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ABSTRACT

This article adapts the Public Sector Financial Fragility Index to exam the Brazilian federal government financial posture over 2000–2016. This Index enables examining public finances based on Minsky's financial fragility hypothesis. The paper undertakes three analyses: one explores the federal government financial fragility using the borrowing requirements data, which is the standard series to assess public finances. The second analysis makes use of the budget execution data, comprising all governmental cash flows, including the financial revenues and expenses but excluding credit operations, which are new debt borrowed by the government; this new debt is considered in the third analysis. The outcomes show that, in its borrowing requirements, the Brazilian government was *Speculative* over 2000–2013, and *Ponzi* from 2014 to 2016. Applying the Index to the budget execution data, Brazil was *Speculative* throughout the period. Considering the budget execution added with credit operations, Brazil was mostly *Hedge*, although artificially, because built on new debt and not on government revenues. Parallelly, the Index enables analyzing the type of the Brazilian fiscal policy, if pro or countercyclical: it was chiefly procyclical, maintaining *Speculative* and *Ponzi* postures whilst the GDP grew, a diverse behavior in relation to the Post Keynesian proposition.

KEYWORDS

Brazilian economy; fiscal policy; public finances; Public Sector Financial Fragility Index

JEL CLASSIFICATION

E12; E60; E62

Introduction

From 2014 to 2016 the Brazilian economy faced a severe fiscal fragility at all levels of government (federal, state and municipalities) becoming, in terms of Minsky's financial postures indicated by the Public Sector Financial Fragility Index, a *Ponzi* public sector.[1] As a result of the increasing financial fragility, a crisis of confidence in the future path of the Brazilian public accounts was generated and culminated both in higher interest rates charged on the public debt (based on IPEADATA (2019) they increased from 10.69% in December 2013 to 15.71% per year in January

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2016) – agents with a greater perception of risk asked higher interest rates for the bonds of the Brazilian National Treasury – and in a greater share of bonds bearing a base-rate indexed yield, strongly demanded in times of uncertainty, which increased its share on the public debt from 33.4% in December 2013 to 43.8% in December 2016 (BCB 2019a).

Moreover, the fiscal fragility and the higher risk perception of agents dominated the public debate in Brazil in such a way that the federal government was left without space to use public resources to, or to issue debt aiming at financing a countercyclical expansionary fiscal policy amid the 2014–2016 slump of the Brazilian economy. Following the line of this public demonization of public expenses within the context of the Brazilian *Ponzi* public finances, first, in 2015 the Brazilian government decided to embrace fiscal austerity, that is, public spending cuts were seen as essential for regaining economy stability and growth. Second, in 2016 it was submitted and approved by the Brazilian Congress a Constitutional Amendment (number 95), named the New Fiscal Regime, whose aim is a tight fiscal consolidation. Over 2017–2027, the law limits annual variation in non-financial expenditure to the prior year's variation of the Brazilian consumer price index (IPCA). This law imposes a very austere (and Constitutional) fiscal consolidation in Brazil.

In this sense, this article aims at analyzing the fiscal position of the Brazilian federal government from 2000 to 2016.[2] By fiscal position we mean the *Hedge*, *Speculative* and *Ponzi* financial postures coined by Minsky (1975a, 1986, 1992). Thus, a Minskyian analysis of public finances is conducted according to the Public Sector Financial Fragility Index originally created and developed by Ferrari Filho, Terra, and Conceição (2010). The Index summarizes public revenues and expenditures flows in numerical parameters that situate the public finances in terms of the three Minsky's (1986) postures. Parallelly to positing the public finances into one of Minsky's financial postures, the Index also denotes the type of fiscal policy conducted in Brazil, if pro or countercyclical. Before reporting the contributions of this paper, a question arises: does it make sense to elaborate a public sector financial fragility index in accordance to Minsky's taxonomy? In our point of view, this is feasible because of three reasons.

First, although the central bank can always guarantee resources to the public sector and the liquidity of the public debt, once it can print money, this expedient should only be used sporadically, otherwise "lender-of-last-resort powers provide the Federal Reserve with powerful medicine, but like most powerful medicines, they can have serious side effects, one is lagged inflationary impacts of increases in liquidity due to lend-of-last-resort operations" (Minsky 1986, 56). Moreover, despite the fact that a country may not get as deep as becoming insolvent in its own currency, the fiscal policy

space can be strongly reduced, and/or its operation may turn very costly when agents start doubting on the financial posture of the fiscal policy. Thus, the first reason for using Minsky's (1986) financial postures in public finances is that, if governments are to undertake a countercyclical prone-to-growth fiscal policy, they need the trust of private agents both for the financing of the public deficit that may occur, and for conveying private investments along with the public ones – the desired crowding in effect.

Frequent *Ponzi* or even long-lasting *Speculative* positions may inspire mistrust and make the fiscal policy likely to fail in its intentions of boosting the aggregate demand. So, agents' confidence in the future stance of the fiscal policy matters and it has to inspire reliability, something that may not happen promptly, like it is exemplified by the fiscal crisis of the Latin American countries in the 1980' and 1990s. Governments have not always got a given trustworthy condition and if the public does not hold confidence in the fiscal posture of a government and, consequently, have no trust on its public bonds – even knowing that a central bank can ensure them at any moment – interest rates on both internal and external debts would raise to attract lenders, what weakens the fiscal situation because of greater public financial expenses, pushing the government to *Speculative* or *Ponzi* positions and limiting the countercyclical capacity of the fiscal policy.

The second reason for using Minsky to posit the public finance stance also deals with confidence, but regarding an open-economy and the hierarchy of currencies in the international monetary and financial system. Countries whose money has international liquidity can issue money to finance countercyclical fiscal policy more easily and frequently, but considering the asymmetrical international monetary and financial system, only a few countries can print worldwide convertible currency[3] (Andrade and Prates 2013). As a result, a very restricted number of currencies has liquidity and are a store of wealth at the international market. But, diversely, a large number of countries need foreign money to settle any type of international transactions. The governments of these countries must build confidence in their fiscal policy if they need to borrow foreign currency on external markets – and they usually do need. Thus, the call for confidence in public accounts stands even stronger for the vast majority of countries because they do not have an international currency. This is even truer in the common case in which public bonds in foreign markets are not denominated in the country's currency as it is not accepted abroad, culminating on a kind of 'non-sovereign sovereign public debt'.

Lastly, as Keynes (1980) and Minsky (1986) stated, fiscal policy should operate in a countercyclical manner. Based on Keynes' (1980) capital budget or Minsky's (1986) Big Government, in times of prosperity there should be public savings forming funds of resources capable of financing

higher public expenditures in moments of economic slump. In this sense, Minsky's postures highlight the type of fiscal policy undertaken by Economic Authorities: procyclical, when there are *Speculative* and *Ponzi* positions along with GDP growth, or countercyclical, cases in which *Hedge* postures emerge together with economic expansion.

