PONTIFÍCIA UNIVERSIDADE CATÓLICA DO RIO DE JANEIRO

DEPARTAMENTO DE ECONOMIA MONOGRAFIA

FINAL DE CURSO

FOOL ME ONCE, SHAME ON YOU. FOOL ME TWICE…
FISCAL AND MONETARY CREDIBILITY IN BRAZIL, 2000-2018

João Gabriel Caetano Leite

No de Matrícula: 1510891

Orientador:

Agosto, 2021

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Declaro que o presente trabalho é de minha autoria e que não recorri para realizá-lo, a nenhuma forma de ajuda externa, exceto quando autorizado pelo professor tutor

João Gabriel Caetano Leite

As opiniões expressas neste trabalho são de opinião única e exclusiva do autor

Acknowledgments

Abstract

Caetano Leite, João Gabriel; Beccard, Yvan (Advisor). **Fool me once shame on you, fool me twice... Fiscal and Monetary Credibility in Brazil 2008-2018**. Rio de Janeiro,2019, 65 p.– Departamento de Ciências Econômicas, Pontifícia Universidade Católica do Riode Janeiro

In this monograph, we seek to study the impacts of the loss of credibility of fiscal and monetary policies on the Brazilian business cycle. To this end, we conduct an extensive literature review not only on the definition of credibility in macroeconomics but also on the measurement of monetary policy and its debate in Brazil. In addition, we debate the possibility of building an index of fiscal policy credibility. Secondly, we do an extensive analysis of institutional deterioration, using political economy models, and its impact on the disanchoring of agents' expectations. Finally, we evaluate the impacts of credibility loss in a simple three equation model. Our identification strategy is based on a Factor Augmented Vector Autoregressive Model.

Keywords: Credibility; Monetary Policy; Fiscal Policy.

Resumo

Caetano Leite, João Gabriel; **Fool me once shame on you, fool me twice... Fiscal and Monetary Credibility in Brazil 2000-2018**. Rio de Janeiro,2019, 65 p.– Departamento de Ciências Econômicas, Pontifícia Universidade Católica do Riode Janeiro

Summary
1. Introduction
2. Institutional background

By the beginning of 2010s, Brazil was widely recognized as a development success case. Not only in the November 2009 edition of The Economist Brazil was hailed as a major player and vigorous economy (the notorious Brazil Takes Off cover)1, some of the most renowned economists in the world praised Brazilian conduction of economic policy on the wake of the 2008 crisis, adding to a decade of social inclusion, economic growth, and institutional and macroeconomic stability.

This success story is mainly due to an adoption of an institutional framework. In 1988 Brazil finally adopted a democratic constitution, after a century of oligarchic republic regimes, coups, and dictatorships. The new constitution set a general bundle of social rights associated with what could be called the first Welfare State proposition in almost a century of republican government. It was the first to recognize universal rights to education and health, for instance, but also led to many changes in labor regulation, social protection mechanisms, social pension structure and many more.

The so-called "Citzen Constitution" was a benchmark for a new age of Brazilian development. However, as constitutions are commitment mechanisms, the new Brazilian one was met with some institutional setbacks from the start.

The role of institutional stability developed by constitutions is not new in the literature. Constitutions are a social contract set by elites and groups of power while shaping the institutions that will rule the society. Douglass C. North (1990) famously stated that institutions are the rules that limit the individuals, and, in terms of economic policy, constitutions such as the Brazilian one tends to describe not only what kind of public goods the government must provide, as how it must provide, and the government's structure regarding such provision.

Constitutions, however, usually reflect the context and the interests of the elites who shape them. In regard to commitment mechanisms, Brazil was, by far, not exactly trustworthy: in the one hundred years in between the Proclamation of Republic in 1889 and the new constitution promulgation, Brazil went through 6 constitutions, seven currency denominations and two dictatorships.

Thus, if we should follow North and Weingast (1989) argument that constitutions have long-term macroeconomic effects as commitment mechanisms, Brazil could not be considered

[1] As seen in https://www.economist.com/leaders/2009/11/12/brazil-takes-off

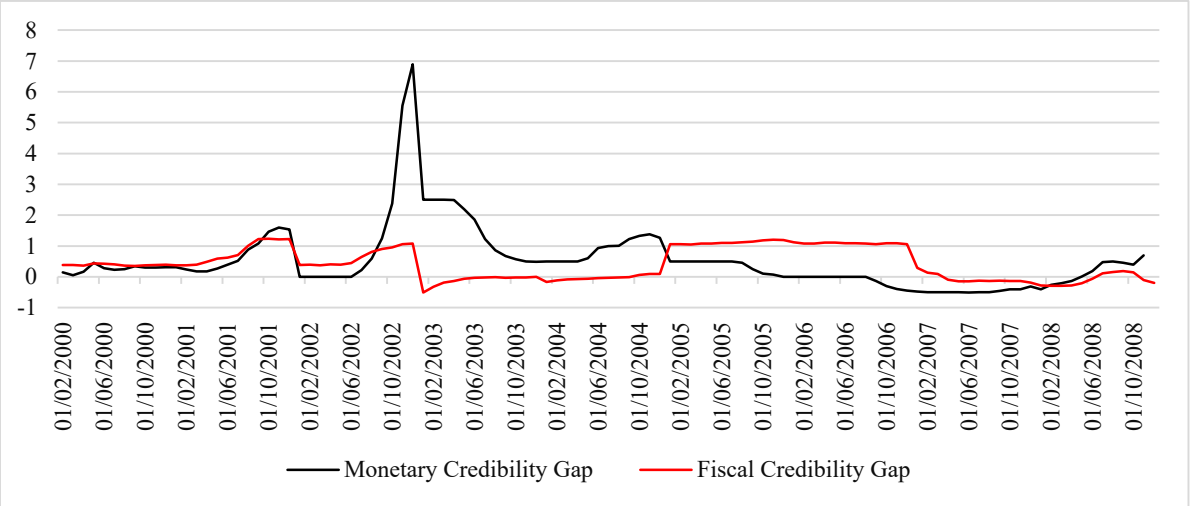
a committed country. Furthermore, the transition between the military dictatorship to democracy in 1985 was highly mediated by the previous regime elites, maintaining a high degree of institutional power in the nascent democracy.

The newly elected Congress responsible for writing the constitution was an amalgam of interest groups. Ranging from workers unions represented by the Workers Party and intellectual elites persecuted by the dictatorship to even former ministers of the military government such Antonio Delfim Netto and Roberto Campos. In fact, the process was itself complicated to say the least: 'An "ugly" but functional "compromise", the constitution became the focal point of a myriad interest groups in a context of strong political fragmentation' (ALSTON et al, 2016). This political accommodation took 19 months to complete itself but bore one relevant fruit: a strong presidentialism system.

However, it took some time for the infant Constitution to be thoroughly applied. The 1980s were marked as a lost decade due to the hyperinflation, which was caused by the enormous external debt assumed by the military dictatorship in the 1970s (CARNEIRO, 2015) (CARNEIRO & MODIANO, 2015) (AYRES et al, 2018). This economic crisis was met with institutional turmoil: between 1980 and 1994 there were 12 finance ministers, some of them lasting few months in office, six currencies denominations, up to 9 stabilization programs aiming to control hyperinflation, and up to 21 proposals to pay the external debt.

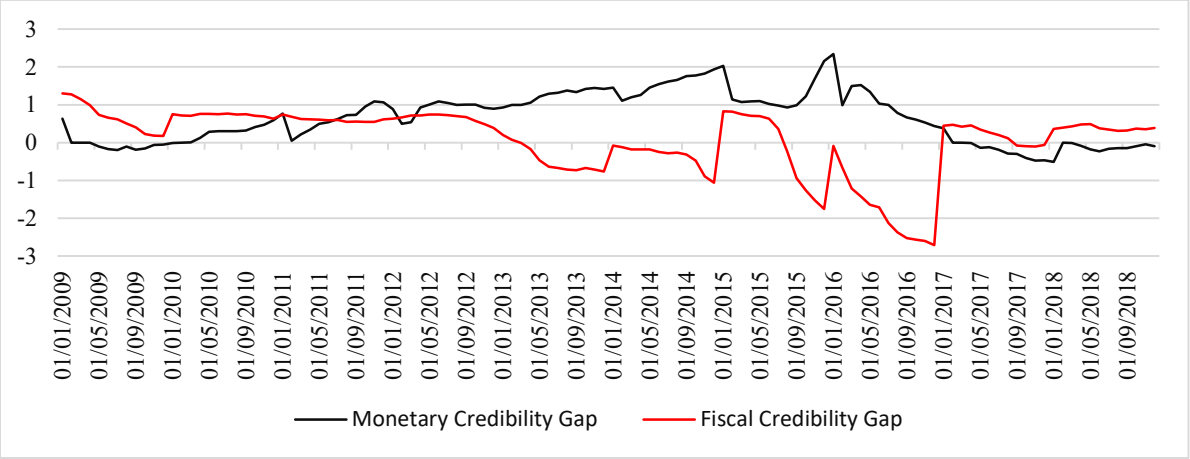
This would change by 1994, with the Real Plan. Of the many reasons that can explain the success of the Real Plan, we can highlight the anchoring of inflation expectations through the URV and the compromise to effectively go through a major fiscal structural reform. As such, in many ways, the Real Plan was itself a sign of victory of the bourgeoning

Graph X: Fiscal and monetary credibility gaps, 2000-2008



Source: We used the Brazilian Central Bank Focus Report for the expectations on inflation and primary result one year ahead. Fiscal targets were extracted from Brazilian "Lei de Diretrizes Orçamentárias" annexes and the inflation targets from the Brazilian Central Bank.

Graph X: Fiscal and monetary credibility gaps, 2009-2018



Source: We used the Brazilian Central Bank Focus Report for the expectations on inflation and primary result one year ahead. Fiscal targets were extracted from Brazilian "Lei de Diretrizes Orçamentárias" annexes and the inflation targets from the Brazilian Central Bank.

3. Expectations and monetary policy credibility

3.1. Expectations and credibility of the monetary policy in macroeconomic theory.

Over the last four decades, there was a revolution in analyzing the role ofexpectations on monetary policy. As Robert Lucas Jr. kickstarted the new classicalschool with its seminal 1972 (LUCAS, 1972), also known as the Lucasian Revolution (DE VROY, 2016), the interaction between announced policies, information, and agents' expectations became a major driver of the business cycle analysis. In such spirit, Edward C. Prescott and Finn E. Kydland in their 1977 classic*Rules Rather than Discretion* first formally described the concept of monetary policy credibility[2] and intertemporal inconsistency in the modern canonical sense.

However, many authors mused with the idea at the time, as UnitedStates was effectively forcing the last nail on the coffin of the gold standard, whilefacing major inflation, such as Milton Friedman (DE VROY, 1976). According to McCallum (1984), it was William Fellner, who first introduced the idea into the macroeconomics and "chose this particular word because he believed that the U. S. aggregate demand policy of the middle/the late 1970s was unsustainable and in that sense unbelievable" (MCCALLUM, 1984) but concedes that with time, it has cometo mean that "(…) the term has come to be used in a slightly different way, in particular, as meaning 'believed' rather than 'believable'." (MCCALLUM, 1984) alluding to the role of agents' expectations over the character of the central banker.

Other authors have attributed the parenthood of the concept to many *éminents* of economic thought, Mervyn King goes as far as attributing the genesis of the concept to Adam Smith[3] (KING, 1995). Regardless of the quest for the ontological *raison d'être* of monetary policy credibility, it is still a fickle question regarding measurement.

There is no universal measure of credibility, however, the simplest way to define is that a central bank is credible if people believe it will do what it says (Issler & Soares, 2019). Therefore, the simplest way to measure credibility is the deviation of the expected inflation rate in the first period from the actual inflation in the second period. If the Central Bank is credible, then the equation below is valid, where πte is the expected inflation rate at any given period, πt+1 is the inflation rate in the subsequent period, and ε is an error measure, that should fall in a zone accepted by the market: $\sigma 2$. This definition follows the work of Alan Blinder (2000).

$$\pi_t^e = \pi_{t+1} + \varepsilon, \varepsilon \leq \sigma^2$$

[2] Which is fundamentally different from the reputation concept, developed by Robert Barro and David Gordon in *Rules, discretion, and reputation in*

[3] As it usually is with almost all economic concepts, someone will trace, even if it is a frail mention,an allusion in Adam Smith's work.

However, it is not easy to achieve a universal measure of expectations. While some central banks adopt instruments to measure and propagate the market expectations, such as the Brazilian Central Bank (BCB), with its Focus report, in many other countries, there is a necessity to analyzes financial reports by banks and other agents and/or track the media.

Furthermore, in many ways, different Central Banks have different institutional characteristics. They may have different objectives, whether it is just to maintain the price level or to maintain the price level and to achieve the natural unemployment rate, for instance. They may have different structures. Therefore, to achieve anything close to similar parameters to build a scale or index for comparing, on an international level, it is required to develop some proxies and instruments as strategies, which, of course, means some level of discordance in the literature.

As explained previously, the literature on the concept of credibility dates from, at least, the first half of the 1970s, but the efforts to measure it started to show developments by the late 1980s. There are many reasons for that, but in general terms, it is necessary to highlight that in the 1980s there was a process of stabilization of the monetary policy being ignited in the developed economies. The so-called great moderation was marked by the slowly trimming of the volatility of the inflation rates, and by further communication of the central banks as globalization advanced.

With institutional improvements, the number of empirical works on Central Bank's performance increased, with the majority showing that independent, accountable, transparent, and credible central banks are more efficient (Issler & Soares, 2019). And of these characteristics, transparency is the most important one for our analysis, as credibility derivates from expectations and expectations are better formed if Central Banks is as transparent as possible (Rudebusch & Williams, 2008).

Many authors have tried to develop their credibility indexes, such as Svensson (1993, 2000), Cukierman & Meltzer (1986), Bomfim & Rudebusch (2000), and Issler Soares (2019). A good comparative analysis of the international literature is reflected on the efforts of Michael D. Bordo and Pierre L. Siklos (Bordo & Siklos, 2014) (Bordo & Siklos 2015a) (Bordo & Siklos 2015b) because they follow the simple definition aforementioned at the beginning of the section and because they try to evaluate on a cross country, perspective, thus generating a reliable database for the empirical analysis.

