PONTÍFICIA 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: Yvan Beccard

Dezembro, 2021

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João Gabriel Caetano Leite

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

Acknowledgments

Agradeço aos meus pais sem os quais nada teria no mundo. À minha mãe por ser minha eterna amiga e confidente e ao meu pai por ser o maior exemplo que posso seguir. Agradeço também ao meu irmão, por me aturar todos estes anos.

Agradeço ao meu orientador Yvan Béccard por todos os conselhos, o auxílio e, em especial, pela sua compreensão com os desafios e entraves na confecção desta monografia. Agradeço imensamente à PUC Rio pelo auxílio e bolsa, e ao departamento de economia que proveu a melhor formação que alguém poderia desejar, em especial aos professores Márcio Garcia, Marcelo de Paiva Abreu, Gustavo Gonzaga, José Márcio Camargo, Ortega, Eduardo Zilberman, Sérgio Besserman Rogério Werneck, Juliano Assunção, Marco Antonio Cavalcanti entre outros pela inspiração e aprendizado.

Agradeço a todos os meus amigos que fizeram a experiência de estudar na PUC inestimável. Seria impossível enumerar e citar todos, mas devo agradecer em especial a Henrique Mota, Bernardo Fernandes, Rodrigo Armando, Enzo Fischer, Rodrigo Moura, Gabriel Cecilio, Maria Luiza Teixeira Leite, João Mourão, Victor Sattamini, Maria Carol Soares, e tantos os outros sem o qual o Pilotis não teria 1% da graça.

Agradeço principalmente a Oxalufã que guia e protege minha cabeça, me levantando quando caio e me colocando no meu caminho apesar de todas as adversidades. Agradeço a todos os orixás por iluminar a minha vida.

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. 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 VARX model

Keywords: Credibility; Monetary Policy; Fiscal Policy.

Contents

1. Introduction

By the beginning of 2010s, Brazil was widely recognized as a development success case. Widely recognized by its macroeconomic performance while controlling inflation by the last fifteen years- a huge victory considering the scars of the eighties and nineties- and reducing inequality, expanding education and health covering, reducing inequality, and promoting even major ecological advancements. This would drastically change in the following decades, in fact, the 2010s can be considered a lost decade.

In this work we aim to evaluate the role of institutional deterioration as perceived by market agents on the building of the crisis. Credibility is dependent on the notion that agents expect that government will provide what it is promised, either by political compromise or goals set in rules. As Mian et al (2021) show, expectations do suffer from partisan bias and are dependent on the perception of the political background.

The notion that institutions shape and directly affect macroeconomic volatility is not exactly new. Acemoglu et al. (2003) shows that "countries pursuing poor macroeconomic policies also have weak ''institutions,'' including political institutions that do not constrain politicians and political elites, (…), widespread corruption, and a high degree of political instability." Therefore, institutional deterioration is correlated and may even cause macroeconomic policy deterioration.

Our hypothesis is that agents are not blind to this process, and it is reflected in their expectations. Brazil has one of the best expectations surveys on the world, the FOCUS survey held weekly by the Brazilian Central Bank, and we use it to measure agents' credibility of fiscal and monetary policy. Then we use it to evaluate the role of the credibility of fiscal and monetary policies in the business cycles and macroeconomic performance.

This work also climbs on the back of the extensive literature on monetary policy credibility in Brazil, extensively reviewed here. Furthermore, it is closely related to works such as Montes and Acar (2020), Montes et al. (2019), Sa Earp (2019 and Lucena (2018).

This monograph is divided in five chapters. The first evaluates the institutional background that led to the crisis, the second reviews the literature on monetary credibility, the third analyzes the origins of debt, the conduction of fiscal policy as a problem of political economy and fiscal credibility, the fourth presents a simple analytical model and finally the fifth develops the VARX model.