If it does make sense to exam public finances using Minsky's theoretical framework, why is the Public Sector Financial Fragility Index important to do so?[4] First, the Index synthesizes the behavior of public finance flows in numerical parameters that indicate the fiscal fragility in terms of Minsky's financial fragility postures. This makes the Index an empirical tool to assess the public finances within the Post Keynesian theory. Second, the Index focuses on flows, it does not use stocks such as the mainstream economics' debt sustainability and debt threshold analysis, whose metrics can be arbitrarily set. Third, the Index is based on budget execution data. Differently from the conventional public sector borrowing requirements, the former comprises all financial revenues and expenses and not only the primary balance, which is the usual series, but limited because excludes the financial flows (in section 3, it is further discussed the differences of the two data sets). Fourth, as will be originally done in this article, the Index can be calculated with the public sector borrowing requirements data, allowing comparisons between the latter and the budget execution data, displaying, for instance, their practical differences in budget management. Fifth, the Index also enables identifying the type of fiscal policy conducted in a country as pro or countercyclical. It is worth saying that all these features of the Index apply not only to Brazil, but the Index can be used to analyze any country, as it is calculated using international standard series of public finances.

Although there are some empirical analyses using the Index in the literature, which we describe later on, this article undertakes new applications of it, adding two contributions to the relevant literature. One innovation of the article is that it applies the Index to the federal government, which no previous study has done; by reason of this, we will call the Index the Federal Government Financial Fragility Index (FGFFI). Assessing the federal government financial position is important because it is the greatest public entity and, chiefly, it is responsible for fiscal policy. For instance, in Brazil, the nominal federal borrowing requirements were 7.6% of GDP in 2016, against 1.25% of states and municipalities (BCB 2019a). Hence, more detailed study of the federal government helps better understanding the fiscal policy posture.

In addition, the Index will also be adapted to contemplate the federal government borrowing requirements data, going further than the current uses of the Index, including the pioneer exam of Ferrari-Filho, Terra, and Conceição (2010), which only accounted for the budget execution data. This makes it possible to compare primary balances data, which are the

mainstream foundations of fiscal soundness, with that of budget execution, that includes all variables of the borrowing requirements series and more.

This article is divided into five more sections, in addition to this introduction. The second section presents Minsky's financial fragility hypothesis. The third section focuses on presenting the FGFFI. The fourth section describes the data used to calculate the Index, whereas the fifth reports the empirical analyses to the Brazil's federal government fiscal positions from 2000 to 2016. Finally, the paper presents its main conclusions.

Minsky's financial fragility hypothesis

The original idea of Minsky was expressed in his financial fragility hypothesis (Minsky 1975a) that thereafter turned into his financial instability hypothesis (1986, 1992). It was designed to explain how economic cycles are conditioned and aggravated by financial cycles, so that "financial relations are major determinants of the behavior of a capitalist economy" (Minsky, 1975b, 6).

The first step of the entrepreneur's decision-making process is the estimation of the internal rate of return of investment plans, which is the ratio between the revenues expected from sales of goods and services produced by the wished capital asset and its investment and operating costs, that is Keynes' (1964) marginal efficiency of capital. If the return rate of a capital asset is greater than the minimum acceptable rate of return offered by other assets in the economy, particularly low-risk and fixed-income financial assets, the investment is usually made.

Moreover, funding is fundamental for investments and "there are three forms of such finance: cash and financial assets on hand, internal funds (i.e., gross profits after taxes and dividends), and external funds" (Minsky, 1986, 205). Considering the third form, external funding, firms can issue equities and/or borrow money not only by selling bonds, but also by contracting loans from banks. Different from sharing equities, borrowing entails liabilities that firms pay back only if they collect their planned revenues, "the payment commitments determine the minimum cash flows required to satisfy the legal obligations of the unit doing the financing" (Minsky 1986, 205). However, according to Minsky (1986), nothing forecasts if there will be demand for the entrepreneur's products: the revenues that are awaited to discharge financial contracts are only expected and they often change with the economic cycle.

From the relation between expected revenues and committed financial obligations, Minsky (1986) graded three possible positions for the financial fragility of an economic unit. Simplifying considerably his framework, the financial positions depend on the safety margin of the unit, i.e., the

distance between its revenues and financial payments. Thus, a greater safety margin relies on generating positive cash flows over time.[5]

In that scenario, the *Hedge* financial posture is the safest one. This unit has a reasonable safety margin between returns and financial payments. The debts of *Hedge* units tend to diminish trough time as they do not need refinancing its liabilities. They also have enough room for cyclic oscillations in revenues to occur. Thus, "hedge financing units are those which can fulfill all of their contractual payment obligations by their cash flows" (Minsky 1992, 7).

A *Speculative* posture is the intermediate financial fragility. It means that revenues only partly cover financial commitments, and so "such units need to roll over their liabilities: (e.g., issue new debt to meet commitments on maturing debt)" (Minsky 1992, 7). Normally, a *Speculative* posture is planned to last briefly, for the time it takes to establish the demand for a new product or to cover higher financial costs resulting from an expansion plan. *Speculative* units have no safety margin in their short-term cash flows, but they bet on having it in the long-term. Owing to that, their debt increases in the short-run, though it tends, depending on the economic conditions, to stabilize in the long-term.

Lastly, the *Ponzi* posture is the one in which the unit fails to raise sufficient revenue to pay even its operating costs. This unit cannot produce safety margins by means of its yields and the only way it builds up safety margins is selling assets, that is, restructuring itself. *Ponzi* units have quickly growing debts and, consequently, higher interest payments that deteriorate their already delicate condition.

How do *Ponzi* units come about? To Minsky (1975a, 1986, 1992) capitalist economies are inherently cyclic, alternating booms and recessions. In a boom, production and revenues grow, capital gains increase, stocks turn over. Based on a conventional reasoning that the good current conditions will repeat in the future, entrepreneurs are encouraged to develop new business plans and to raise funding to carry them out. Meanwhile, banks' revenues also rise, and they are ready to meet the entrepreneurs' loan demand. The economy thus leans into higher-risk overall stance, moving from *Hedge* to *Speculative*.

However, over the course of the cycle, prices and costs increase, leading to a more restrictive monetary policy. Furthermore, units become leveraged, modifying the way that banks assess risks. Credit thus becomes tighter, new investments are not made, revenues no longer grow, and *Speculative* units turn fast and involuntarily into *Ponzi* positions, intensifying the possibility of an economic crisis.

Although Minsky theorized the financial fragility model regarding the behavior of firms and banks, he had also denoted that it could be expanded to other units. As Minsky (1986, 221) stated,

> to analyze how financial commitments affect the economy it is necessary to look at economic units in terms of their cash flows. The cash flow approach looks at all economic units – be they households, corporations, state and municipal governments, or even national governments – as if they were banks.

Finally, what does a Minskyan analysis mean to the operation of the fiscal policy? Should public finances pursue *Hedge* posture over time? Minsky (1986, 1992) argued that, in time of crisis, the Big Government should act to stabilize the economy, as well as Keynes (1980) extensively stated the importance of countercyclical fiscal policy, by means of what he called the capital budget, to avoid economic slumps.

A countercyclical conduction of fiscal policy requires that, in Minsky's words, "in truth the government fiscal posture must be in surplus from time to time" (Minsky, 1986, 56). It is expected that the federal government financial fragility oscillates over time, standing at *Hedge* positions when the private initiative is investing and pushing the economy up, and going to more financially fragile postures when signals of crisis pop up – this is the nature of a countercyclical fiscal policy.