In *Central Bank Credibility: An Historical and Quantitative Exploration*, the authors provide empirical measures of central bank credibility, based on institutional, financial, and

monetary parameters for eleven countries. In *Central Bank Credibility, Reputation and Inflation Targeting in Historical Perspective*, the authors focus on the historical evolution of central banks for 16 countries, going as far as before 1914, using both empirics and historical narratives. Finally, in *Central Bank Credibility Before and After the Crisis* the authors evaluate the credibility of 86 countries and try to measure the effects of financial crisis upon the Central Bank.

3.2. Measuring monetary credibility in Brazil

Regarding Brazil, there is a wide range of literature that aims to develop an index of the Central Bank's Credibility. There are historical, institutional, and political reasons for such interest in academia and policymakers: Brazil has faced a struggle with high levels of inflation for the majority of the second half of the twentieth century and while the Real Plan developed a virtuous path towards a rational monetary policy, the introduction of efficient rules for the Central Bank were met with political difficulties. Furthermore, there a debate in the public sphere on whether the level of the interest rates is correct, as the real interest rates in Brazil are relatively high.

There is a methodological reason as well. Brazil has developed a consistent database of market expectations in its FOCUS survey. The Survey was established in 1999 as part of the transition towards the implementation of the inflation targeting system and nowadays is widely used by market agents as an important tool in evaluating macroeconomic scenarios and developing their strategies.

The debate of monetary credibility in Brazil truly starts by the turn of the millennium as Brazil adopts an inflation target system. Furthermore, by the early 2000's there is a staunch debate on whether inflation targets were successful in anchoring the agents' expectations. We'll divide the literature into two generations henceforward.

While Cechetti & Krauze (2002) wasn't developed specifically for the Brazilian case, it was the original mold for the first generation. It is a normalized index (between zero and one) for the divergence of the inflation expectations from the target, therefore it was consistent with the time, as it was the beginning of the Brazilian experiment with inflation targets. The proposed credibility index is an inverse function of the deviation between expected inflation and the central bank's target, ranging from 0 (no credibility) to 1 (full credibility). It is described as below. In the model $\bar{\pi}_t$ is the Central Bank inflation target, π^e is the expected inflation and between 0 and 1 the index is linearly inversely correlated to the agents' expectations, and they set 20% as an arbitrary index.

$$I_{CK} = \begin{cases} 1, & if\ \pi^e \leq \bar{\pi} \\ 1 - \dfrac{\pi^e - \bar{\pi}}{20\% - \bar{\pi}}, & if\ \bar{\pi} \leq \pi^e \leq 20\% \\ 1, & if\ \pi^e \geq 20\% \end{cases}$$

In this tradition, Sicsú (2002) developedhis index, the first designed specifically by a Brazilian author regarding the BCB. It is built upon the market's expectations that the Central Bank will reach the inflation target; thus, it is based on an assigned probability index, set in the set]-∞, 100]. If the market believes that the central bank is thoroughly credible, which means that it can hold the inflation on the target, the index will be stable at 100 points, if it is close to the upper or lower thresholds it will converge to zero, and if the goes beyond the targets, it will be negative and therefore the Central Bank is believed to be non-Credible. The index is built as follows.

$$I_S = 100 - \left(100 \cdot \frac{|\pi^e - \bar{\pi}|}{\bar{\pi}^{Max} - \bar{\pi}}\right)$$

The next index was developed by Helder de Mendonça in 2004. It is an adaptation of the Cechetti & Krauze (2002) index applied to Brazil, through the introductions of the Brazilian Central Bank target systems with bandwidths. Furthermore, it is a normalization of the Sicsú Index, which binds the index to variations between 0 and 1. It is described as bellow:

$$I_M = \begin{cases} 1, & if\ \pi^e = \bar{\pi} \\ 1 - \dfrac{\pi^e - \bar{\pi}}{\bar{\pi}^{Max} - \bar{\pi}}, & if\ \bar{\pi}^{Min} < \pi^e < \bar{\pi}^{Max} \\ 0, & if\ \pi^e \geq \bar{\pi}^{Max}\ or\ if\ \pi^e \leq \bar{\pi}^{Min} \end{cases}$$

Garcia and Guillén (2014) point out that the index features a discontinuity. If the expectations are reaching the lower target, the credibility index will be zero until it reaches the threshold, however, if the index if falling towards the lower threshold, the index will be higher than zero. Effectively, this would mean that, if the inflation is lower than the allowed by the bandwidth, and the Central Bank then starts an inflationary policy aiming to reach the target it would be considered less credible than if the Central Bank is not able to contain deflationary pressures. While this problem would be far from the Brazilian reality at the time, it means that it isn't suited for developed countries such as the United States which face inflation chronically below its target.

Furthermore, if the inflation is lower than the lower target, which by the time was quite

rare- however, it became a feature in the inflation time series after 2016- the Central Bank would be considered non-credible, which is somewhat an unfair penalty considering that Brazil has historically a problem with inflation and not with deflation, however, this is consistent with the Policy Rule.

Then, there is the Nahon & Meurer (2005) index. The index is somewhat a more "realistic" variation of the previous index. As the authors believed that, considering the Brazilian historic experience, the credibility index should reflect the fact that as long the index is below the upper bound of the target bandwidth, Brazilian Central Bank can be considered credible. Furthermore, BCB's credibility is imperfect if the agents' expectations fall between the upper threshold of inflation target bandwidth and 20% (the ad hoc level of 20% inflation is kept throughout the first generation of models. The index is built as it follows:

$$I_{NMa} = \begin{cases} 1, & if\ \pi^e < \bar{\pi}^{Max} \\ 1 - \dfrac{\pi^e - \bar{\pi}^{Max}}{\bar{\pi}^{Max} - \bar{\pi}}, & if\ \bar{\pi}^{Max} < \pi^e < 20\% \\ 0, & if\ \pi^e \geq 20\% \end{cases}$$

While this can be seen as a highly lenient index towards the Central Bank's ability to reach the target and its mandate of keeping price stability, it reflects the Brazilian experience with inflation. Between 1995-2004, the average annual inflation rate in Brazil was 9,085%. This in many ways shows how has the country evolved while dealing with price stability. Furthermore, this index itself allows for a simplified version as exposed by Garcia and Guillén (2014). Although it is not a normalized index, thus it is highly volatile.

$$I_{NMb} = \frac{\pi^t_{max}}{E(\pi)}$$

Finally, there is the study proposed by Garcia & Lowenkron (2007). In this paper, the authors study the effect of the short-term inflation surprises over the long-run inflation expectations. In general, they find that, for their sample (that ends in 2006), "inflation surprises have pushed expected inflation away from the target and have also driven inflation risk premium up" (GARCIA & LOWENKRON, 2007). The authors thus posit that the imperfect credibility of monetary policy was "clogging" the expectations channel in monetary policy, and, as such, driving the costs of the monetary policy requiring higher interest rates (GARCIA & LOWENKRON, 2007).

Lowenkron and Garcia (2007) is the last work in the first generation of studies on the credibility of monetary policy. As previously explained, after the 2006 election, Brazil had

firmly established a framework of monetary policy based on inflation targeting, and the Lula government had a firm public compromise that it would maintain the Brazilian Central Bank's informal autonomy (a promise, that, as we previously explained, was relatively void). As such, Brazil was on a path for macroeconomic success, at least in public and international perception, and until the end of the decade, credibility and inflation issues hadn't crept investors' expectations, except in 2008-2009.

By the end of the first Dilma's presidency, however, a different scenario was in place. The deterioration caused by the sequential interventions in the Brazilian Central Bank, the failure of heterodox macroeconomic policies, the deterioration of the global economy after the Euro Crisis of 2012, and the fall in the Chinese demand for commodities led to a deterioration of inflation expectations. Furthermore, the 2014-2015 crisis was marked by a sharp inflationary pressure.

As such, a new generation of credibility studies sprung in Brazil. In general, they differ from the first generation not only because their sample is larger, ranging from 2000 to 2014-2018 with two credibility shocks (2002 and 2015), but in their complexity. The new works usually espouse more complex identification and econometric techniques, microfoundations, or structural models, in line with advancements in the international literature, such as Debortoli and Lakdawala (2016).

The first one in this line is Guillen and Garcia (2014). Using disaggregated inflation expectations, they study the persistence of lack of credibility. They hypothesize that that "long-term expectations' heterogeneity comes from different beliefs about central bank's aversion to inflation" (GARCIA & GUILLEN, 2014). As such, considering that credibility, in its most basic form, is the belief that the policymaker will deliver the promised policy, the "existence of persistently optimistic or pessimistic agents would reflect a credibility loss" (GARCIA & GUILLEN, 2014). Therefore, they build a credibility index using Markov Chains, which evaluates the possibility of changing from pessimist to optimist as changes in credibility. The index can be described as:

$$IC_{GG} = -\sum_{j=1}^{3}\left|\sum_{i=1}^{3}|p_{ijt} - \bar{p}_{ijt}|\right|$$

$$\bar{p}_{ijt} = 33{,}33$$

In this index, p_{ijt} is the probability of state change from i to j in the t period. As such, the lower the index, the lower the credibility, for the probability difference is larger (there is a larger persistence of pessimism or optimism).

The second one is the Val et al. (2017), which uses a State-Space Model and Forward Measures to estimate the Credibility of Monetary Policy. While they do not build a new index per se, their model uses the breakeven inflation and the FOCUS survey and generates AR(1) processes. Furthermore, they follow Caravalho and Minella (2012) in "the identification of variables that are important in predicting the dynamics of these measures of credibility" (VAL et. al, 2017).

While they find that all variables in the first differences of the lags are significant, the short-term fluctuations of these variables are not significant. This means that the credibility of monetary policy is related to large, structural, and institutional even, changes. The dependent variables are the real-dollar exchange rate, the monthly inflation, the monthly output gap, the unemployment rate, the sovereign risk (embi+), and a dummy used to indicate recession periods.

While their model is not a definite answer, the results indicate some interesting directions. The breakeven inflation credibility helps to predict almost all variables (except output gap), on the other hand, the exchange rate and the sovereign risk Granger cause the breakeven inflation. This bi-directional causality can be explained because breakeven inflation incorporates a risk premium.

However, the focus survey credibility indicates no causality, through the not rejection of the null hypothesis in all cases. This, in its turn, can be explained by the fact that agents may not reveal their true expectations in the survey or the expectations that reveal the relevant information in their investments, even though the Brazilian Central Bank awards the best predictors in the Focus Survey. They find that the BCB was non-credible in 2002 and after the 2014 election up until the Ilan Goldfajn mandate beginning in 2016.

Then, there is Issler and Soares (2019), which studies the credibility with microfounded forecasted inflation as expectations. They take Blinder's (2000) definition of credibility and try to extract from the Focus survey a measure of agents' beliefs. They "estimate every month the conditional expectation of inflation 12-months ahead, coupled with a robust estimate of its asymptotic variance and the respective 95% robust confidence interval" and then, measure the difference from the inflation target. The authors find that for 2007 to 2017 that BCB was credible 65% of the time, except for the beginning of 2007 and mid-2013 up to mid-2017.

Summarizing the papers, the data fit our institutional narrative. We see that there is a clear process of the credibility-building process from the establishment of the inflation targets until Lula's election in 2002. After Lula promised to respect the macroeconomic policy framework set by the FHC government and Henrique Meirelles was called to the presidency of

the Brazilian Central Bank, the credibility of the monetary policy kept rising until reaching perfect credibility by mid-Lula's first government.

The credibility of the monetary policy was at high levels until the 2008 crisis. After the heterodox turn by mid-2009 and the abandonment of the trilemma set at the beginning of the century, there was a process of credibility erosion. The period in between the Dilma years is the point of hard fall, the New Economic Matrix is marked by a sharp rise of inflation expectations by agents, even if some indexes do propose that the expectations are relatively anchored. With the 2014 crisis, there is the first period after 2002 when the Central Bank could be considered non-credible.

Credibility only began to improve again after the impeachment. As Ilan Goldfajn assumed as the new president of the BCB, and -after years of strong academic and market career- began his term with the clear objective of reducing inflation towards the target. Furthermore, he was not alone in this quest as the new government had a public compromise in stabilizing the public debt trajectory.

This can be all seen in the graph below, which represents a credibility index akin to Mendonça (2004). In the index, we made the correction that could correct the discontinuity pointed by Garcia and Guillen (2014): instead of using the pure difference $\pi^e - \bar{\pi}$, we use its absolute. Furthermore, as the index is highly volatile, we extract its trend through a Hodrick Prescott Filter. Finally, in red, we set the region which marks the heterodox policies adoption period, and, in grey, Dilma Roussef's impeachment period. We also mark all the elections and the 20% index lower threshold of non-credibility. The index used is as follows:

$$I_M = \begin{cases} 1, & if\ \pi^e = \bar{\pi} \\ 1 - \dfrac{|\pi^e - \bar{\pi}|}{\bar{\pi}^{Max} - \bar{\pi}}, & if\ \bar{\pi}^{Min} < \pi^e < \bar{\pi}^{Max} \\ 0, & if\ \pi^e \geq \bar{\pi}^{Max}\ or\ if\ \pi^e \leq \bar{\pi}^{Min} \end{cases}$$

Graph X: Monetary Policy Credibility, 2000-2018

Source: The index was built using the average of inflation expectations, one year ahead, extracted from the Brazilian Central Bank FOCUS Survey

4. Is fiscal policy optimal?

One of the major aims of macroeconomists in the twentieth century was to develop ways to program economic policy towards equilibrium, and thus find optimal levels that could lead to full employment and price stability. In the wake of the 1970s, with the critique espoused by Barro to the macroeconometric modeling's assumptions of fiscal policy used in the '60s, however, there was a renewal in interest in the development of newer optimal fiscal policies that could be based on modern microeconomic fundaments (DE VROEY, 2016).

