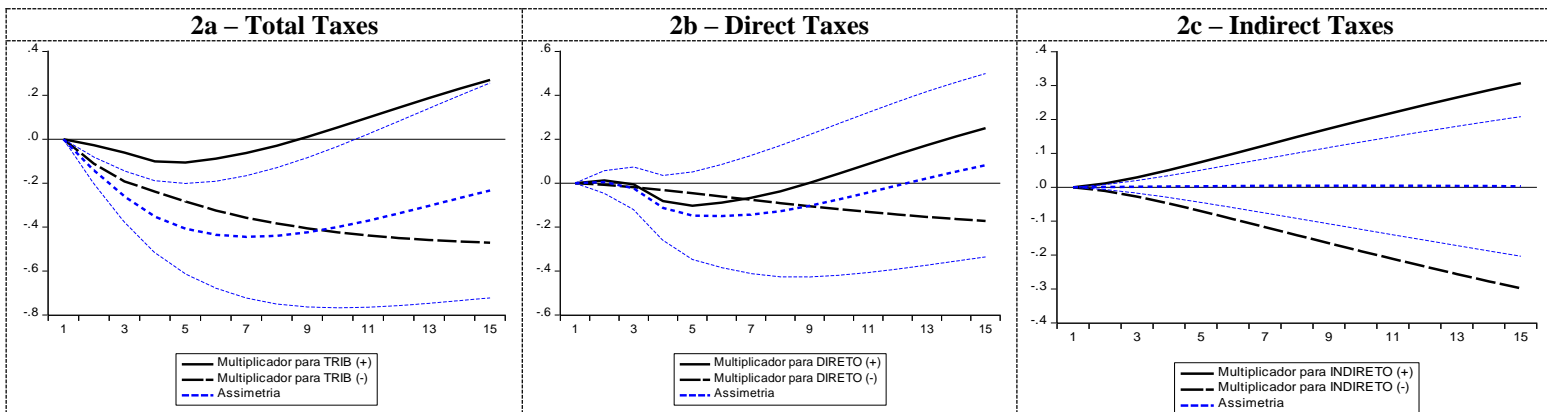**Figure 2 - Dynamic Multipliers of Models 3, 5 and 6**

Figure 3 shows the estimated dynamic multipliers for the nexus between total, mandatory, and discretionary spending relative to GDP, respectively shown in Figures 3a, 3b, and 3c. Starting with total expenditures, we find negative asymmetry and that positive shocks to public spending cause a reduction in GDP. This may indicate that public expenditures in Brazil have a low multiplier and are not good instruments to induce economic growth. On the other hand, negative shocks in total expenditures are contractionary in the first months, but turn expansionary after 10 months. With regard to mandatory expenditures (Figure 3b), positive asymmetry was estimated and the results show that positive shocks in these items lead to a fall in GDP over time. On the other hand, negative mandatory spending shocks are expansionary and their effects on activity dynamics increase over time. Finally, Figure 3c reports the effects of discretionary spending on GDP. It was seen, again, the negative asymmetry and negative effects on activity from positive shocks in discretionary spending. Negative shocks in this expenditure item, on the other hand, are slightly recessive in the first moment, becoming expansionary after 4 months.

Figure 3 - Dynamic Multipliers of Models 4, 7 and 8
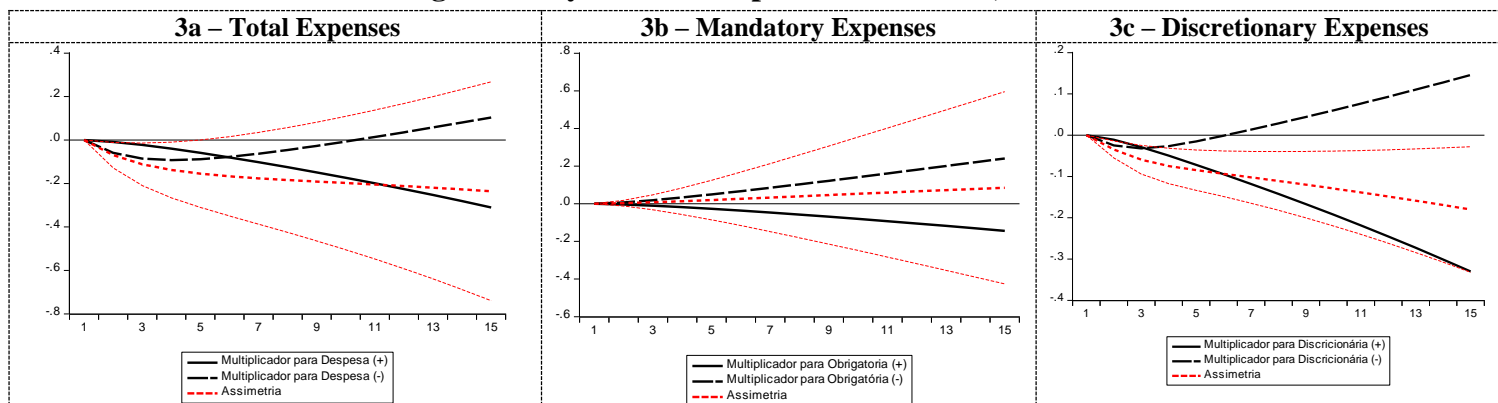
The results of the dynamic multipliers estimated on the expenditure side, agree with the results of Alesina *et. al* (2019). That is, fiscal adjustments undertaken on the expenditure side can be expansionary after some time after their implementation. The results reported here go further, first because in Brazil, due to specificities already mentioned, austerity plans undertaken on the tax side can also be expansionary. Moreover, austerity plans focused on mandatory expenditures are expansionary in the first moment and this

may be related to the perception, by consumers and firms, that adjustments in this item may lead to tax reductions afterwards.

Conclusions

This paper tested the effects of austerity policies on the GDP of the Brazilian economy between January 2000 and December 2020. Several conclusions can be drawn from the results. First, there is a long-term relationship between GDP and fiscal variables such as gross debt, net debt, total direct and indirect taxes, and total mandatory and discretionary spending. This highlights that the numerous crises experienced in the two decades, austerity measures were efficient in preserving the long-term relationship of fiscal aggregates.

Secondly, it was seen that in the long run public expenses have little effect on economic activity, except for discretionary expenses that positively influence GDP. With regard to taxes, it was verified that total taxes, as well as direct and indirect taxes, exert long-term effects on the GDP.

As for the short-term dynamics, it was found that the short-term shocks of the fiscal variables on GDP, return to their long-term trend. However, the short-term adjustment is quite slow. It was also seen that shocks on the expenditure side are more resilient in relation to tax and debt shocks, and this is related to the normative environment of the Brazilian economy, whose public spending is constitutionalized and depends on great legislative effort to have its trend modified.

Finally, the analysis of dynamic multipliers pointed to evidence favorable to the expansionary austerity hypothesis in Brazil. It was found that negative shocks in the gross, net public debt are expansionary after a few months. It was also seen that tax shocks can be expansionary after some time, and finally, austerity measures on the expenditure side are expansionary, especially plans focused on mandatory expenditures.

The results of this paper are important in the current context of the country characterized by excessively low growth rates and high public debt. In this context it is common to see calls for the removal of fiscal rules that discipline fiscal policy in order to stimulate growth, especially through the expansion of public spending. With these results, such proposals may be counterproductive. Either because positive shocks to public spending inhibit output, or because this may lead to expansions in the tax burden and public debt, contributing to a reduction in economic growth. Or because this may alter the long-term dynamics of the fiscal aggregates, putting Brazil's macroeconomic stability at risk.

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