Three reasons explain why a *Hedge* public finance is important when the economy is in a normal or boom trend: (i) it helps building funds of resources for the times of crisis, at which public revenues go down and liquidity preference prevails; (ii) being *Hedge* for some periods increases people's confidence in the public finances, making them follow the intentions of the government, a key condition for a successful countercyclical fiscal policy; and (iii) as Minsky (1986) alerted, being *Hedge* from time to time avoids the collateral effects that an incessant Big Government can cause, as inflation or pressures over the long-term interest rate when a *Speculative* or *Ponzi* government borrows too much.

The federal government financial fragility index (FGFFI)

There are some works adapting Minsky to empirical analysis in the Post-Keynesian literature, both in microeconomics and macroeconomics. Torres Filho, Martins, and Miaguti (2017) uses Minsky to check the financial fragility of the electricity distribution companies in Brazil, and Tymoigne (2010) creates a model to show the *Ponzi* situation of the American financial system in the 2000s whereas Nishi (2016) uses econometric data to posit non-financial sectors in the Japanese economy into Minsky's financial postures. Paula and Alves (2000) adapted Minsky's financial postures to Brazil's external financial fragility in the 1990s, and Galbraith (2008) remodeled Minsky's ideas to qualitative compare Nation-States. Lopes (2009) uses Minsky's (1986) *Ponzi* idea to exam the burden that high real interest rates impose to fiscal policy in Brazil in the 1990s. Ferrari-Filho,

Terra, and Conceição (2010) created the Public Sector Financial Fragility (PSFFI) Index to analyze the financial fragility of the Brazilian public sector.

Although the PSFFI was created and applied to Brazil, it is based on the major standard public finance accounting. Thereby, it is neither restricted to Brazil nor to only one level of the public sector. Based on the PSFFI, Argitis and Nikoalidi (2014) and Nikolaidi (2014) presented an analysis of Greece, a recent notorious case of fiscal insolvency. Relying on the PSFFI, they created a further financial posture to adapt the Index to the deepness of the Greek fiscal fragility, the *Ultra Ponzi*. Looking into other Brazilian scenarios, Carvalho (2016) replicated the original Index for the Brazilian public sector updating it to the 2008–2012 period. Picolotto (2016) used the Index to analyze the subnational finances of the Brazilian state of Rio Grande do Sul, which has been facing one of the most severe fiscal fragility in the country. Padrón (2015) applied the Index to analyzing the overall set of Brazilian states from 1995 to 2013.

Following Ferrari-Filho, Terra, and Conceição (2010) model, the PSFFI adapted to the federal government only considers the flows of public revenues and expenditures, without taking stock variables into account, such as the level of the public debt, because the latter results from the behavior of the flows analyzed by the Index. Expenses are of two kinds, current and financial: the first include all those that are neither amortizations nor interest payments as they are the second type of expenditures, the financial ones. In turn, public revenues also arise from current (mostly taxes) and financial sources – financial revenues have several sources.

Starting with the public revenues, the total revenue R_{fg} is given by the sum of the current R_{cfg}, and the financial revenues R_{ffg}. Hereafter, the subscript fg holds for federal government, c for current and f for financial.[6] Hence,

$$R_{fg} = R_{cfg} + R_{ffg} \tag{1}$$

Similarly, E_{fg} is the federal government total expenses, E_{cfg} the current and E_{ffg} the financial expenses. In light of Minsky (1986), Ferrari-Filho, Terra, and Conceição (2010) segregate E_{ffg} into amortizations (A_{fg}) and interest payments (i_{fg}). Thereby, it is possible to measure the influence of financial commitments on the government cash flow. Accordingly, E_{fg} and E_{ffg} are given by:

$$E_{fg} = E_{cfg} + E_{ffg} \tag{2}$$

and

$$E_{ffg} = A_{fg} + i_{fg} \tag{3}$$

Considering a balanced budget situation, from (1) and (2), $R_{fg} = E_{fg}$. Therefore,

$$R_{cfg} + R_{ffg} = E_{cfg} + E_{ffg} \tag{4}$$

To be consistent with Minsky's less fragile financial posture, *Hedge*, R_{fg} must first cover E_{cfg}, the expenses generated by the State as the provider of basic public services, without incurring in any borrowing for that supply *a priori*. After defraying its non-financial costs, the federal government redeems its A_{fg} and i_{fg} expenses. Subsequently, from (4):

$$(R_{cfg} + R_{ffg}) - E_{cfg} = E_{ffg} \tag{4.1}$$

In order to achieve a budget position in which there is no need to incur in debt financing, the difference expressed on the left side of (4.1) has to be exactly equal to E_{ffg}. Hence, both sides of Eq. (4.1) are multiplied by $\frac{1}{E_{ffg}}$, reaching

$$\frac{(R_{cfg} + R_{ffg}) - Ecfg}{E_{ffg}} = 1 \tag{5}$$

Substituting (3) into (5),

$$\frac{(R_{cfg} + R_{ffg}) - E_{cfg}}{A_{fg} + i_{fg}} = 1 \tag{6}$$

Equation (6) is the FGFFI parameterized for a balanced cash flow. This equation can be derived to stipulate the following matrix of financial postures:

$$\begin{cases} Case\ (\text{i}) \\ \dfrac{(R_{cfg} + R_{ffg}) - E_{cfg}}{A_{fg} + i_{fg}} > 1\text{: } Hedge\ \ Posture \\ Case\ (\text{ii}) \\ 0 < \dfrac{(R_{cfg} + R_{ffg}) - E_{cfg}}{A_{fg} + i_{fg}} < 1\text{: } \ \ Speculative\ \ Posture \\ Case\ (\text{iii}) \\ \dfrac{(R_{cfg} + R_{ffg}) - E_{cfg}}{A_{fg} + i_{fg}} < 0\text{: } Ponzi\ \ Posture \end{cases}$$

In case (i), a Hedge posture, the safety margin expressed in $(R_{cfg} + R_{ffg}) - E_{cfg}$ is greater than $A_{fg} + i_{fg}$, so that the federal government has a cash flow leftover sufficient to cover its financial expenditures. In case (ii), the *Speculative* posture, financial expenses are only partly covered, and so the difference between R_{fg} and E_{cfg} is positive, but smaller than $A_{fg} + i_{fg}$. As a result, part of E_{ffg} needs to be debt financed in the short-term. Lastly, in case (iii), the *Ponzi* posture, the federal government fails to cover its

current expenses, resulting in mounting public debt from both the total refinancing of A_{fg} and i_{fg} and partly from loans to finance E_{cfg}. Case (iii) also means a greater likelihood of crisis in public finances, as the federal government has the most financially fragile posture and may become unable to contract cheap new loans and reschedule mature contracts with favorable interest rates, making it harder to stabilize the public debt and to undertake a countercyclical fiscal policy.

After presenting the FGFFI, the next step is to adapt it to calculate the federal government financial postures using the borrowing requirements series. For that purpose, the matrix of financial postures for cases (i) to (iii), and the variables specified for Eqs. (1)–(6) remain the same. The necessary changes have to do exclusively with removing R_{ffg} and A_{fg} of Eq. (6):

$$\frac{(R_{cfg} - E_{cfg})}{i_{fg}} = 1 \tag{6.1}$$

so that the difference between R_{cfg} and E_{fg} is the primary balance and i_{fg} is the interest payments.