However, recent literature in fiscal policy shows that this type of model does not suit data well, and cannot account for the reality of expansion in public debt. This led to intense development in political economy models to explain the behavior of fiscal policy (YARED, 2019). Such models tend to focus on partisan politics, with different parties whose views on fiscal policy follow different political beliefs.

Following a review of the literature of the subject, we sustain that fiscal policy, for institutional reasons, does not obey any notion of optimality, but rather immediate political

interests, which may explain the secular growth of public debt of the developed economies. Thus, we aim to fundament the basic hypothesis that agents cannot fully predict the level of fiscal policy in t+1, and, as such, contaminates with uncertainty the credibility of the economic policy. Finally, we provide an analysis of the effects of fiscal rules, and the effect on public debt growth, as they restrict the policymakers. Which we conclude is paramount to anchor expectations.

4.1. Optimal fiscal policy and its challenges in economic theory

Since John Maynard Keynes famously postulated that fiscal policy has an active role on unemployment and the activity levels, there was a race in the nascent field. of Macroeconomics to develop the perfect path to conduct fiscal policy. Such quest drove the development of the majority of the first macroeconometric models in the Keynesian golden age, such as the FRB Model (CHERRIER & BACKHOUSE, 2018). The general feeling was that it was now possible to "program" the business cycles with controlled interventions of monetary and fiscal policies whenever there was a recession.

In 1974, Robert Barro (BARRO, 1974) published the paper On the Determinants of Public Debt in the Journal of Political Economy that would establish the so-called Ricardian Equivalence. It states that the level of government debt is completely innocuous on the real economy's activity because agents are rational and anticipate that an expansionist move or tax cuts by the government will be compensated in the future, henceforth agents operate through the bond market as saving and hedge mechanisms.

The Ricardian Equivalence operates on three strong, unrealistic assumptions: austere fiscal policies involve no deadweight loss in welfare, that firms and families have the same lending power as the government and are financially unconstrained, and, lastly, households and companies can forecast the tax level without limits. Nevertheless, it was enough to stir the intellectual community towards new theories of optimal fiscal policy, with major characteristics and references outlined below following Yared (2019).

Table X: Optimal fiscal policy theories

Theory	Hypothesis	Major characteristics	References
Tax- Smoothing	When the government raises revenue, there is a deadweight loss in the economy	Unanticipated fiscal needs	Barro, 1979
		Anticipated fiscal needs	Lucas- Stokey, 1983
Safe asset provision	Companies and families are financially constrained and cannot operate in the credit market as freely as government	Financial constraints	Woodford, 1990
		Precautionary private savings	Ayigari- McGrattan, 1998; Holmström-Tirole, 1998
		Global capital flows and interest rates	Aizenman- Marion, 2011
Dynamic Efficiency	Private sector does not internalize fiscal policies' consequences infinitely into the future and beyond	Dynamic inefficiencies in the economy and over accumulated capital can lead to an optimal increase in government debt	Diamond, 1965 Blanchard, 1985

The first theory (Tax-Smoothing) is the most commonly used to explain government debt management. It is based on the notion that government may use debt to smooth deadweight loss from raising revenue (YARED, 2019), as raising revenue distorts economic decisions, on the other hand, debt does not. (BARRO, 1979, LUCAS & STOKEY, 1983, YARED, 2019).

Such a hypothesis is applied in a scenario that is set in an economy where there are *unanticipated fiscal shocks*. If facing unanticipated fiscal and temporary fiscal needs, the government should raise debt as optimal fiscal policy, rather than raise taxes, as taxes may distort prices and allocations in the economy, also they have a direct effect on agents' income. Therefore, a sudden tax raise distorts the economic allocation of resources, but debt does not as agents internalize it in their optimal intertemporal allocation as wealth[4].

Yared (2019) evaluates whether this hypothesis sustains itself empirically by testing the debt management in the wake of the 2008 financial crisis and military spending during wars for developed countries. These unexpected fiscal needs can account for the increase in the level of debt in specific periods but cannot in the long run.

Another possible option is anticipated fiscal needs. If the government expects a reduction in future spending, debt should be raised in the present, as it would be more easily paid over in the future. The long-term anticipated fiscal needs in developed countries- and Brazil- has, risen exponentially mainly due to the pressure of the aging population in pension

[4] This satisfies the rational agents' hypothesis.

funds and the reduction of the fertility rate. If tax-smoothing theory held empirical validity, governments were to be reducing debt presently, and they aren't.

According to the *safe asset provision theory*, as proposed by Woodford (1990), Aiyagari and McGrattan (1998), Holmstrom and Tirole (1998), Mankiw (2000), etc... the private sector does not have the same financial potency as the government, which is to say that "[the] private sector is financially constrained and cannot borrow or lend in the same terms as the government" (YARED, 2018).

This theory is especially attractive for some developing countries such as Brazil. Not only there is a large parcel of public debt in the global debt of the Brazilian economy, which is used as an asset by private agents who want to mitigate their portfolio risk, as the government is a major lender in the economy[5], going as far as using a lower interest rate than the market benchmark[6].

It is based on the idea that government debt is less risky than private debt[7]. Government has a safer revenue than corporations as its income is originated in taxes, which the government can always coercively "harvest" from individuals. In this sense government bonds mitigate the risk in investor portfolios, especially in the Brazilian case where some classes of government bonds are considered risk-free assets.

Thus, if the private agents are facing financial constraints, it would be optimal for the government to raise debt. As the financial constraints become tighter, by issuing more debt, the government supplies the market with safe assets and provides more liquidity for the agents, who are increasingly constrained, if facing a financial crisis (AZZIMONTI & YARED, 2018).

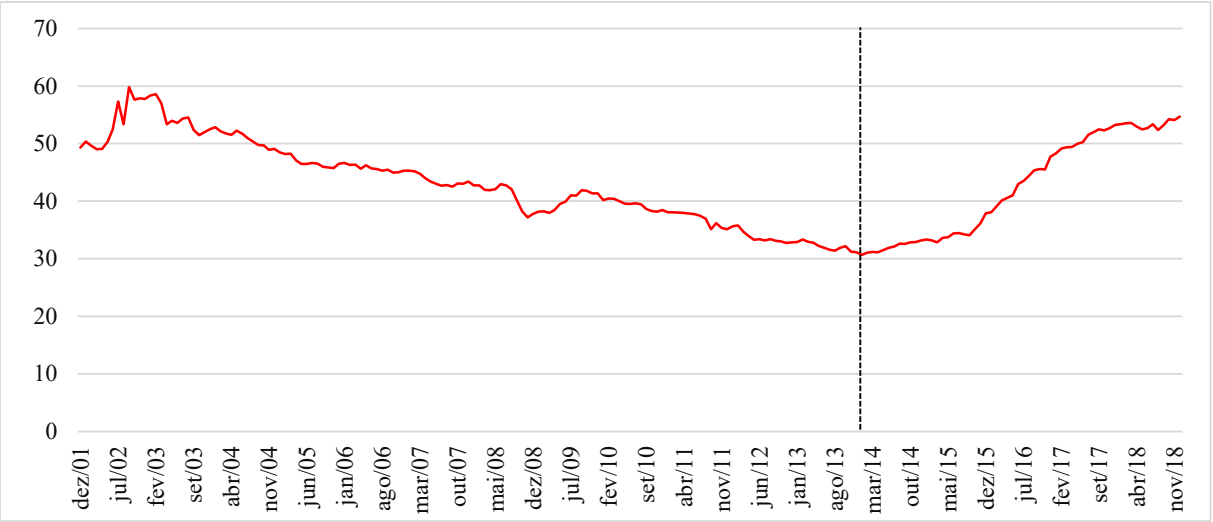
According to Yared (2019), this perspective explains the surge in public debt to counter-react to the 2008 Financial Crisis, however, it is not consistent with the secular growth in debt. Considering the Brazilian case, as shown in the graph below, the growth of public debt was accelerated during the 2015 recession but has not changed its course after the return of growth.

[5] As a good example, see the Brazilian National Confederation of Industry (Confederação Nacional da Industria – CNI) presidential report on infrastructure funding, which shows that the proportion of bank credit in the global credit is much larger than in selected countries. However, the majority of the issuing of such bank credit, as debentures in general, was under the guise of the BNDES, which lent at an interest rate below the market benchmark and with public resources as guarantee. (FRISHTAK et al, 2018)

[6] The BNDES own long-term interest rate, called TJLP, which was eventually abolished on January first, 2018.

[7] Yared (2019) uses the term private defaultable debt.

Graph X: Brazilian General Government Net Debt



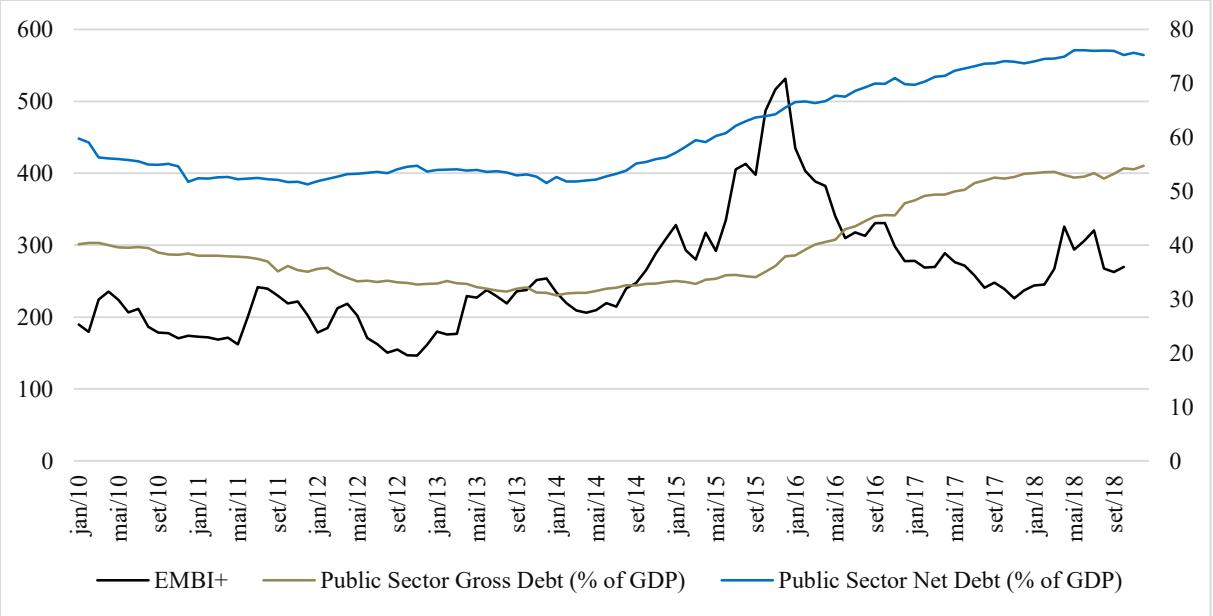
Source: Brazilian Central Bank

Regarding income risk, the theoretical prevision is similar to the financial constraint, which means a positive correlation between income risk and government debt growth. If households and firms are facing higher income risk, there is a tendency for the agents to allocate their resources in portfolios with less return volatility (AZZIMONTI et al, 2014).

However, Yared (2019) using the findings of Sablehaus and Song (2010), and Guvenem, et al. (2014), concludes that, while U.S. household income risk has decayed since 1980, debt has risen[8]. In the graphics below we use the EMBI+ index monthly as a proxy for income risk in the Brazilian economy and show that while there is a clear drop between 2015 and 2016, there is still a growing trend in public debt.

[8] Yared (2019) adverts that, according to Campbell et al. (2001) and Brandt et al. (2010), there are mixed findings in trends on business-level risk.

Graph X: Income risk vs Brazilian Public Debt



Source: Brazilian Central Bank and IPEAData (Institute for Applied Economic Research)

The cases of *financial constraints* and *precautionary private savings* were argued in a closed economy context. Regarding *global capital flows*, the reduction of international barriers to capital has presented itself as a challenge, as shown in the 1990s emerging countries crises such as the Asian Financial Crisis of 1997 and the Russian Financial Crisis of 1998, both of them showcasing the financial fragilities of countries and had dire effects of sustainability of many economies[9]. As such, the *safe asset provision theory* may help to develop a framework on optimal fiscal policy in a globalization scenario. This proposition is not in the scope of our analysis, for a good exposition of the effects of globalization on optimal debt provision and its effects on the interest rate, see Yared (2019), who also shows that this array of transmission channels don't hold empirical value in advanced economies.

The last tradition is the *dynamic efficiency theory* as proposed by Diamond (1965) and Blanchard (1985). This theory is concerned with the intergenerational effect, when the private sector does not internalize in its optimal decision process the effect of raising debt infinitely in the future. This imposes an impasse between older and younger households, as the cost of issuing public debt affects differently these heterogeneous agents.

Older generations prefer the issuing of present debt as they won't face the burden of paying the taxes in the future, which will be the responsibility of younger generations. Agents know this, and, therefore, the issuing of present debt alters the decisions of agents, "tilting the

[9] For instance, Russia has defaulted on its debt during the 1998 crisis.

lifetime consumption towards older generations, while also increasing interest rates and crowding out capital investment" (YARED, 2019). There is also an even direr consequence of raising debt in this context. If the bonds become a sufficiently attractive investment, there is a possible debt bubble situation, in which the agents will hold debt bonds simply because the next generation will, expectably, also do so.

Considering such overlapping generations model, raising debt can be optimal if there is over accumulated capital in the economy. In this picture, the over accumulated capital is not invested, thus reducing the economic growth, and as such, it may be optimal for the government to raise debt. This policy is optimal because it dilutes the household savings and increases lifetime consumption, as previously explained, thus reducing dynamic inefficiencies and promoting welfare.

Yared (2019) concludes that there is mixed evidence for dynamic inefficiencies in OECD countries, using the findings of Abel et al. (1989) and his analysis of the U.S. economy. Any attempt to do test the Brazilian economy would be distorted by institutional idiosyncrasies, such as the difference between the public pension between government officials and public servants, and private sector members.