2. Institutional background

2.1. Golden Years: Institutional Building, development and credibility

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 "Citizen 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. Regarding 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 literature on the role of rational expectations and credibility, as some of the major economists in Brazil were quickly incorporating it, such as Mario Henrique Simonsen (1980), André Lara Resende (1983)[2] and Gustavo Franco (1987). Lara Resende and Franco famously would be some of the "fathers" of the Real Plan.

As the Real Plan crushed hyperinflation by 1995, Fernando Henrique Cardoso had an open field to develop a government plan. It is fair to say that FHC governments were the first to administrate the country while having to ponder the goals set in the Constitution. While the Constitution was formally introduced by the end of 1988, the major challenge of the country was how to deal with hyperinflation, furthermore, Fernando Collor de Mello -the first directly

[2] Marco Bonomo (2018) shows how the eclectic influences of Brazilian structuralist traditions, and the influences of the mainstream frontier economic thought of MIT, Yale and Harvard shaped the inertial inflation theory developed at PUC Rio in the 1980s and how it can be integrated with modern macroeconomic theory

elected president in thirty years in Brazil- was impeached in 1992 after corruption allegations and a major loss of popularity due to the failure in dealing with the economic crisis.

As such, the new government of FHC had set many goals for the development. Not only progressing with the Real Plan agenda, but also modernizing the economy with major regulation changes and privatizations (FRISCHTAK et al. 2018) and developing major social programs such as FUNCEF and Bolsa Escola.

However, FHC's government had some major challenges as well. The first one was a banking crisis in 1995 after the end of the hyperinflation which led to the failure of some public and private banks, one of the main reasons of the failure was "the fall in inflation led to a fall in seigniorage-like revenues (the float) that were partially captured by these banks" (AYRES et al., 2018), furthermore, Brazil did suffer the contagion of international shocks such as the 1997 Asian financial crisis and 1998 Russian financial crisis which required the intervention of the IMF.

This led to major innovations in monetary and fiscal policy framework. The first one was the adoption of the floating exchange rates and inflation targeting in 1999, and the second one the adoption of the "Lei de Responsabilidade Fiscal" (Fiscal Responsibility Law, or FRL) in 2000. The FRL changed the whole fiscal framework of Brazil, setting spending limits with personnel for subnational entities, and other policies, but for the sake of this work we will focus on the transparency and fiscal targets.

According to the FRL, the government was now obliged to provide annual directions to the fiscal policy. As such the economic team of the government should propose the Lei de Diretrizes Orçamentárias (LDO), a law project where all the technical considerations and assumptions for the budget setting and planning should be exposed, and in its annexes, the government should set an annual primary budget target, in this paper we use this target as the effective fiscal target of the government because the government is obliged by law to follow it with risks of judicial measures (including impeachment) should it fail sequentially. The LDO is the technical basis for the budget proposal sent to the congress.

Those reforms were the basis of the new macroeconomic policy framework known as the "Tripé Macroeconômico" (Macroeconomic Trilemma) composed of the compromise to achieve primary surpluses or fiscal responsibility, floating exchange rates and commitment to inflation targeting. This system would usher macroeconomic stability for the next decade but was challenged in between 2000 and 2002 by some shocks, such as the Dot Com Bubble, the Argentinean Crisis, major energy production problems which led to inflationary shocks and most importantly the so called "Lula Effect".

As aforementioned, the end of the second mandate of FHC was met with some major economic shocks, which led to inflation and unemployment. This helped Luís Inácio Lula da Silva to advance largely in the polls. Lula was a former union leader and the candidate of the Workers Party (PT), which is the largest left-wing party in the Americas. He was the presidential candidate of PT in the 1989, 1994 and 1998 elections, and his agenda traditionally was made of promises of nationalization, minimum wages hikes, urban and rural reforms, advancement of social protection networks and the reversal of the "neoliberal" macroeconomic agenda of FHC.