The differences between the two series that are used in the FGFFI can be seen comparing (6) and (6.1). Equation (6) contemplates all the accounts that enter into the public budget and, therefore, comprises a larger set of revenues and expenses than (6.1). In turn, (6.1) refers, in the difference between R_{cfg} and E_{cfg}, to primary accounts, excluding R_{ffg} and A_{fg} flows.

Before continuing, it is important to present some comments about the data methodology. They are internationally set, calculated in most of the countries and both deal with public accounts, however through different lens: the public sector borrowing requirements is a below the line methodology that reports the fiscal net debt variation, (which is equal to the nominal balance). So, it intends to show the efforts a government must take to stabilize its debt (i.e., to equilibrate the nominal balance) by using no other means than what it ideally should 'count on', its tax gathering, the main and most regular source of governmental income. That is why the borrowing requirements data does not account for financial revenues in its primary balance, they are not seen as recurrent revenues. Amortizations are also disregarded because they are considered an update of the debt value, a patrimonial change that comes from the confront between the primary balance and the interest payments.

The budget execution data is part of the national public sector accounting balance sheet. It embraces all kinds of public sector flows, including those coming from real assets (like state owned companies and real estate) and financial assets; that is, it expresses the real dimension of the State. Because of that, the budget execution data includes all the State's revenues

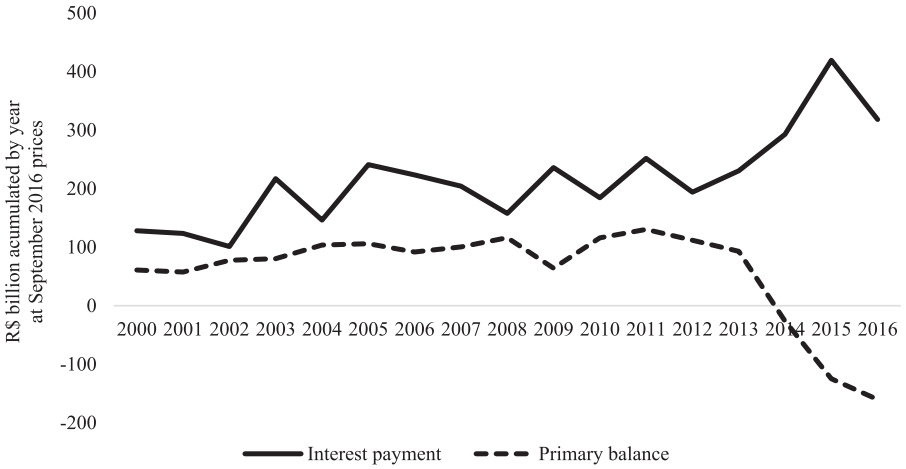
and expenditures (in Minsky's (1986) terms, portfolio and balance sheet cash flows).

An analysis using both datasets has a broader picture of the fiscal posture of an economy. In this general portrait, it is possible to observe both flows, the more regular primary balance, and the financial balance, whose magnitude may broadly vary from country to country. Also, it is possible to measure the relevance of both to the financial position occupied by the federal government along with the economic cycle. At the policy level this wider analysis is relevant too. For instance, the greater and more constant are the differences in the postures caused by financial revenues over time, the larger is the room for using them to fund public policies. Still, if some economy reaches fragile postures because of amortization payments, something that the Index cannot report by means of the public sector borrowing requirements, but through the budget execution data it does, fiscal policy can set measures to offset the higher financial expenditures.[7]

Descriptive data analysis

The data of the empirical analysis are the borrowing requirements, which offer data on the primary balance and interest payment accumulated until December of each year in the period 2000–2016. The source of the data is IPEADATA (2019). The budget execution data from 2000 to 2012 were taken from the Consolidated Public Accounts, and over 2013–2015, from the National Public Sector Accounting Balance Sheet, both published by the National Treasury (NT) (2012, 2014a, 2015a, 2016a). Specific data on public debt amortization from 2013 to 2015 were drawn from the Summary Central Government Budget Execution Reports (NT 2013, 2014b, 2015b). Revenues were calculated on a cash basis and expenses on an accrual basis. All data were deflated using the Brazilian consumer index price (IPCA) to September 2016 prices for borrowing requirements, and to December 2015 prices for budget execution. The period starting year, 2000, is due to the availability of budget execution data, which is also the reason for a year-end difference between the two datasets.

Graph 1 shows government borrowing requirements. Over all period interest payments grew, although the gradient becomes steeper from 2013 onwards, because of the growing fiscal fragility in Brazil, which are expressed in the deficit in the primary balance from 2014 on. From 2000 to 2013 the federal government engaged in primary saving, but after 2014 the fiscal situation decayed rapidly to a fragile posture, leading to worse risk assessing of buyers of federal bonds and, as a result, there was greater interest payment over 2013–2016. In addition, the BCB raised its basic interest rate (Selic) to mitigate inflation, that reached 10.5% in 2015, whilst

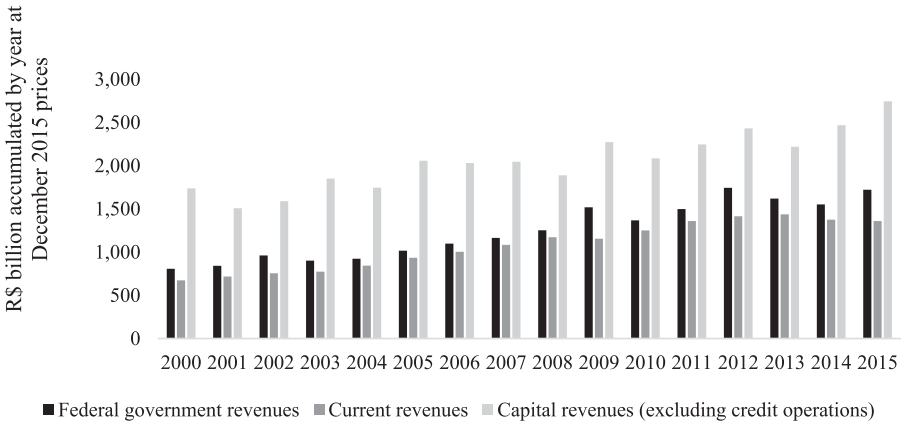


Graph 1. Federal government borrowing requirements: primary balance and interest payment, 2000–2016 (R$ billion). *Source:* produced by the authors from IPEADATA (2019). *Note:* primary borrowing requirements calculated as primary balance. A negative balance is deficit and positive is surplus.

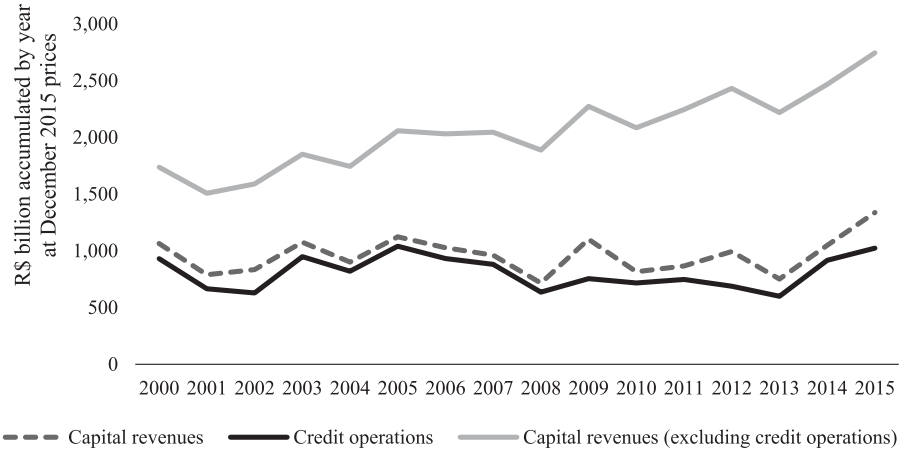
there was also an increase in exchange rate swap disbursements that accounted for just over one third of the variation of interest payments in 2015 (BCB 2017).