In sum, we may safely claim that the debt management in the world and, more specifically in Brazil does not follow any optimal fiscal policy model, evaluating long-term data. There is a sort of political economy model that attempts to explain rising government debt, as we will present some sequentially. Also, in the next session, we will discuss debt management in Brazil during the 2014-2018 period, aiming to show why there was a surge in non-credibility of the fiscal policy.

4.2. Political economy and fiscal policy

If there aren't any normative characteristics that lead to an optimal path of fiscal policy indicates that political forces are behind the determination of fiscal policy. Political models in general stress the notion that governments are short-sighted and tend to prefer short-term goals to maximize their gains during their mandates, in exchange for long-term goals that may be more beneficial for society. These models of spending based on short-term goals are important because the effects of rising debt and fiscal unsustainability are perennial.

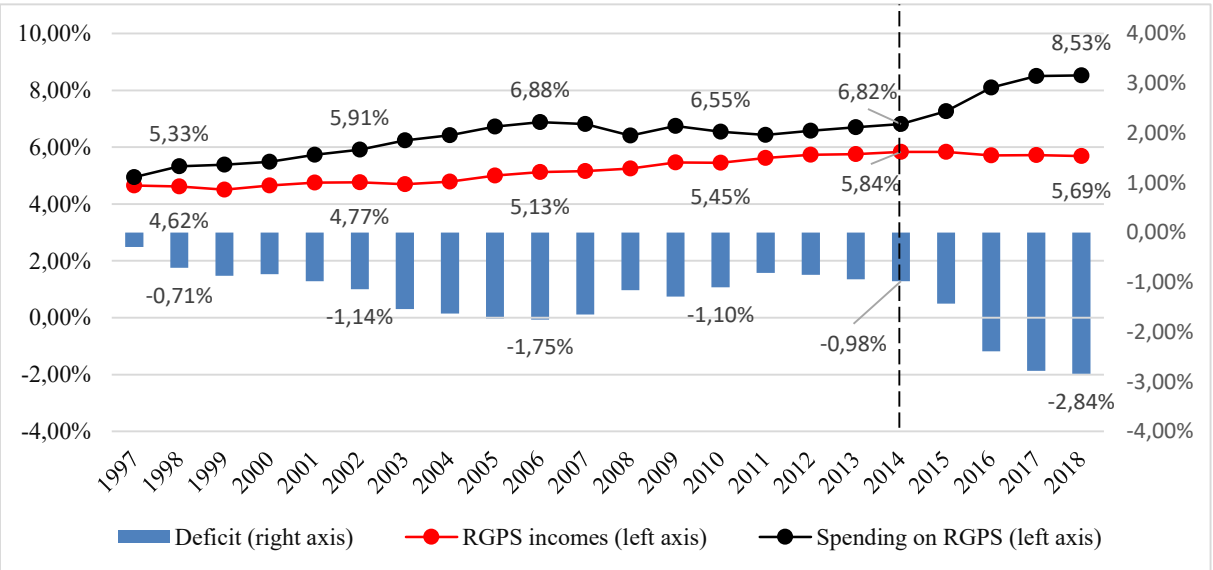
The literature on political economy models of debt is immense and in achieving canonical status in the economic mainstream. This kind of model is becoming a focus of

attention in Brazil, as Brazilian economists are slowly adopting *neoinstitutionalist*[10] tools and using inputs from political science in their analysis. We claim that this adoption is due to the more expound fracture of the political *status quo* after the 2014 election.

Yared (2019) proposes that these models, in general, deal with "aging population and heterogeneous discount, political polarization, and electoral uncertainty". Regarding Brazil, these three questions have become the primary focus of diatribes in the political and economic debate, which can be easily confirmed by a quick analysis of newspapers between 2014 and 2018.

The aging population is directly related to the Brazilian pension fund's weight on the deficit. The graph below shows the evolution of public pension and social assistance spending, then filtering for the evolution of the Brazilian public pension spending (RGPS), and finally, filtering for the public spending in retirements being for age limits, being for work time. And lastly, the demographic transition as analyzed by the Brazilian Senate fiscal watchdog (IFI)[11].

Graph X: Public spending on pensions and public assistance (minus public servants and officials)



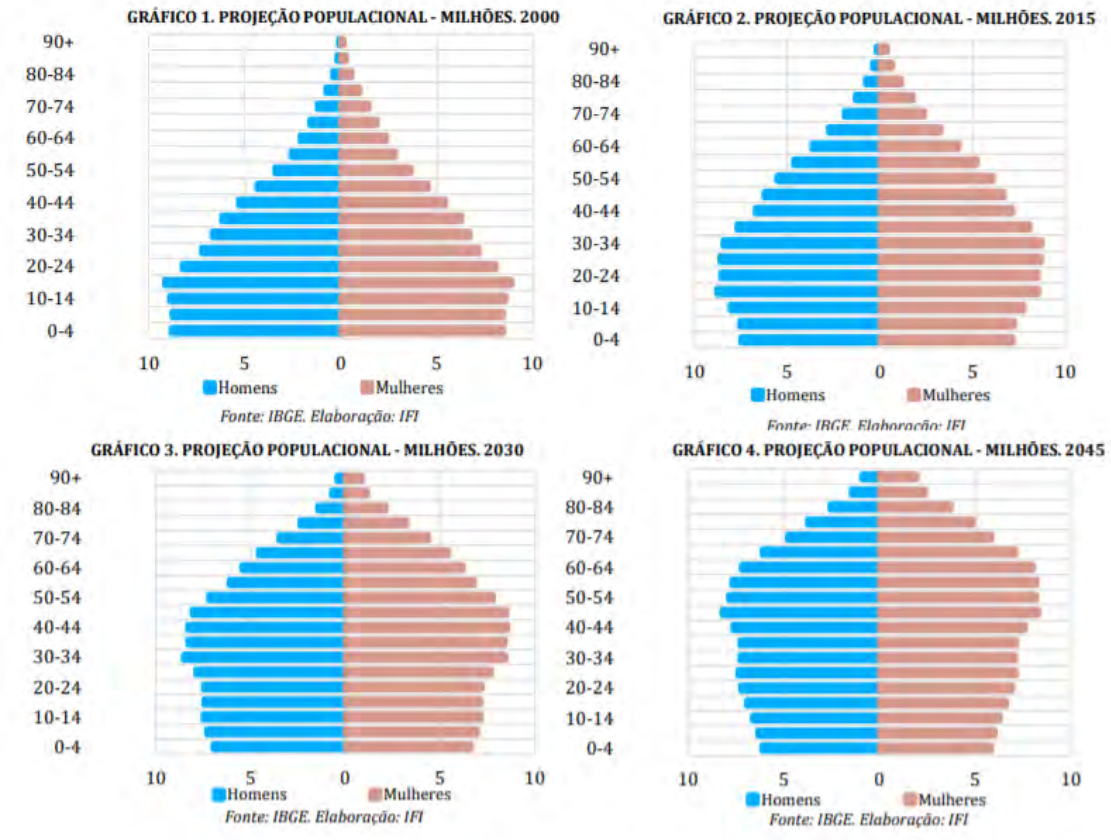
Source: https://www2.senado.leg.br/bdsf/bitstream/handle/id/554772/RAF26_MAR2019.pdf

[10] LIVRO MAILSON DA NOBREGA
[11] https://www2.senado.leg.br/bdsf/bitstream/handle/id/554772/RAF26_MAR2019.pdf

Graph X: Public spending on private retirements by age and work time

Source: https://www2.senado.leg.br/bdsf/bitstream/handle/id/554772/RAF26_MAR2019.pdf

Figure X: Demographic transition and aging of the population in Brazil, 2000-2045



Source: https://www2.senado.leg.br/bdsf/bitstream/handle/id/554772/RAF26_MAR2019.pdf

Spending on the RGPS system had become the largest driver of public debt in Brazil by 2018, starting to worry fiscal analysts by 2012-2013 (INSTITUIÇÃO FISCAL INDEPENDENTE, 2019). It must be remarked that the political economy type of models which deal with the aging effect is based on heterogeneous discounting, that is, old households who are more impatient are more politically relevant than younger who are more patient therefore the public spending is tilted towards them. While this is most certainly true, a simple proof would be the growth of retirement spending during a dire fiscal crisis between 2014 and 2017, or the size of spending in retirement *vis a vis* education spending there are additional political economy problems.

As previously seen in Graph X, public spending on work time retirements is larger than age retirements. Work time is based on the period of contribution, while age retirement is based on the minimum age to retire with public resources. In general, this is a class division, as workers in the formal market, who are paid more than the minimum wage, tend to contribute more and extract more resources from social security. On the other hand, poor workers, who are paid the minimum wage, or pushed into informality, less than the minimum wage, aren't able, in general, to meet the basic standards of the worktime system.

Therefore, this system enhances inequality naturally (BARBOSA et al. 2020). More importantly, this effect is enhanced during a fiscal crisis as the workers who were better paid during their lifetime are awarded more public resources. As Acemoglu and Robinson (2015) put it, the effect of inequality and elites capturing the political institutions tend to distort the macroeconomic performance and this is an example. The intense growth of spending during a fiscal crisis in retirements is an example, as the elites were thoroughly against cuts in social security, especially cuts which punished them more than poor workers.

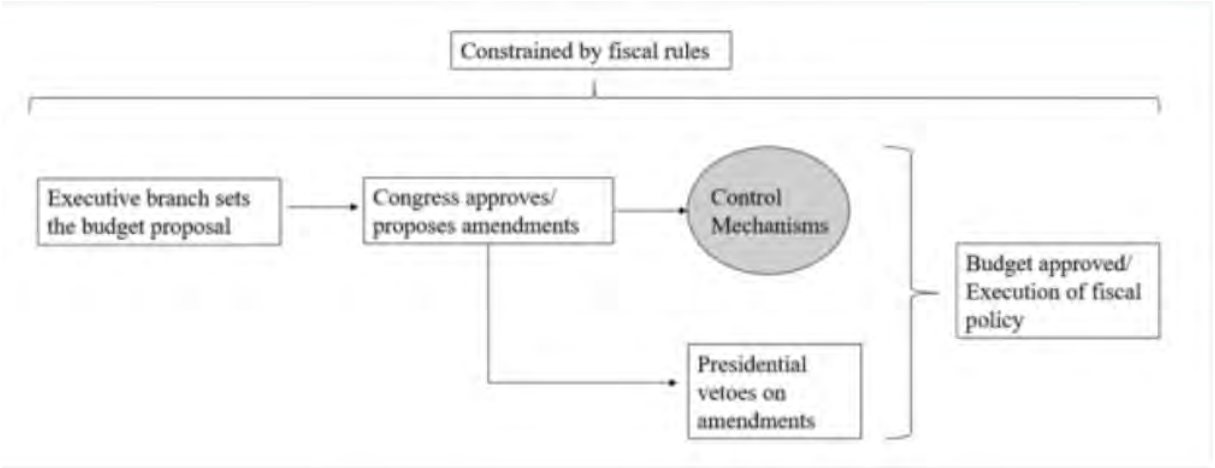
Furthermore, we have only dealt with spending in RGPS and not in public pensions of the public sector (the RPPS system). As Medeiros and Souza (2015) evaluate, by 2014 the difference between pension rules between public and private workers was already a significant driver in inequality. Spending in pensions for public servants is one of the larger drivers of public spending on federal, state, and municipal levels, but is also a dire source of budget rigidity as the institutions protect the public servants from having cuts in pensions and they have large lobbying powers in the Congress. And budget rigidity is a major source of fiscal problems taking the institutional design of macroeconomic policy in Brazil (SOUZA JUNIOR et al. 2018).

The second major theory deals with a tragedy of commons type of problem. As Yared (2019) summarizes, it is the cost of discoordination between parties when settling the budget. This theory predicts that countries with a large number of parties with chairs in Congress or deep disagreements in fiscal priorities across constituencies will lead to larger deficits. As parties must fight for their priorities and form coalitions, the number of policies in the budget will enlarge.

If polarization increases or if the number/power of extreme parties rises in the long-term there is also an increase of the deficits. This is due to the parties that converge to the center of the spectrum will have to double-bet their promises and policies aiming to curb the influence of the extremes/other sides. According to Yared (2019), this is a major force in explaining the long trend of debt growth in developed countries.

Regarding Brazil, it is a little bit more complicated. The Brazilian political system is usually characterized as a coalition presidential ever since the late eighties (ABRANCHES, 1988). Coalition presidential can be understood in the broader terms of coalition theory, and it has nothing special concerning other world experiences. In general, it follows a game where the president, usually, monopolizes legislative initiative and coalitions obey and are built according to party principles (LIMONGI, 2016). Regarding fiscal policy, it can be summed up like this:

Figure X: Budget setting game



Source: Author's elaboration

There is a large debate on where coalitions can develop a higher cost in amendments to the budget. Traditionally, there are two myths regarding the parliamentary relationship with the Executive branch while setting the budget in Brazil: the first one is that the Congress would distort the budget as members of the legislature would act aiming to pass its amendments or trying to favor its constituencies, sacrificing national policies in the process. The second is that members of the parliament would trade their votes for the execution of their private

amendments, sacrificing party consistency (FIGUEIREDO & LIMONGI, 2019).

The first problem with those myths is the very own rules of the game. These rules are heavily skewed to the executive, aiming to maintain the health of the presidential system. A good synthesis of this effect is present in Mueller and Pereira (2002): according to the authors, the executive has exclusive rights to initiate the annual budget. To legislators is reserved the right to amend the bill; however, those amendments must be constricted by "the multi-year budget plan elaborated by the executive as well as with the law on budgetary guidelines" (PEREIRA & MUELLER, 2002).

Furthermore, the executive is also favored by the fiscal rules in constraining the parliamentary moving space. For the executive, it is reserved the power to "determine which amendment will be appropriated, as the appropriation is contingent on the availability of resources in the national treasury" (PEREIRA & MUELLER, 2002). Pereira and Mueller (2002) argue that "those rules not only restrict congressional action but also enable the president to preserve at low costs its coalition inside Congress.". Furthermore, they posit that there was strong evidence that the president would reward or punish legislators by deciding to execute or not their amendment should they choose to support the executive or not.