As such, as soon as it became clear that Lula would win the elections, there was a major capital flight out of Brazil. Brazilian debt was largely international, so major exchange rate shocks represented fiscal and monetary shocks in Brazil which led to the inefficacy of curbing inflation with interest rates. This case was so emblematic that some of the leading economists of the world were debating if Brazil was facing a Fiscal Dominance case, such as Olivier Blanchard (2005) or a Credibility shock, such as Carlo Favero and Francesco Giavazzi (2004).

As it seems, the credibility theory was the hypothesis that won the debate. Lula by the end of 2002 had compromised in maintaining the Tripé Macroeconômico as a guideline, and chose Henrique Meirelles, a major financier and president of BankBoston to be the president of the Brazilian Central Bank. As Graph 1 shows, this led to a stability and anchoring of market inflation expectations.

Lula's first mandate was in many ways virtuous in its macroeconomic policies. He largely kept its promise to keep FHC macroeconomic framework which led to stability and growth, furthermore he dutifully enhanced the previous social policies and developed new ones such as the world famous Bolsa Família. In fact, 2004-2008 were the best in terms of macroeconomic performance in Brazil for the 1960-2016 period (AYRES et al, 2018).

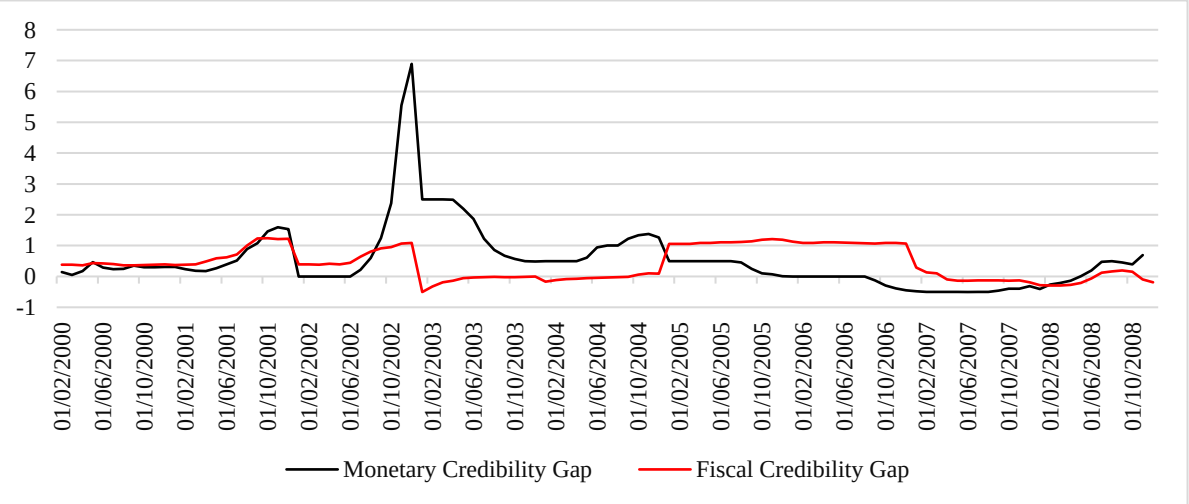
In terms of macroeconomic performance, it was a golden age for Brazil. The adoption of sound policies and the blessings of an outstanding commodity boom led to a period characterized by fiscal surpluses, with an average 3.1% primary surplus in relation to GDP, roughly the same average as the previous two mandates of FHC, but with better nominal results as the interest rates were lower, furthermore, the public debt was internalized as it became national, and the external debt was paid (CUNHA, 2018). It was also characterized by "high growth rates of real GDP per capita, current account surpluses, an expansion of international trade, a reduction of the public external debt and the accumulation of international reserves, and the consolidation of the inflation-targeting regime that had been adopted in 1999" (AYRES et al. 2018).

As exposed by Aranches and Couto (2018), the very own notion of an *originalist* interpretation of Brazilian 1988 Constitution makes no sense at all. The Brazilian Constitution is immense, and has many articles related to policy, furthermore it is frequently amended. As such, it is a living body of regulation and governments usually face the necessity of reforming it through amendments.