It is worth mentioning that in the period 2011–2014, Dilma Rousseff's government undertook unconventional measures in the conduction of fiscal policy. Among these measures were the use of, to balance the federal government budget, the so-called "creative accounting"[8] in 2012, nonrecurrent revenues gathered by the selling of government-owned oil fields in 2013, and the postponement of noticeable amounts of public expenses all over 2011–2014. Notwithstanding these measures, the current revenues were also affected by the large tax exemptions furnished by the government to several productive sectors, in an attempt to stimulate the economic activity. These tax exemptions reduced the federal government's tax gathering and help to explain the deterioration of the Brazilian financial fragility after 2014, as displayed in Graph 1.

Regarding the budget execution data, Graph 2 reports the overall revenue of the federal government, deducting credit operations, which are borrowed money and thus not proper public revenues. Graph 2 displays that the revenues were growing throughout the period, except for 2009, 2013, 2014 and 2015. Current receipts also went up over time, apart from 2009, 2013 and 2014. The financial income of the government, discounted from credit operations, is modest over the period, although not so in 2002, 2009 and 2015, years when the exchange rate devaluation afforded the BCB better financial returns because of its positive effects on the value of the Brazilian international reserves, which are far greater than Brazil's foreign debt and whose gains are transferred to the NT as financial income.[9]

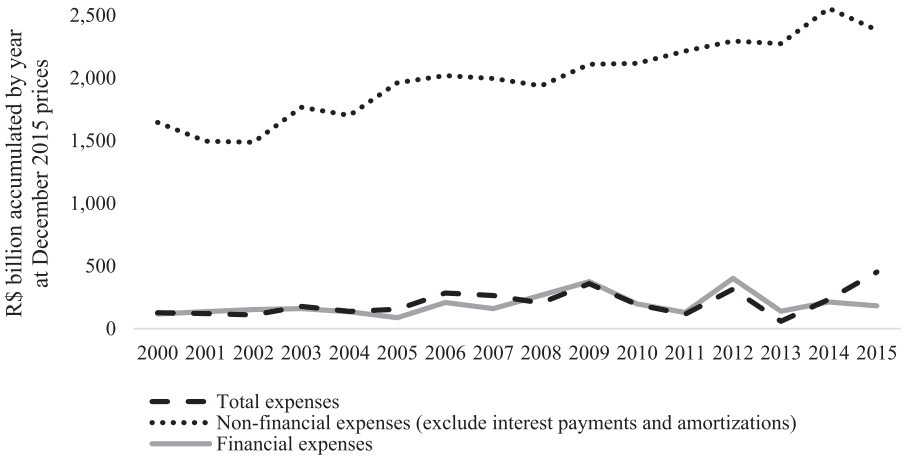


Graph 2. Federal government current and capital revenues (excluding credit operations), 2000–2015 (R$ billion). *Source:* produced by the authors from NT (2012, 2014a, 2015a, 2016a). *Note:* other sources of revenue are not separately in the Graph, because they involve small amounts. They represent a null balance from 2000 to 2008 and, in R$billion accumulated by year at December 2015 prices, equal R$16.000 in 2009, R$17.000 in 2010, R$19.000 in 2011, R$22.000 in 2012, R$31.000 in 2013, R$42.000 in 2014 and R$48.000 in 2015. Nonetheless, these amounts form part of R_{fg} on the Graph.



Graph 3. Revenues from capital and credit operations, 2000–2015 (R$ billion). *Source:* produced by the authors from NT (2012, 2014a, 2015a, 2016a).

To better represent all the possibilities of financial revenues, Graph 3 shows the trajectory of credit operations, which are debt contracted by the federal government, specifically for two purposes. On the one hand, the aim of almost all credit operations is to rollover public debt at maturity. On the other hand, the portion that exceeds such refinancing is used by the federal government to cover its current expenses.[10] It is clear from Graph 3 that financial revenues accompany credit operations, except when the former's expansion was due to exchange rate devaluation, namely 2002,



Graph 4. Federal government expenses: total, non-financial and financial, 2000–2015 (R$ billion). *Source:* produced by the authors from NT (2012, 2013, 2014a, 2014b, 2015a, 2015b, 2016a). *Note:* Total expenses are different from the sum of non-financial and financial expenses. Total expenses embrace debt refinancing; however, it is not an effective disbursement of cash, but only debt rollover inscribed as an expenditure. Thereby, debt rollover is withdrawn from non-financial and financial expenses series.

2009, 2012 and 2015. It is worth noticing the intensity of credit operations between 2014 and 2015, as the primary balance deteriorated, and interest payments increased (Graph 1), while current revenues stagnated (Graph 2).

Graph 4 reports budget execution expenses in three categories: (i) overall expenditures, including debt refinancing, (ii) current non-financial outgoings, which are total expenses less (iii) the financial (amortization and interest) ones. Graph 4 illustrates the constant growth of current and overall expenses, and the continuous, although slower, expansion of financial expenses. It is noticeable both the ongoing rising trend of the total expenses, particularly caused by the current outgoings, whose level modifies continuously over 2000–2015, and the change of financial expenses level after 2005. In 2006, interest payments explain the shock on the financial expenditure curve, though in the other peak years, 2009 and 2012, amortizations determine the series' behavior. After 2009, financial outgoings also have a higher level because of the greater financial expenses to outlay the loans that capitalized Brazil's national development bank (BNDES), with the NT subsidizing the Bank by R$220 billion from 2009 to 2014 (Castro and Terra 2016).

Another important item concerns the variation rate of total revenues, current and financial expenditures, amortization and interest payments, from which the dynamics of the variables of the FGFFI can be seen clearer. Table 1 shows these data. Note that current expenditures are the only flow that increases constantly, apart from 2015, because of the implementation of austerity policies for fiscal consolidation in Brazil in that year. Moreover,

Table 1. Variation of total revenues, current expenditures, interest and amortization, 2000–2015 (% annual variation).