This argument is also made by Figueiredo and Limongi (2002). And in fact, they show that not only "rules and regulations governing the budget process affect the distribution of funds both between branches of government and within the legislative branch itself" but, the Constitution and the rules preserve the original budget proposition by the executive. However, they also show that participation by the legislative branch in the budget process can only be understood when the political parties are taken into account. According to the authors, "partisan participation in the budget process depends on the parties' relations with the Executive" FIGUEIREDO & LIMONGI, 2002), which means that in the end, coordination games lead to the formation of two blocs: pro-administration and opposition. A natural conclusion of said works is that, in the general costs of governing, the legislative amendments are not a relevant one.

However, these works were devised by the end of the FHC governments, which, as we previously proposed, were a peak of institutional accommodation. If the amendment effect depends on the coalitions and the Presidential relationship with parties, it is necessary to evaluate said effect during a process of dispersion of congressional seats for more parties and the deterioration of the Congress and the executive.

Vasselai and Mignozetti (2014) test the effect of budget amendments in parliamentary behavior using time series ranging from 1996 to 2010, aiming to correct for the temporal effect.

The main objective is to investigate "whether the distance between the ideal points of congressmen and the appointments by the government chief whip in a given year are influenced by the execution of the budget amendments made by deputies" (VASSELAI & MIGNOZETTI, 2016). They use auto-regressive models correcting serial auto-correlation, aiming to evaluate the effect on the same year as well as on previous ones. In general, they do not find a relevant effect for individual legislators, however, they posit that using time-series elements opens for more gaps, which would indicate that voting behavior and the budget amendments have relationships open to study.

Figueiredo and Limongi (2019) evaluate that, by the end of our period of analysis, the political rules that constrained the legislators are the same. Not only the rites of budget same are the same, as, from FHC to Temer governments, but the budget setting process was also the same: presidential monopoly of setting the terms and starting the process and sustained through coalitions. Therefore, the coalition deterioration could affect the very nature of budget setting? This question remains to be answered conclusively. What we do know is that individual congressmen aren't able to "blackmail" the government into approving their amendments and that the budget setting game is based on the relationship between the president and the parties.

However, naturally, amendments aren't the only way that the relationship between Congress and the President is relevant to the fiscal deficits. The President has to accommodate the interests of congressmen and coalitions either through the legislative process, by not vetoing their bills and supporting their interests in their bills, or by appointing cabinet members.

Darrieux (2019) provides an analysis of the success of the FHC, Lula, and Dilma governments in setting their agenda in Congress through the success of their bills. They find evidence that the prerogatives of the president are of fundamental concern, "in light of the remarkable success of the presidents in approving provisional measures compared to ordinary laws, and administrative and especially budgetary matters in comparison to other types". This means that "institutionally strong presidents can carry out their projects through the strong agenda-setting powers they possess", and that the size of the coalition determinates the success rate of the executive, as they require less negotiation with the opposition.

This alone would be relevant for our analysis, as it would sustain that for the fiscal policy to pass as designed by the central government, it would require strong institutions. Even if Congress wouldn't be able to directly alter the budget, not only it could veto it its important bills, as the other legislative pieces would be at risk if the government did not negotiate.

Therefore, an institutionally strong president can pass a budget that is closer to an optimal, if we suppose that the central government desires an optimal path to fiscal policy (a

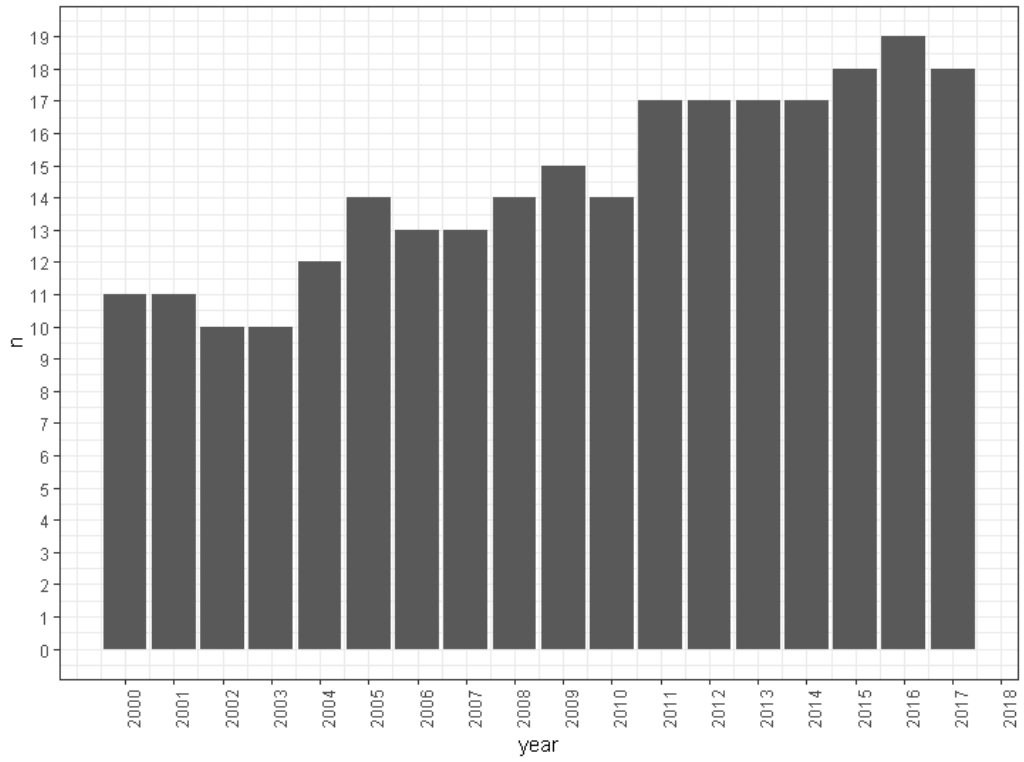
very strong hypothesis by itself). As seen in the graphs below, the legislative success rate of the governments started to decline by the end of the first Lula mandate. Regarding this, Darrieux (2019) proposes that "Lula and Rousseff had more ideologically heterogeneous coalitions than Cardoso, and this fact may have been fundamental in allowing greater space for bills originating from congress".

Another angle is the one proposed by Bertholini and Pereira (2017), which investigates the effects of a president's coalition management decisions on the costs of governing. Using principal component analysis, they build a Governing Costs Index (GCI) which takes into consideration financial and political transfers made by the president to coalition parties. Their findings indicate that large, ideologically heterogeneous coalitions (in line with Darrieux's (2019) findings), and disproportional and dysfunctional cabinets tend to be more expensive over time.

The authors also propose that presidential decisions about how to manage coalitions influence governing costs. This is valid even if controlling exogenous constraints like party fragmentation at the Congress and presidential popularity. Additionally, to crown the tragedy, spending more financial and political resources with coalition allies does not necessarily lead to greater political support for the president in Congress.

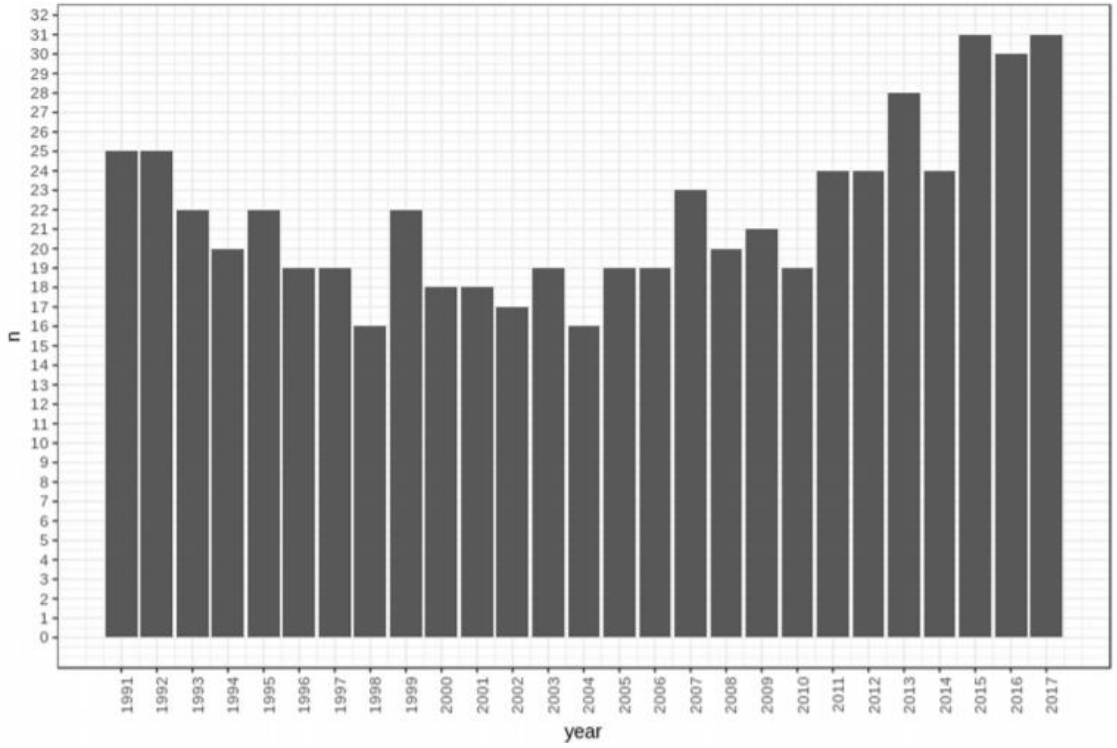
These findings in general corroborate Pierre Yared's point regarding polarization and fragmentation. However, the transmission mechanism is more complex than, for instance, in the USA where Congress has the power to alter 100% of the budget if so they wish. Furthermore, the coalition system allied with the fiscal rules and a large number of parties lead to more complex institutional dynamics. The graphs below show that from FHC to Dilma government, the number of parties has increased, as had the cost of governing, and the success rate of governments.

Graph X: Number of Parties in the Senate (2010-2018)



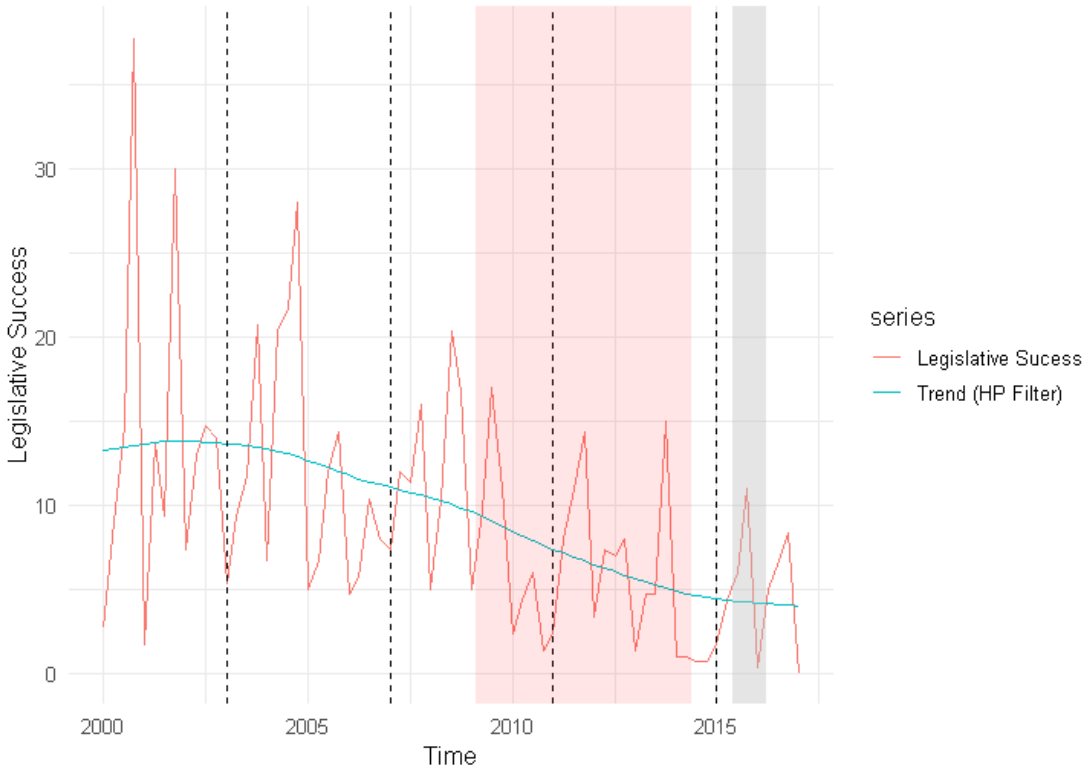
Source: Author's calculation using Brazilian Senate nominal votes and the congress by package developed by McDonnel et al. (2017).

Graph X: Number of Parties in the Chamber (2010-2018)



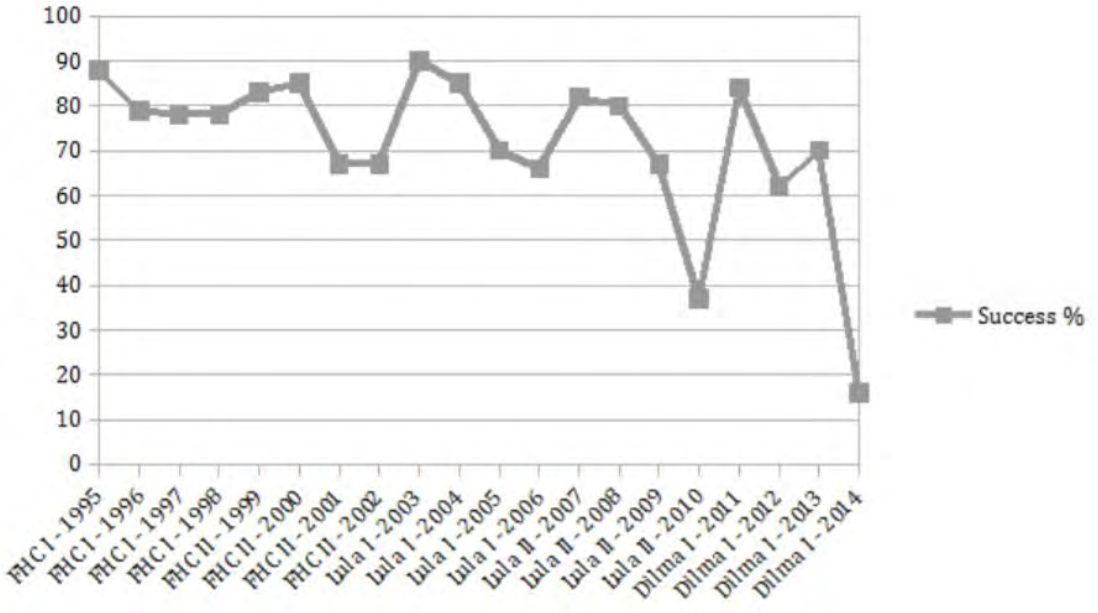
Source: McDonnell, Robert Myles, et al. 2019.