In terms of an institutional framework this poses a challenge, as the Constitution is an infant body of regulation (this work covers a period that ends with its thirtieth anniversary). However, as North (1990) posits, as an institution is itself a rule of the game. In general terms, the macroeconomic framework for the 2000-2009 period was the provision of public goods aiming to provide access and citizenship for most of the population, while being constrained by the FRL and keeping the macroeconomic stability through an inflation target system and a *de facto* Central Bank autonomy. This has led to a period of intense poverty reduction and welfare increase (NERI, 2007).

In general, the smooth transition between FHC and Lula and the compromise to follow the rules of the macroeconomic policy were seen as a major sign of institutional success (ACEMOGLU & ROBINSON, 2012). Brazil had finally won in 2002-2003 and by 2008 there was a perception that development was fully on track. This can be seen in graphs 1, which exposes the credibility of the fiscal and monetary policy, and in graph 2 which exposes the Getulio Vargas Foundation uncertainty index, and its media component[3]. In general, the major instability point was the 2002 election, but the markets were appeased by Lula's compromise

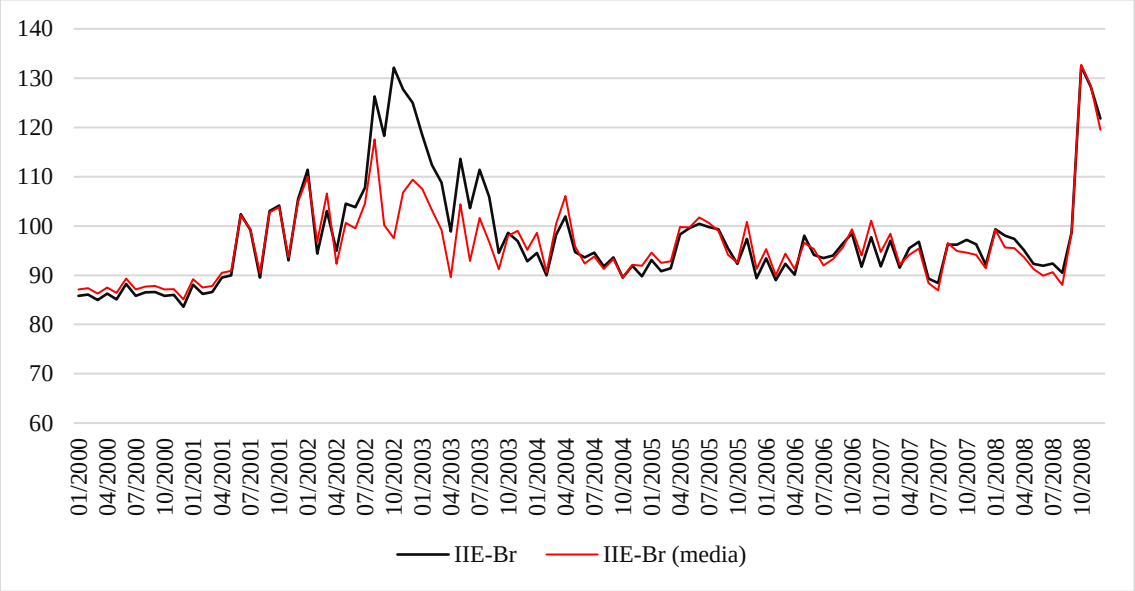
Graph 1: Fiscal and monetary credibility gaps, 2000-2008



[3] The IIE-Br is a composed index based on the perceived uncertainty in the media and the expectations for the next year GDP and interest rates.