Year	R_{fg}	E_{cfg}	i_{fg}	A_{fg}	$E_{ffg} = (i_{fg}$ and $A_{fg})$
2000/2001	4.27	10.14	26.31	15.59	17.10
2001/2002	14.24	1.40	−7.02	12.17	2.66
2002/2003	−6.14	1.15	8.79	5.54	6.53
2003/2004	2.46	6.20	5.20	−16.35	−7.07
2004/2005	10.04	11.28	14.29	−34.92	−10.92
2005/2006	8.06	8.96	63.12	138.06	47.27
2006/2007	6.01	9.45	−11.13	−23.14	−19.72
2007/2008	7.48	8.03	−25.84	66.51	10.65
2008/2009	21.28	7.87	8.41	41.25	22.11
2009/2010	−9.94	5.97	−7.24	−47.37	−51.74
2010/2011	9.49	4.69	0.57	−34.58	−22.28
2011/2012	16.42	5.79	−2.68	210.09	46.90
2012/2013	−7.09	3.47	15.72	−65.44	−70.74
2013/2014	−4.23	5.14	−3.17	53.07	16.81
2014/2015	10.99	−3.49	10.39	−14.24	−2.72
Mean	5.56	5.74	6.38	20.42	−1.01
Standard deviation	8.51	3.67	18.89	69.03	29.99

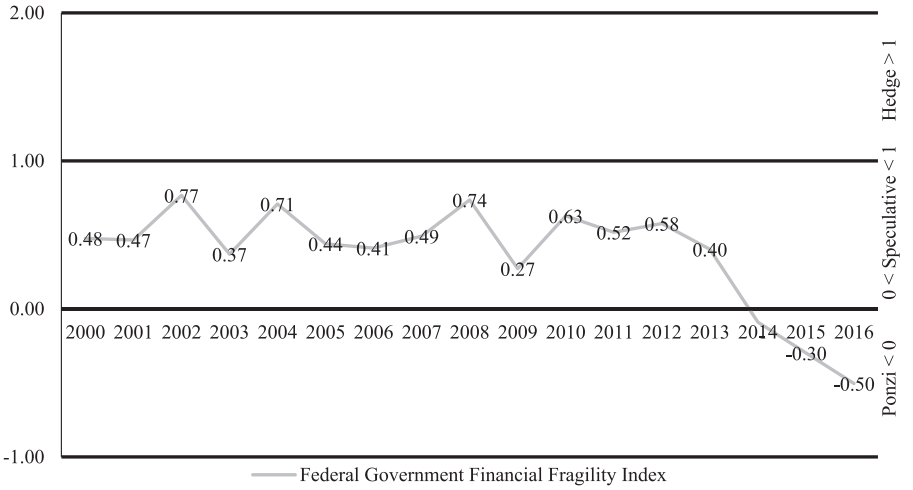
Source: produced by the authors from NT (2012, 2013, 2014a, 2014b, 2015a, 2015b, 2016a).

this variable has the smallest standard deviation of all series whereas all data display considerable standard deviation, so reporting volatility in their trends. Two further aspects are worth noticing. First, financial expenditures have especially high values. Second, the average expansion of total revenues is smaller than that of the current and financial expenses, meaning that the former grew at a slower pace than the latter and signaling evidences of safety margin absence and so of a greater financial fragility over time.

An analysis of Brazilian federal government public finances through the FGFFI

This section comprises the three applications of the FGFFI: (i) the first using the federal government borrowing requirements (FGFFI 1), (ii) the second based on the budget execution data, but excluding credit operations completely (FGFFI 2) and (iii) the third adding to financial revenues the credit operations discounted from debt refinancing, a variable that works as a proxy for the part of the public debt that entered the federal government cash flow (FGFFG 3).

Graph 5 shows the FGFFI based on the federal government borrowing requirements. The federal government was *Speculative* over 2000–2013; thereby, it covered its current expenses, but not all of the financial expenses. Given the lack of safety margin, when current revenues declined from 2012 onwards, the federal government endogenously became *Ponzi* with the worst financial fragility in 2015 (−0.30) and 2016 (−0.50) – the years of the Brazilian economic crisis. This is a rather fragile fiscal situation in which the federal government was left with no choice but to borrow in order to finance current expenditures, a fact displayed on Graph 3 through

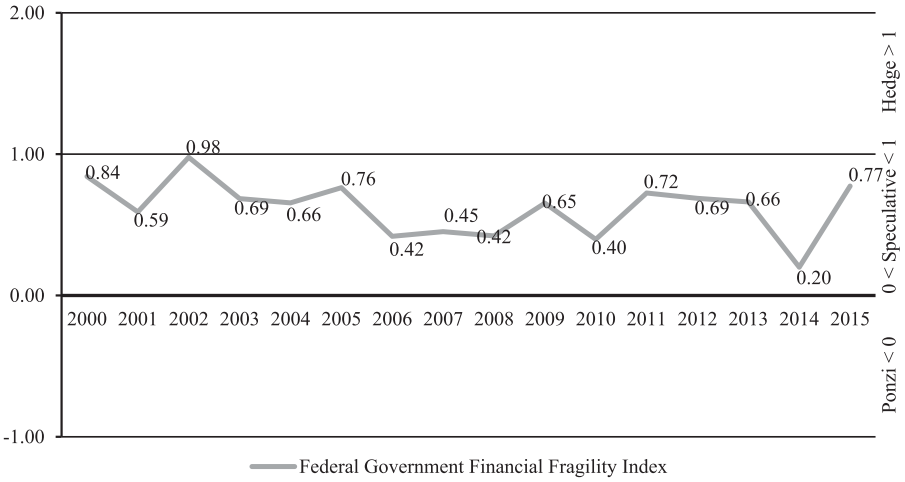


Graph 5. Financial fragility index of the federal government, based on borrowing requirements, from 2000 to 2016. *Source:* produced by the authors from IPEADATA (2019).

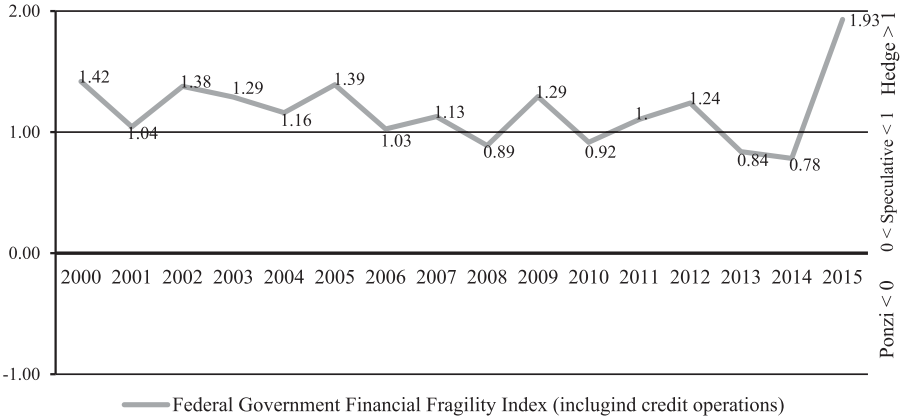
the growing credit operations from 2013 onwards. In light of a *Ponzi* federal government, agents' confidence in the public finances declined and, as a result, lenders asked higher premiums on public debt purchases: nominal interest payments rose from 3.5% of the GDP in December 2013 to 7.22% in January 2016 (IPEADATA 2019).[11]

Graph 6 reports the FGFFI 2, calculated with the budget execution data so that it includes both financial revenues and amortizations. This FGFFI displays a *Speculative* federal government throughout the period, diverse from the previous outcome, in which the federal government was *Ponzi* over 2014–2016. Note that not only the postures in the series' best years, 2000 (0.84) and 2002 (0.98), were almost *Hedge*, but also that 2015 is a *Speculative* year, displaying the importance of the financial revenues to fiscal policy, something not seen in the FGFFI 1, calculated with the borrowing requirements

Graph 7 shows the FGFFI 3, the one considering the new debt added to financial revenues. In this case, the FGFFI reports a *Hedge* federal government almost all the period, except for 2008, 2010, 2013 and 2014. The financial posture of 2014 is worth highlighting as it clearly presents the federal government descending into its *Ponzi* fiscal situation. Then, there was the greatest public borrowing of the period, responding to falling revenues and increasing interest payments and current expenses. Notwithstanding the sizable volume of new debt, the Brazilian federal government was still *Speculative* in 2014 with the worst financial fragility over 2000–2015 in this sort of FGFFI calculation. The FGFFI so displays the depth of the fiscal fragility in Brazil.