Graph X: Legislative Success (quarterly) (2000-2018)



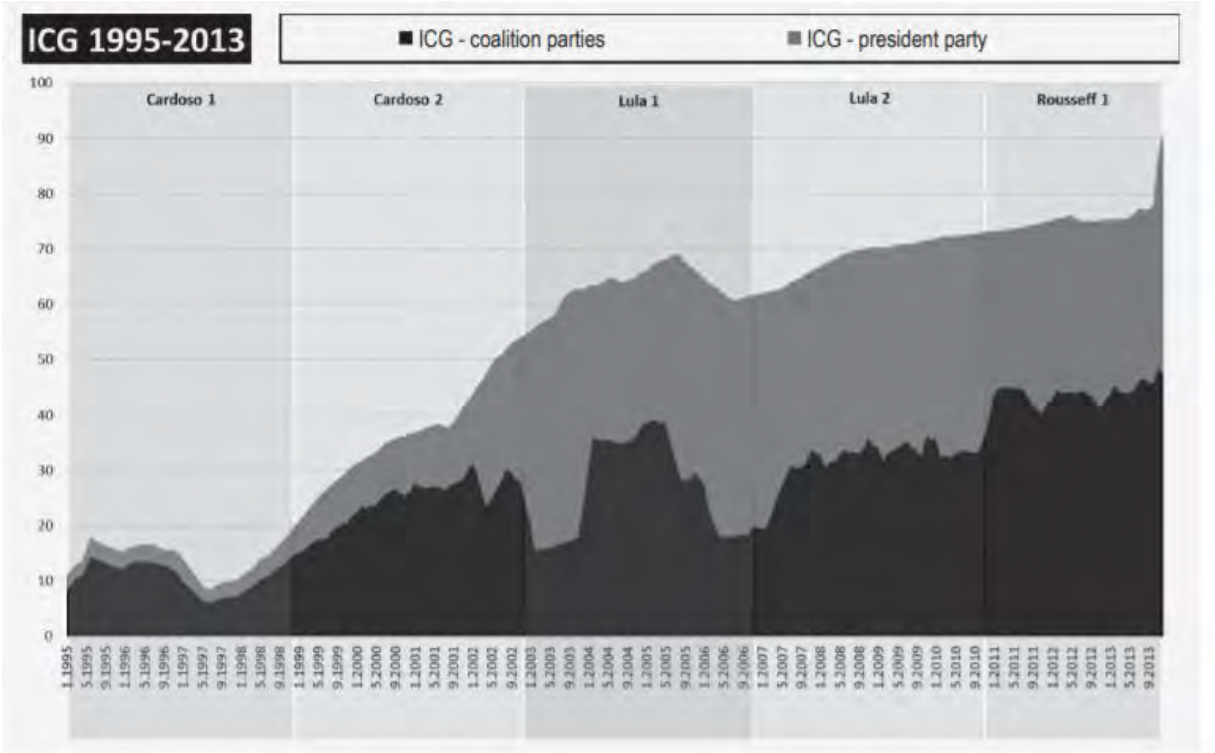
Source: Cebrap, considering law projects, executive orders, and budget bills that are approved

Figure X: Annual variation in the legislative success of the Executive (1995-2014)



Source: Darrieux (2019)

Figure X: Governing Costs Index (GCI), 1995-2013



Source: Bertholini & Pereira (2017)

A final type of theory proposed by Pierre Yared (2019) is models that evaluate the debt concerning political turnover. Surveying classic works from Torsten Persson, Lars E. O. Svensson, Alberto Alesina, Guido Tabellini but also from modern works from Battaglini, Coate, and Yared, he evaluates that political turnover affects the present bias of the government in two ways.

The first would be the temporary concentration of political authority in one political party. This party has additional benefits from spending while in power by boosting its popularity, concentrating government resources on preferred initiatives, such as heterodox policies, or increasing wasteful rents such as public sector pensions. The second would be "the inability of parties to make binding (intertemporal) commitments to one another" (YARED, 2019).

Those effects are derived from the fact that the party holding office would be more impatient as "present bias is more severe if the temporary benefits from spending and rent-seeking while in the office are large". This is enhanced if only a subset of parties can make decisions at a time (others don't have a relevant political party and have to follow the coalition lines) or political risk increases.

It is easy to see that this theory has high explanatory value to the debt dynamics in

Brazil. According to Yared (2019) "[t]his theory predicts that countries with more rent-seeking, political fragmentation, or political risk will incur larger government deficits, resulting in faster government debt accumulation." And this risk is increasing if the party accumulates subsequential mandates as the risk in turnover increases.

This theory can be seen in the context of declining margin rates of victory in presidential elections. Fernando Henrique Cardoso was reelected in the first turn of the 1998 elections with 53,06% of the votes; Lula was elected in 2002 with 61,27% of the votes[12] and was reelected with 60,83% of the votes in 2006; Dilma was elected in 2010 with 56,05% of the votes and was reelected with 51,64% in 2014, to be impeached in 2016. Furthermore, in our sample, the Worker's Party reigned for 14 out of 18 years (would be 16 if not for Dilma's impeachment in 2016).

As we can see, the surge in government debt can be explained more by political models than traditional macroeconomic models. Not only the bad choices of policies set in the first set of this monograph are relevant to explain the debt dynamics, but also the very own institutions and political nature of the party system in Brazil. However, it is fair to say that while the institutional deterioration is a relevant candidate in explaining the crisis of 2014-2016, it is also possible that the economic deterioration was relevant in accelerating the institutional crisis to its peak in the impeachment.

4.3. Credibility of fiscal policy: why it matters and how to achieve

If fiscal policy does not have an optimal trajectory, but is determined by the characteristics of the political system and the countries institutions, it is harder to mitigate the costs of debt in the long- term.

[12] We consider that FHC had a higher margin of victory in 1998 as he won in the first turn, with a difference of 20% of votes in relation to Lula, the second placed in the election.