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 2: Uncertainty in Brazil, 2000-2008



Source: Getulio Vargas Foundation

2.1. A lost decade: Institutional deterioration, crisis, and instability

Brazil has a long history of pluralism of economic thought which has spread from the early policy debates to the very own conception of the academic field in Brazil (FERNÁNDEZ & SUPRINYAK, 2018) (CUNHA & SUPRINYAK, 2019) (FERNÁNDEZ & SUPRINYAK, 2019). This has lead to a high presence of heterodox economists of many traditions ("desenvolvimentistas" of many breeds, post-keynesians, marxists, structuralists, neo-schumpeterians, etc...) both in universities (NOVAES, 2008) and in public debate. Furthermore, in regard to public service, economists in Brazil tend to form long lines of sucession based on personal relationships (KLUGER, 2017).

As such, many parties had economists with heterodox inclinations and the Workers Party was no exception. Many of the intellectuals associated with the party origins and the workers movement were proeminent heterodox economists, such as Maria Conceição Tavares and Aloisio Mercadante, were heteredox economists and were not fond of the continuum of the neoliberal policies during Lula's first mandate.

One could argue that those examples are not significant as both of them weren't on the executive branch's economic team (however they were party officials, and both held legislative offices: Maria Conceição Tavares had been a Congresswoman from 1995-1999 and Aloisio Mercadante was a senator from 2003-2010). However, while the government most famous economists were true keepers of an orthodox agenda, many were heretodox economists and protégés of the intellectuals, such as Carlos Lessa- the president of the National Bank for Economic and Social Development from 2003 and 2004- and specially Guido Mantega and Nelson Barbosa.

Guido Mantega took many roles in the Lula government. Firstly, as Minister of Planning, Budget, and Management from 2003 to 2004, then president of the National Bank for Economic and Social Development from 2003 to 2006 and finally Finance Minister from 2006 to 2015. Nelson Barbosa on the other hand worked as a secretary of many different branches inside the Finance Ministry, the Ministry of Planning, Budget, and Management and BNDES; along the early 2010s he served as chairman of the board of directors of many state-owned companies and finally took office as Minister of Planning, Budget, and Management by 2014 and Finance Minister by late 2015.

This comes to show that there always was an internal struggle for power inside the government between orthodox and hetherodox agenda. In general, during the first Lula mandate, the heterodox economists were confined to development agencies and banks, while the ortodox economists had their strongholds in the Central Bank and the very influential department of economic policy of the Finance Ministry.

This equilibrium would slowly star to change by 2007. The first major changing point was the demise of Antonio Palocci as Finance Minister in 2006. Palocci was a physician and the major responsible for the the smooth transition between FHC and Lula's government, however he was involved in major corruption scandals by the end of 2006 and resigned from his office. This led to the ascension of Guido Mantega as Finance Minister. As soon as Mantega took office, policies regarding incentives for family credit and major programs of large investment in infrastructure became the norm.

However, the tipping point was the 2008 Crisis. Brazil was kept out of the global crisis because it had adopted a very strong anticyclical policy and, while it did suffer a major GDP shock in 2009, it quickly recovered. The reaction success was quickly seized by the heterodox economists as a symbol of their agenda success. Suddenly it became a very strong narrative in the public discourse that orthodox economics was dead, and neoliberalism met its inevitable demise: it was time to bring the Big Government back.

There are many ways to evaluate how 2008-9 marked a dire shift in relation to macroeconomic policy. Gustavo Franco evaluates the slow change in directors of the Central Bank and the adoption of loose monetary policy after 2008 as an institutional change regarding the previous decade, with a loss in BCB's independence and, subsequentially, in its credibility. Other possible analysis is through the policy inflection of the Secretary of Economic Policy (SPE) of the Finance Ministry.

The inflection of policy of the SPE is relevant as it is responsible for the elaboration of economic and fiscal analysis in the scope of the Finance Ministry. It is also responsible for setting the planning and economic forecasts that should base the fiscal planning and the fiscal targets in Brazil. Table 1 shows its evolution during the Worker's Party Era.