Graph 6. Federal government fragility index (without credit operations), from 2000 to 2015. *Source:* produced by the authors from NT (2012, 2013, 2014a, 2014b, 2015a, 2015b, 2016a).



Graph 7. Federal government financial fragility index (with credit operations), from 2000 to 2015. *Source:* produced by the authors from NT (2012, 2013, 2014a, 2014b, 2015a, 2015b, 2016a). *Note:* credit operations calculated by subtracting total credit operations from the amounts of debt refinancing. Thus, it is the new debt contracted by the federal government in excess of the amount expended on debt rollover.

FGFFI also allows to categorize the fiscal policy undertaken in Brazil as pro or countercyclical, the latter being the manner Minsky (1986) and Keynes (1980) prescribed it. Table 2 reports the fiscal policy type in relation to the FGFFI in all its three calculations. In general, the FGFFI was mostly procyclical. So, the federal government was *Speculative*, spending more than saving, when the GDP was increasing. In 2009, the year the Great Financial Crisis affected Brazil, the fiscal policy was countercyclical. Moreover, after 2014 all three FGFFI reports countercyclical fiscal policies. Hence, even in face of austerity measures, Brazil did not reach a fiscal consolidation. The reason for

Table 2. Brazilian fiscal policy type 2000–2016 (GDP % annual variation).

Year	△% GDP	FGFFI (1)	FGFFI (1) fiscal policy type	FGFFI (2)	FGFFI (2) fiscal policy type	FGFFI 3	FGFFI (3) fiscal policy type
2000	4.39	*Speculative*	Procyclical	*Speculative*	Procyclical	*Hedge*	Countercyclical
2001	1.39						
2002	3.05						
2003	1.14						
2004	5.76						
2005	3.2						
2006	3.96						
2007	6.07						
2008	5.09					*Speculative*	Procyclical
2009	−0.13		Countercyclical		Countercyclical	*Hedge*	Indebting
2010	7.53		Procyclical		Procyclical	*Speculative*	Procyclical
2011	3.97					Hedge	Countercyclical
2012	1.92						
2013	3.0					Speculative	Procyclical
2014	0.5	*Ponzi*	Countercyclical		Countercyclical	Speculative	Countercyclical
2015	−3.55					Hedge	Indebting
2016	−3.46						

Source: Produced by the authors from NT (2012, 2013, 2014a, 2014b, 2015a, 2015b and 2016a) and BCB (2019b).

that is to be found on the strength of the country's recession: revenues were slumping faster than spending cuts, causing a kind of 'forced countercyclical fiscal policy'. Lastly, in 2009 and 2015 we call the fiscal policy type *indebting*. In both years, the FGFFI 3, considering credit operations, goes *Hedge* whereas the other two are *Speculative* or *Ponzi* and so countercyclical. This puzzle let it clear that the fiscal policy is undertaking a countercyclical fiscal policy not owing to funds raised during economic growth periods but to borrowing, that is why we named these years *indebting*.

Finally, the analysis of all three FGFFI enables inferences on Brazil's fiscal fragility. The 2014–2016 dip of the FGFFI 1 and 2 meant that the federal government was unable to build up safety margins to cover its expenditures sustainably. As a result, on the one hand, when the first symptoms of the recessive cycle began in 2014, in the borrowing requirements analysis the federal government weakened fast from *Speculative* to *Ponzi*. In the budget execution analysis, the federal government financial posture also reached its worst *Speculative* level in 2014, both considering the credit operations (0.20 of FGFFI 2) and disregarding them (0.78 of FGFFI 3). Minsky (1986) explained that the financial fragility characteristically intensifies cyclically, which is exactly what all FGFFI show in the period after 2013.

On the other hand, borrowing was constant over the period, which is typical for a *Speculative* posture, because without safety margins, financial expenditures have to be refinanced. As shown above, although credit operations oscillated, they were positive throughout the period, to the point that,

when included in the FGFFI calculation, the federal government posture is chiefly *Hedge*, albeit artificially because financed by borrowings. Also, were it not for the financial revenues, Brazil's financial fragility would be even greater, as the difference between the FGFFI calculated with the borrowing requirements and the one using the budget execution data reported.

In addition to debt, therefore, the federal government also needed financial revenues to administer its public finances as a whole. In the case of Brazil, the federal government gained from exchange rate devaluations, mainly in 2002 and 2015; however these revenues are volatile and whenever depending on them, they might not come and the Brazilian fiscal policy can become *Ponzi* quickly. In the middle of its fiscal fragility in 2015, Brazil had to count on luck to gather financial revenues from exchange rate devaluation, otherwise it would have needed even more credit operations, what would have brought higher financial expenditures.

Finally, based on the FGFFI, it is possible to present some comments related to the Brazilian austerity plan implemented in the end of 2016, that is, the New Fiscal Regime (NFR). Austerity is problematic by its very nature, but the one implemented in Brazil, an expenditure cap rule, is even more questionable for three reasons, in view of the FGFFI. First, it does not address total revenues, in that it does not implement mechanisms either to smooth its cycles or minimally adjust the dynamics of current expenses to total revenues. Second, it makes no provision for financial expenses, which are important to the dynamics of the Brazilian fiscal fragility. Third, it prevents any countercyclical use of current expenses, which are required particularly during crisis, continuing with the procyclical behavior of the fiscal policy in Brazil, its chiefly trend over 2000–2016. Rising public investments will only be possible in the wake of NFR by reducing expenditures in other areas of the federal budget.

NFR seems to consider both the total revenues and financial expenses as givens, as long as it just limits current outgoings. Yet, as the FGFFI showed in all three analysis, the former two accounts respond elastically to the economic cycle and can make the federal government finance fragile. Brazil needs a fiscal regime that controls not only non-financial expenditures, but all the factors that condition the financial fragility of the federal government, that is, revenues as a whole, amortizations and interest payments. As this was not the case with the NFR, what it has ensued is a new mechanism for controlling the expansion of current outgoings, and not in fact a new fiscal regime.

Conclusion

Three analyses of the Brazilian federal government financial fragility were undertaken using the FGFFI. The models based on both borrowing requirements and budget execution showed that the federal government, by far

the greatest and most substantial entity in public finances and responsible for fiscal policy, assumed a fragile financial posture throughout the research period. To judge from its borrowing requirements, it was *Speculative* from 2000 to 2013, and *Ponzi* from 2014 onwards. Regarding the FGFFI calculated with budget execution data, it was *Speculative* the whole period. In the third model, which accounted for the debt that entered the government cash flow, Brazilian fiscal policy was mostly *Hedge*, although this was an artificial less fragile posture, given that credit operations made the federal government's positive margin of safety.

The factors influencing FGFFI show that all the variables are significant in explaining the federal government financial fragility. Current expenses grew steadily and at a higher mean rate than total revenues that, in turn, are quite sensitive to the economic cycle – just as Minsky (1986, 1992) argued– and the latter were affected by large tax exemptions furnished by the federal government over 2011–2014. Financial expenses are rather volatile, and this intensifies the federal government fragility, particularly in moments of crisis.