Figure X: Fiscal Expectations Standard deviation

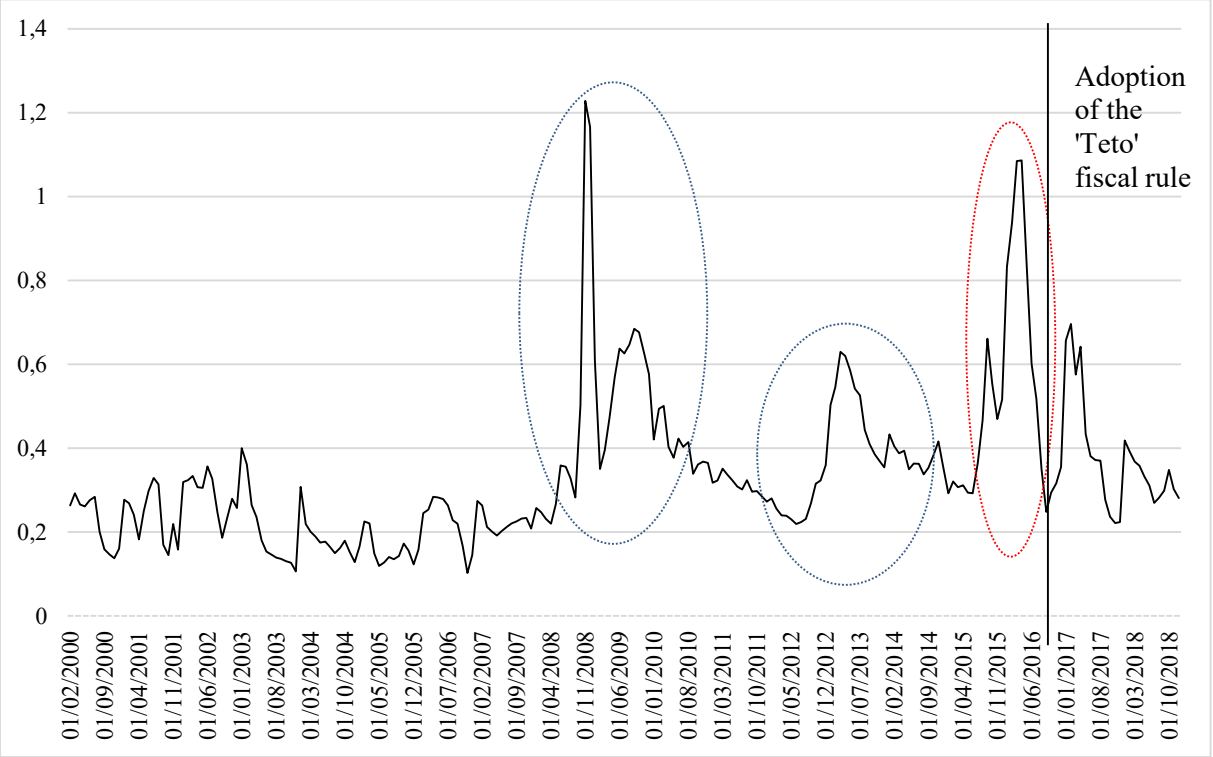


Figure X: Fiscal Expectations descriptive statistics

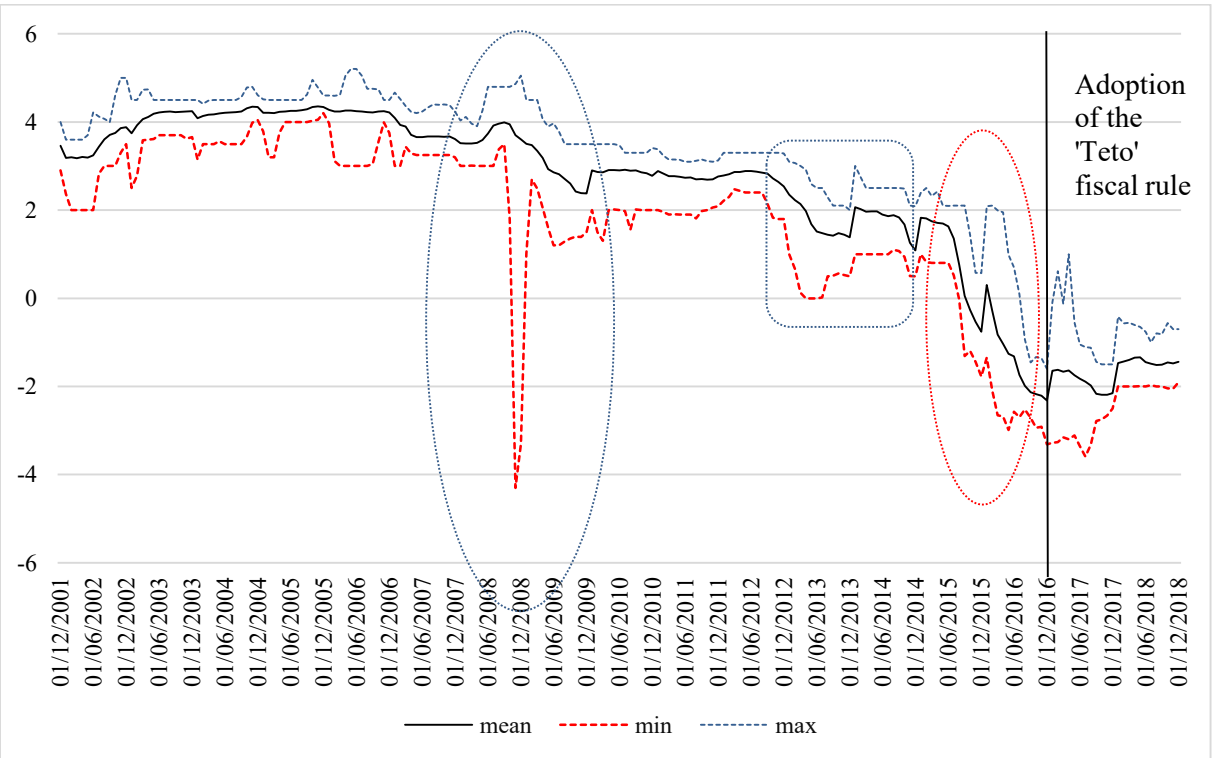


Figure X: Fiscal Credibility Gap full sample

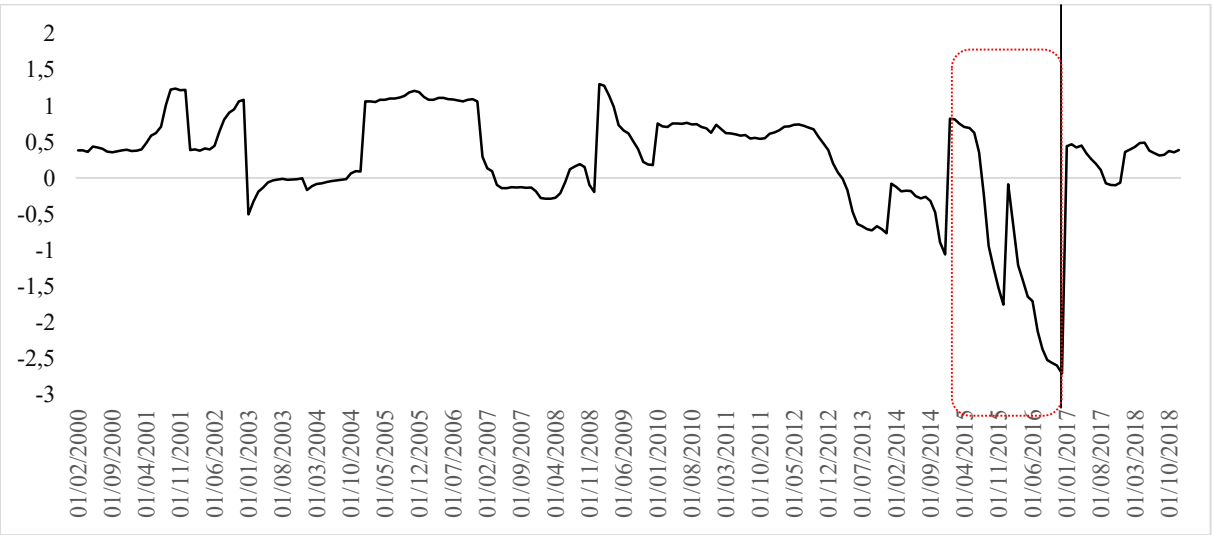
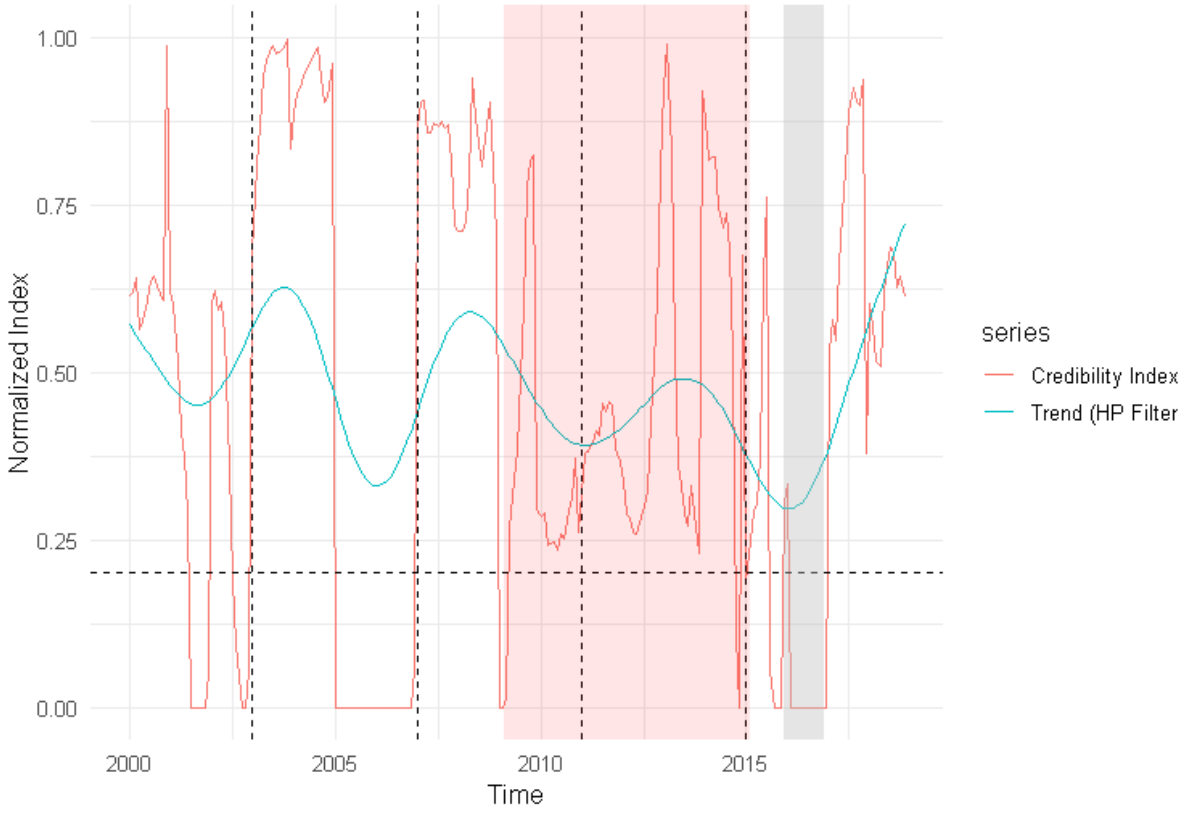


Figure X: Fiscal Credibility Index



5. Analytical Model

Our baseline model is a simplification of the medium-size semi-structural model used by the Brazilian Central Bank, based on works such as Bogdanski et al. (2000), which is described by the three equations as below:

$$y_t = \beta_0 + \beta_1 y_{t-1} - \beta_2(i_t - E(\pi_{t+1}) - r_t^*) + \beta_4 \varphi_{t-1} + \beta_5 b_{t-1} + \epsilon_t^d \quad \text{(I)}$$

$$\pi_t = \alpha_0 + \alpha_1 \pi_t^e + \alpha_2 \pi_{t-1} + \alpha_3 y_{t-1} + \alpha_4 \Delta\varepsilon_t + \epsilon_t^s \quad \text{(II)}$$

$$i_t = \gamma_0 + \gamma_1(r_{t-1}^* + \pi_{t-1}) + \gamma_2(\pi_t^e - \bar{\pi}) + \gamma_3 y_{t-1} + \gamma_4 \Delta\varepsilon_t + \epsilon_t^{BCB} \quad \text{(III)}$$

And, also, a parity condition equation.

$$\Delta\varepsilon_t = \theta_0 - \theta_1(i_t - i_1^*) + \theta_2 x_t + \epsilon_t^e \quad \text{(IV)}$$

Therefore, we have in (I) a IS Curve equation to represent the demand-side of the economy. The relevant variables start with y_t, which is the log deviation of the observed GDP from its long-term trend, as a proxy for the output gap. Furthermore, agents observe past output gaps.

We also allow for the monetary policy to have a role in shaping cycles. Therefore, if the ex-ante real interest rate- measured as the nominal interest rate discounted by the inflation expectations $(i_t - E(\pi_{t+1}))$ deviates from the neutral interest rate, there is an impact in the business cycle. Since Brazil is an export-led economy, the impact of a devaluation of the real rate of exchange in the previous period (φ_{t-1}) translates into a rise in exports, which impacts GDP growth, and, therefore future income. We also allow for fiscal policy to affect the GDP through b_{t-1} which is a measure of structural primary result (the evolution of government spending

We also allow for fiscal policy to affect the GDP through b_{t-1} which is a measure of the primary result. The primary result is defined as the evolution of the Government's primary expenses, minus the primary incomes, therefore we exclude interest on debt payment. Finally, ϵ_t^d is a measure of transitory demand shocks.

In equation II we model the supply side through a hybrid Phillips Curve. The hybrid nature comes from the fact that inflation is affected not only by the inflation expectations as in the traditional New Keynesian Phillips Curve model but also by an autoregressive component which translates into an inflation inertia effect. Prices in this model are also affected both by demand-led impacts through the internalization of the past output gap and supply shocks which are represented in ϵ_t^d.

As Brazil imports many of the goods which feature extensively in its consumer price index the exchange rates have a relevant role in inflation evolution. Furthermore, exchange rates also pressure inflation through importing costs from firms. Finally, we introduce a

measure of financial risk, ρ_t, which leads to inflationary pressures. This component captures the effect of having a staunch fiscal deterioration over the price-setting mechanisms. The Brazilian Central Bank (2020)[13] defines fiscal risk as a composition of the domestic nominal interest rate variation, the 5-year Brazilian CDS, the uncertainty of the economy measured through an index of confidence, and, finally, a commodity index in dollars, we will further augment this index to include institutional deterioration variables.

The Monetary Policy Rule, described in (III) is a Taylor-type policy rule, as such we have the reaction function based on the nominal interest rate in function of the past nominal interest rates and the past hiatus. But we introduce fiscal risk as a relevant variable too. Furthermore, regarding the Brazilian economy, $(\pi_t^e - \bar{\pi})$ describes the credibility of the monetary policy, as previously exposed, as it is the deviation of expectations from the central target.

Finally, we have the parity condition that defines the variation of the exchange rate. In (IV) we see that the exchange rate variation is defined by the difference between the domestic nominal interest rate and the foreign interest rate, but also defined by the premium risk.

[13] https://www.bcb.gov.br/content/ri/relatorioinflacao/202012/ri202012b9p.pdf

References and bibliography

ABEL, Andrew B., MANKIW, N. Gregory, SUMMERS, Lawrence H. ZECKHAUSER, Richard J. *Assessing Dynamic Efficiency: Theory and Evidence.* Review of Economic Studies, 56 pp.1-20. 1989

ABRANCHES, Sérgio. *Presidencialismo de coalizão: o dilema institucional brasileiro*. Dados - Revista de Ciências Sociais, Rio de Janeiro, v. 31, n. 1, p. 5-38, 1988

ALLEN, Nakesha & ROBINSON, James. *Monetary Policy Effects in a Regime Switching Model*. Bank of Jamaica Working Paper, July 2015

ALSTON, Lee J. MELO, Marcus André, MUELLER, Bernardo, PEREIRA, Carlos. *Brazil in Transition: Beliefs, Leadership, and Institutional Change*. Princeton: Princeton University Press. 259 pp. 2016

AYIAGARI, Rao S., MCGRATTAN, Ellen. *The Optimal Quantity of Debt.* Journal of Monetary Economics 42 (3), pps. 447-469. 1998

AZZIMONTI, Marina, DE FRANCISCO, Eva, QUADRINI, Vicenzo. *Financial Globalization, Inequality and the Rising Public Debt*. American Economic Review, 103(8) pp. 2267-2302. 2014.

AZZIMONTI, Marina, YARED, Pierre. *The Optimal Public and Private Provision of Safe Assets*. National Bureau of Economic Research Working Papers, No. 24534. 2018

BALL, Lawrence. *Another Look at Long-Run Money Demand*. National Bureau of Economics: NBER Working Paper 6597. 1998. pp.: 23

BARRO, Robert J. *Are Government Bonds Net Wealth?* Journal of Political Economy, n.: 82, November/ December, p.:1095-1118. 1974

BARRO, Robert J. *On the Determination of the Public Debt*. Journal of Political Economy, n.:87, vol.: 5, part.: 1, p.: 940-971. 1979

BARRO, Robert J. *Rules, discretion and reputation in a model of monetary policy*. Journal of Monetary Economics 12(1). Pps. 101-121. 1983

BEVILAQUA, Afonso & GARCIA, Márcio G.P. *Debt Management in Brazil: evaluation of the real plan and challenges ahead*. International Journal of Finance and Economics 15, pps. 15-35. 2002.

BLANCHARD, Olivier. *Public Debt and Low Interest Rates*. American Economic Review, 109 (4): 1197-1229. April 2019

BLANCHARD, Olivier. *Debt, Deficits, and Finite Horizons*. Journal of Political Economy, 93(2), pps. 223-247. 1985.

BLINDER, Alan, S. *Central-Bank Credibility: Why Do We Care? How Do We Build It?* American Economic Review, 90 (5): 1421-1431. 2000

BOMFIM, A. N.; RUDEBUSCH, G. D. *Opportunistic and deliberate disinflation under imperfect credibility*. Journal of Money, Credit and Banking, v. 32 (4). p. 707–721, 2000.

BONOMO, Marco; BRITTO, Ricardo D.; LAZZARINI, Sérgio. *Crédito Direcionado E Financiamento Do Desenvolvimento*. In: DE NEGRI, João Alberto; ARAÚJO, Bruno Cesar; BACELETTE, Ricardo. *Desafios da nação: artigos de apoio, volume 1*. Brasília: Ipea, 2018. Pp.631-661

BARBOSA, Rogério; FERREIRA DE SOUZA, Pedro; SOARES, Serguei. *Desigualdade de renda no Brasil de 2012 a 2019*. Blog DADOS, 2020 [published 16 July 2020]. Available from: http://dados.iesp.uerj.br/desigualdade-brasil/

BORDO, M. D.; SIKLOS, P. L. *Central bank credibility before and after the crisis. Open Economies Review*, Springer, p. 1–27, 2015.

BORDO, M. D.; SIKLOS, P. L. *Central Bank Credibility: An Historical and Quantitative Exploration*. NBER Working Paper No. 20824. 2015. 95 p.

BORDO, M. D.; SIKLOS, P. L. *Central Bank Credibility, Reputation and Inflation Targeting in Historical Perspective.* NBER Working Paper No. 20693. 2014. 98 p.

BRANDT, Michael W., BRAV, Alon, GRAHAM, John R., KUMAR, Alok. *The Idiosyncratic Volatility Puzzle: Time Trend or Speculative Episodes?* Review of Financial Sudies, 23(2), pp. 863-899. 2010

CAMPBELL, John Y., LETTAU, Martin, MALKIEL, Burton G. XU, Yexiao. *Have Individual Stocks Become More Volatile?: An Empirical Exploration of Idiosyncratic Risk* Journal of Finance, 56 (1). Pp.1-43. 2001

CARNEIRO, Dionísio Dias. *Crise E Esperança, 1974-1980* in ABREU, Marcelo de Paiva (org.) *A Ordem do Progresso: Dois Séculos de Política Econômica no Brasil*. Rio de Janeiro: Elsevier, 2014 pps. 241-262

CARNEIRO, Dionísio Dias, MODIANO, Eduardo Marco. *Ajuste Externo E Desequilíbrio Interno, 1980-1984* in ABREU, Marcelo de Paiva (org.) *A Ordem do Progresso: Dois Séculos de Política Econômica no Brasil*. Rio de Janeiro: Elsevier, 2014 pps. 263-280.

CARVALHO, Carlos and NECHIO, Fernanda. Do *People Understand Monetary Policy?* (April 11, 2014). Available at SSRN: https://ssrn.com/abstract=1984321 or http://dx.doi.org/10.2139/ssrn.1984321

CECHETTI, S.G., KRAUSE, S., 2002. *Central bank structure, policy efficiency, and macroeconomic performance: Exploring empirical relationships*. Federal Reserve Bank of St. Louis Econ. Rev. 84(4), 47-59.