Also, 2014 was emblematic to the federal government financial fragility. The FGFFI 1 indicates a rapidly attained *Ponzi* posture in 2014, even though 2013 was not at odds with the other study years. That is a clear expression of Minsky's (1986) financial fragility. Although the federal government does not closure as a firm, its fiscal policy space to push up the economy, or to stabilize it during a recession, closes when it is *Ponzi* and it may quickly lose agents' confidence, as happened in Brazil in 2015–2016.

In addition, the FGFFI derived from budget execution data shows the importance of financial revenues to sustaining less fragile financial postures over 2000–2015. The same appeared when analyzing the impacts of borrowing on the financial fragility of the federal government: at *Speculative* postures, it needed to issue debt continuously. No less important, credit operations expanded during all period, which is an explanatory factor for Brazil's gross debt having grown so worryingly, particularly after 2013 – it went from 51.1% of the GDP in December 2013 to 70.0% in December 2016 (BCB 2019a).[12] This is precisely the outcome of the worsening of the Brazilian federal government financial fragility from 2013 onwards, in all three FGFFI.

The last analysis that emerged from the FGFFI was related to the type of fiscal policy Brazil engaged in, pro or countercyclical. Differently from the Post Keynesian prescription, fiscal policy in Brazil was essentially procyclical, the greater the GDP increased, the more fragile was its financial posture. As so, the Brazilian fiscal policy has not built public funds to finance expansionary policies in recessive moments. In 2015, the FGFFI appointed a countercyclical fiscal policy, but it was done by means of issuing public debt at an interest of more than 15% per year, the price that agents' confidence charged to lend to an untrustworthy non-*Hedge* federal government.

Notes

1. IPEADATA (2019) shows that between 2014 and 2016, Gross Domestic Product (GDP) fell in the order of 7.2%, while the nominal (primary and financial) public deficit over GDP were 6.7%, 9.1% and 9.0%, respectively, in 2014, 2015 and 2016. Within the Brazilian states, the fiscal crisis became dramatic, to the point that Minas Gerais, Rio de Janeiro and Rio Grande do Sul decreed financial calamity. It is important to mention that the Brazilian crisis was not only caused by domestic factors. The external sector helped to slow the pace of the Brazilian economy because of (i) the lower growth rate of China, the biggest trade partner of Brazil, (ii) the quantitative easing policies of advanced economies' Central Banks that appreciated the Brazilian *Real* when the country's exports were slowing down and (iii) the large fall of commodities' prices in 2014–2015, upon which the Brazilian exports rely. To see more about the Brazilian economic crisis, see Carvalho (2018) and Krugman (2018).
2. Federal government comprises the National Treasury (NT), non-financial State enterprises, the Social Security System and the Brazilian Central Bank (BCB) (BCB, 2012; NT, 2016b). Though we call it Federal Government for simplicity, this entity is conventionally called Central Government in the relevant literature.
3. Eichegreen, Hausmann, and Panizza (2007) list only the American Dollar, Euro, British Pound, the Swiss Franc and the Japanese Yen as so.
4. It is important to mention that those who follow the Modern Monetary Theory (MMT) would strongly disagree with the reasons advanced here to explain why it does make sense to build a public sector financial fragility index based on Minsky (1986), because the MMT states that a sovereign state could never become insolvent in its own currency. Even though the MMT is an important and growing strand of Post-Keynesian theory, it is neither free of controversy nor it is the hegemonic view on fiscal and monetary policies within the Post-Keynesians. However, it is not the subject of this paper to debate the controversies regarding the MMT. This fruitful discussion can be seen in a rich debate, namely Palley (2015a, 2015b) and Tymoigne and Wray (2015). The fiscal positions of Keynes can be seen in Keynes (1980) and a summary is available in Ferrari Filho and Terra (2012). Colander (1984, 2002) discusses the positions of Keynes about Abba Lerner's Functional Finance that partly grounds the MMT views on fiscal policy. Terra (2019) synthesizes the fiscal policy to Keynes, Minsky and the MMT. For more about the MMT, see Wray (2015), and for a critical view of MMT, from a Post-Keynesian perspective, see also Davidson (2017) and Palley (2019).
5. For a deeper debate on margins of safety see: Minsky (1986, chapter 9) and Paula and Alves (2003). Moreover, to Minsky (1986), there are three types of cash flows: income, balance-sheet and portfolio. The first is in- and outflows of money that an economic unit needs for its day-by-day life. The balance sheet cash flow is the money circulating from/to units because of stocks they have on their balance sheet, both on their asset and liabilities sides. The third sort of cash flow is the portfolio, in which money goes around because of the trade of financial and capital assets. To see more, Fazzari, Ferri, and Greenberg (2008) use Minsky's cash flow to debate economic cycles.
6. Based on Minsky (1986), expected revenues and not the current plus financial ones are those that entrepreneurs regard when making their investment plans. However, for the public sector, these data are limited compared to the actual total revenues and so they would make impossible the calculus of the Index. For instance, in the Brazilian case, the expected revenues are annual, reviewed once only or a few times a year, as well as the explanations of the fundamentals that ground the expected values

of the revenues are not clear. Thus, the use of expected revenues would make the calculus of the Financial Fragility Index impracticable.

7. Specific differences happen from country to country. In the Brazilian case, for example, there are the following relevant peculiarities: the financial accounts are not nominated *financial*, but capital revenues and expenses. Moreover, credit operations are financial revenue coming from public debt and it can finance current expenses only to the limit expressed by the Constitutional "golden rule", that prohibits borrowings to exceed the total volume of capital expenses.
8. More about the "creative accounting" can be seen in Arestis et al. (2019) and Villaverde (2016).
9. Since 2008, there has been legislation regulating relations between the BCB and the NT about the BCB's losses and gains regarding oscillations in the value of forex reserves, the cost of purchasing and of maintaining them – what is known as exchange equalization. Under those regulations, any gains transferred to the NT, which are R_{ffg}, can only be used to amortize federal public debt. For more details, see Brasil (2008), Higa and Afonso (2009), Leister and Medeiros (2012) and Brasil (2019).
10. In the specific case of Brazil, this always happens in compliance with the constitutional provision that credit operations must not be greater than overall capital expenses. For further details, see Brasil (1988).
11. Lopes (2009), using Minsky's (1986) *Ponzi* posture to highlight the burden of interest rate payments but without using any model that creates numerical parameters to define what a *Ponzi* posture was, denotes how financial expenses constrained fiscal policy in Brazil over the 1990s corroborating our argument that more fragile postures bring together higher interest rate and less policy space for fiscal measures. Moreover, it is worth noticing that the 2015 and 2016 borrowing requirements FGFFI report Brazil's financial fragility equivalent to the Greek one between 1994 and 2002, calculated by Argitis and Nikolaidi (2014) using the PSFFI.
12. The difference between the net and the gross public debt is that the latter is the sum of all the liabilities of the government whereas the former deducts from the gross public debt all the assets held by the government. In December 2013, the net public debt was equal to 30.5% of the GDP while in December 2016 it reached 46.2% of the GDP (BCB 2019a). The main asset help by the Brazilian Federal Government are the international reserves, which amounted for US$ 365 billion in December 2013.

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