CHERRIER, Beatrice, & BACKHOUSE, Roger. *The Ordinary Business of Macroeconometric Modeling: Working on the Fed-mit-penn Model (1964-1974).* SocArXiv, 15 Oct. 2018. Web. Available at: https://osf.io/preprints/socarxiv/39xkz/

CUKIERMAN, A.; MELTZER, A. H. *A theory of ambiguity, credibility, and inflation under discretion and asymmetric information*. Econometrica, 54 (5), p. 1099–1128, 1986

CUNHA, Paulo Vieira. *A Nova Matriz Econômica e a Política Monetária no Brasil entre 2011 e 2014*. In CARVALHO, José Carlos; OLIVEIRA FILHO, Luis Chrysostomo de; MALAN, Pedro S.; BONELLI, Régis (orgs.) *De Belíndia ao Real: ensaios em homenagem a Edmar Bacha*. Rio de Janeiro: Civilização Brasileira, 2018. 516 p.: 153-195.

DARRIEUX, Rodolfo. *Political Institutions and the Legislative Success of Brazilian Presidents: an Analysis of the Cardoso, Lula and Rousseff Governments* http://dx.doi.org/10.1590/1981-3821201900010004. Brazilian Political Science Review [online]. 2019, v. 13, n. 1. 2019

DEBORTOLI, Davide & LADKAWELA, Aeimit. *How Credible is the Federal Reserve? A Structural Estimation of Policy Re-optimizations*. American Economic Journal: Macreoconomics, 8(3): pp.42-76. 2016

DIAMOND, Peter A. *National Debt in Neoclassical Growth Model*. American Economic Review, 55(5), pp.1126-1150. 1965

ENDERS, Walter. *Applied Econometric Time Series*, 3rd edition. New York: 4th edition, Wiley, 2014.

ENGEN, Eric, HUBBARD, R. Glenn. *Federal Government Debts and Interest Rates*. National Bureau of Economic Research Working Papers, Wp 10681. Pp.71, 2004

FIGUEIREDO, Argelina Cheibub e LIMONGI, Fernando. *Incentivos Eleitorais, Partidos e Política Orçamentária*. Dados, v. 45, n. 2, pp. 303-344. 2002

FIGUEIREDO, Argelina Cheibub e LIMONGI, Fernando. *Política Orçamentária no Congresso Nacional: ontem e hoje*. Blog DADOS, 2019 [published Sep 2019]. Available from: http://dados.iesp.uerj.br/politica-orcamentaria-no-congresso-nacional-ontem-e-hoje/

HANSEN, Bruce E. *Threshold autoregression in economics*. Statistics and Its Interface, 2011, Vol. 4, pp. 123-127

AYRES, João, GARCIA, Márcio, GUILLÉN, Diogo, KEHOE, Patrick. *The Fiscal and Monetary History of Brazil: 1960–2016.* Chicago : BFI WORKING PAPER•AUG 23, 2018, 63 pps.

GUILLÉN, Diogo e GARCIA, Márcio *Expectativas desagregadas, credibilidade do Banco Central e Cadeias de Markov*. Revista Brasileira de Economia. 2014, v. 68, n. 2, pp. 197-223. 2014.

LOWENKRON, Alexandre & GARCIA, Marcio Gomes Pinto. *Monetary policy credibility and inflation risk premium: a model with application to Brazilian data*, Textos para discussão 543, Department of Economics PUC-Rio (Brazil). 2007

HOLMSTROM, Bengt, TIROLE, Jean. *Private and Public Supply of Liquidity*. Journal of Political Economy, 106 (1) pp. 1-40. 1998.

HEMMATY, Maryam, JALALI-NAINI, Ahmad R. *Threshold Effects in the Monetary Policy Reaction Function: Evidence from Central Bank of Iran*. Journal of Money and Economy. Vol 8, No.1, Winter 2013

FRAGA, Armínio. *Sobre a relação entre os regimes fiscal e monetário no Brasil*. . In: BACHA, Edmar (org.) *A Crise Fiscal e Monetária Brasileira: Ensaios em Homenagem a Fabio Barbosa de Oliveira*. Rio de Janeiro: Editora Civilização, 2016. pp. 193-202.

FRISCHTAK, Cláudio; CAETANO LEITE, João Gabriel; DINIZ, Gabriela; MOURÂO, João F. *Privatização na Infraestrutura: O que Falta Fazer?* Brasília: Confederação Nacional da Indústria, 2018. pps. 48. In: CNI: *Propostas da indústria*

eleições 2018 ; v. 20

GARCIA, Márcio G.P. *Public Debt Management, Monetary Policy and Financial Institutions*. Rio de Janeiro: PUC-Rio, Texto Para Discussão 464, 2002

GOBETTI, Sérgio Wulff & ORAIR, Rodrigo Octávio. *Resultado Primário E Contabilidade Criativa: Reconstruindo As Estatísticas Fiscais "Acima Da Linha" Do Governo Geral*. Texto para discussão 2288. Instituto de Pesquisa Econômica Aplicada.- Brasília : Rio de Janeiro: Ipea. 58 pp.

GUILLÉN, Diogo, GARCIA, Márcio. *Expectativas desagregadas, credibilidade do Banco Central, e Cadeias de Markov*. Rev. Bras. Econ. 68(2), 197-223, 2014

GUNVENEN, Faith, OZKHAN, Serdar, SONG, Jae. *The Nature of Countercyclical Income Risk*. Journal of Political Economy, 122(3) pp. 621-660. 2014

ISSLER, João V. & SOARES, Ana F. *Central Bank Credibility and Inflation Expectations: A Microfounded Forecasting Approach.* FGV, Feb 2019

KING, Mervyn. *Credibility and Monetary Policy*: Theory and Evidence. Scottish Journal of Political Economy. Vol. 42 (1). 1995 19 pps.

KYDLAND, F.E. & PRESCOTT, E.C. *Rules Rather than Discretion: The Inconsistency of Optimal Plans*. Journal of Political Economy, n.85, vol.3, p.473-492. 1977.

LAIBSON, David. *Golden Eggs and Hyperbolic Discounting*. Quarterly Journal of Economics, 112 (2), pp. 443-478. 1997

LIMONGI, Fernando A. *democracia no Brasil: presidencialismo, coalizão partidária e processo decisório*. Novos estudos CEBRAP [online]. 2006, n. 76. pp. 17-41. Disponível em: <https://doi.org/10.1590/S0101-33002006000300002>. Epub 16 Feb 2007

LUCAS Jr., Robert E. *Expectations and the Neutrality of Money*. Journal of Economic Theory, n.:4, p.: 103-124. 1972

LUCAS Jr, Robert E., STOKEY, Nancy L. *Optimal Fiscal and Monetary Policy in a Economy Without Capital*. Journal of Monetary Economics 12, 710-727, 1983

MANKIW, N. Gregory *The Savers-Spenders Theory of Fiscal Policy*. American Economic Review, 90 (2) pp. 120-125. 2000

MCCALLUM, Bennett T. *Credibility and Monetary Policy*. NBER Working Paper

No. 1490, 1984. 44 pp.

MCDONNELL, Robert Myles; DUARTE Guilherme Jardim; FREIRE, Danilo. *congressbr: Downloads, Unpacks and Tidies Legislative Data from the Brazilian Federal Senate and Chamber of Deputies*. R package version 0.1.0. 2017 https://CRAN.R-project.org/package=congressbr

MEDEIROS, Marcelo e SOUZA, Pedro H. G. F. *Previdências dos trabalhadores dos setores público e privado e desigualdade no Brasil. Economia Aplicada* [online]. 2014, v. 18, n. 4 [Acessado 2 Julho 2021], pp. 603-623. Disponível em: <https://doi.org/10.1590/1413-8050/EA344>. Epub 03 Fev 2015

MENDONÇA, Hélder.F. *Mensurando a credibilidade do regime de metas inflacionárias no Brasil.* Rev. Econ. Política 24(3), 344-350. 2004

MENDONÇA, Hélder.F., SOUZA, G.J.G. *Inflation targeting credibility and reputation: The consequences for the interest rate*. Econ. Model. 26, p.: 1228-1238. 2009

MONTES, Gabriel C. *Reputation, credibility and monetary policy effectiveness*. Estudos Econômicos, 39(3) Sept. 2009

MOURA, Alkimar R. *Notas Sobre a Independência Operacional e a Supervisão Bancária do Banco Central*. In: BACHA, Edmar (org.) *A Crise Fiscal e Monetária Brasileira: Ensaios em Homenagem a Fabio Barbosa de Oliveira*. Rio de Janeiro: Editora Civilização, 2016. pp. 87-98.

MUTH, John F. *Rational Expectations and the Theory of Price Movements*. Econometrica, n.: 29, July, p.: 315-335. 1977

NAHON, B. F., MEURER, R *Measuring Brazilian Central Bank credibility under inflation targeting*. International Research Journal of Finance and Economics 27, 2009. pp. 72-81.

NORTH, Douglass Cecil. *Institutions, Institutional Change and Economic Performance*. First Edition. New York: Cambridge University Press. 1990, 152 Ps.

NORTH, Douglass C. and WEINGAST, Barry R. *Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England* The Journal of Economic History Vol. 49, No. 4 (Dec., 1989), pp. 803-832

PASTORE, Afonso Celso. *Senhoriagem e Inflação: O Caso Brasileiro*. Rio de Janeiro: FGV/ Centro de Estudos para Reforma do Estado. Texto para Discussão 5.

1997. pp.37

PASTORE, Afonso Celso. *A Crise Fiscal e Monetária Brasileira: Três Episódios*. In CARVALHO, José Carlos; OLIVEIRA FILHO, Luis Chrysostomo de; MALAN, Pedro S.; BONELLI, Régis (orgs.) *De Belíndia ao Real: ensaios em homenagem a Edmar Bacha*. Rio de Janeiro: Civilização Brasileira, 2018. 516 p.: 113-134.

PAZARBASIOGLU, C. et al. Brazil financial intermediation costs and credit allocation. Finance & Markets Global Practice, 2017

PHELPS, E.S., POLLAK, R.A. *On Second-Best National Saving and Game-Equilibrium Growth*. Review of Economic Studies, 35(2). pp.185-199. 1968

PEREIRA, Carlos e MUELLER, Bernardo. *Comportamento Estratégico em Presidencialismo de Coalizão: As Relações entre Executivo e Legislativo na Elaboração do Orçamento Brasileiro*. Dados, v. 45, n. 2 pp. 265-301. 2002.

RUGE-MURCIA, Francisco J. *Credibility and Changes in Policy Regimes*. Journal of Political Economy, Vol 103(1), Feb. pp. 176-208. 1995

RUDEBUSCH, Glenn D. & WILLIAMS, John C. *Revealing the secrets of the temple: The value of publishing central bank interest rate projections.* In *Asset Prices and Monetary Policy.* University of Chicago Press, p.:247-289. 2008

SABLEHAUS, John, SONG, Jae. *The Great Moderation in Micro Labor Earnings*. Journal of Monetary Economics, 57, pps. 391-403. 2010

SCREPANTI, Ernesto & ZAMAGNI, Stefano. *An Outline of the History of Economic Thought*. Oxford: Oxford University Press, p.: 1. 2005.

SVENSSON, L. E. *How should monetary policy be conducted in an era of price stability?* 2000.

SICSÚ, João. *Expectativas inflacionárias no regime de metas de inflação: Uma análise preliminar do caso Brasileiro* Econ. Apl. 6(4), 703-711. 2002

SVENSSON, Lars E. O. *Optimal Inflation Targets 'Conservative' Central Banks and Linear Inflation Contracts*. Cambridge: National Bureau of Economic Research Working Paper 5251, September 1995.

SVENSSON, Lars E. O. *The simplest test of inflation target credibility*. NBER Working Paper No. 4604. 1993. 16 p.

SVENSSON, Lars E. O. *How Should Monetary Policy be Conducted in an Era of*

Price Stability? NBER Working Papers 7516. 2000 53 p.

SOUZA JÚNIOR, José Ronaldo de Castro; CAVALCANTI, Marco Antônio F.H.; LEVY, Paulo Mansur. Regime Fiscal Para o Crescimento Sustentado. In: DE NEGRI, João Alberto; ARAÚJO, Bruno Cesar; BACELETTE, Ricardo. Desafios da nação: artigos de apoio, volume 1. Brasília: Ipea, 2018. pp.:159-177.

VAL, Flavio de Freitas; GAGLIANONE, Wagner Piazza; KLOTZLE, Marcelo Cabus; PINTO, Antonio Carlos Figueiredo. Estimating the Credibility of Brazilian Monetary Policy using Forward Measures and a State-Space Model. Brasília: BCB Working Paper Series no. 463, 2017. pps. 37.

VASSELAI, Fabricio e MIGNOZZETTI, Umberto G.O *Efeito das Emendas ao Orçamento no Comportamento Parlamentar e a Dimensão Temporal: Velhas Teses, Novos Testes*. Dados, v. 57, n. 3, pp. 817-853. 2014

DE VROEY, Michel. A History of Macroeconomics from Keynes to Lucas and Beyond, Cambridge: Cambridge University Press, 2016, 445 pages

YARED, Pierre. Rising Government Debt: Causes and Solutions for a Decades-Old Trend. 2019. Journal of Economic Perspectives, 33, (2). pp. 115–140. 2019

WERNECK, Rogério Furquim Ladeira. Consolidação da Estabilização e Reconstrução Institucional, 1995-2002 in ABREU, Marcelo de Paiva, A ordem do progresso: dois séculos de política econômica no Brasil. Rio de Janeiro: Elsevier, 2nd edition, pp. 331-356, 2014

WOODFORD, Michael. Public Debt as private Liquidity. American Economic Review, 80 (2), pp. 382-388. 1990

WOODFORD, Michael. Control of the Public Debt: A Requirement for Price Stability? National Bureau of Economic Research: NBER Working Papers No. 5684. 1996.