Table 1: Secretaries of Economic Policy during the Worker's Party Era, 2003-2015

Secretary	Period	Finance Minister	Policy Inclination
Marcos Lisboa	2003-2005	Antonio Palocci	Ortodox
Bernardo Appy	2005-2006		Ortodox
Otavio Damaso	2006-2006	Guido Mantega	Ortodox
Júlio Cesar Almeida	2006-2007		Ortodox
Bernardo Appy	2007-2008		Ortodox
Nelson Barbosa	2008-2011		Heterodox
Marcio Holland	2011-2015		Heterodox

However, this transition was not integral in the period of 2009 and 2010, and Dilma Roussef was elected with a moderate agenda (CUNHA, 2018). What really was the relevant point was the deception with the economic performance and the industrial elites of the country. The meager performance was caused in fact by the hangover of the economic performance of 2009 and 2010, when Brazil was very positively affected by FED's and Chinese recovery stimulus, and the Brazilian anticyclical policies, which led to a huge GDP and investment growth. In 2011 the economic team had to do an anticyclical policy correction which led to the general disappointment regarding the previous years. This disappointment, in turn, led to political pressure for a complete change in the direction of the economic policy, based on the idea that the orthodox moderation was curbing Brazilian development.

By 2012 there was a major change in the conduction of the economic policy in Brazil, so intense that it can be characterized as a regime shift. This new direction is called New Economic Matrix and lasted from 2012 to 2014. The extent of how much of a change in the conduction of the economic policy is a matter of dispute, however, it is fair to point out that the

claim that the general goals and means through the government led the economic policy went through complete change, composing a new “macroeconomic matrix” was made by Guido Mantega, which, as beforementioned, was the Finance Minister at the time (MANTEGA, 2012).

In general, the New Economic Matrix can be characterized by the policies exposed in Table 2, based on the works of Singer (2015). While there were hundreds of directions shifts affecting competition, industrial and regulation policies, it can be summarized by the interventions aiming to promote nationalization, GDP Growth and industrialization.

Table 2: The New Economic Matrix ABCs

Major NEM Policy directives
Manipulation of interest rates aiming to reduce them below equilibrium
Intensive employment of BNDES for Industrial Policies and Market Intervention
Exonerations - payroll exemption for fifteen labor-intensive sectors.
Infrastructure Plans and major works
Reform of the electricity sector
Devaluation of the real and FX interventions
Capital controls
Protection of the domestic product
Strong emphasis on industrialization
Incentives to ”national champions”

To achieve this, the Dilma’s Government went as far as to abandon the “Tripé Macroeconômico”. Aiming to promote investment, the government directly intervened in the Central Bank, manipulating the interest rates aiming to reduce them below equilibrium, the basic interest rate was reduced from 12.5% to 7.25% per year between August 2011 and April 2013 by the Central Bank. The captured Central Bank acted to directly devaluate the real aiming to promote exports, and stablished capital controls aiming to prevent the inflow of dollars from increasing the value of the real.

There was also intensive employment of BNDES for industrial policies and market intervention, establishing a subsidized credit line for company investment through transfers received from the Treasury. This was met with exonerations for private companies, which directly affected the government income.

Aiming to modernize infrastructure, there was major investment in public works and concessions, expanding the logic of Lula’s Acceleration Growth Program (PAC) and creating the Investment and Logistics Plan. There was a strong intervention in the electric sector, reducing the prices artificially, aiming to promote general competitiveness in the economy.

Furthermore, the government directly promoted incentives for the industrial elites. Firstly, with industrial policies which included the Plano Brasil Maior, then with the full support

for the “national champions”, companies in sectors ranging from poultry meat to petrochemical industries which received asymmetric incentives and credit lines with rates below the basic interest rates aiming to create enough market power and verticalization to become competitive in international markets. This came accompanied with protectionist policies such as import tariffs hikes of as much as 30%, which was the case of automobiles.

There is a major debate on which extent the New Economic Matrix is responsible for the 2014-2016 crisis. Some in the heterodox side directly single out the external factors or the profit crush caused by the elevation of the minimal wage as the reasons for the crisis, others on the orthodox side condemn the NEM as the cause for the crisis, this debate can be seen in the works of Cagnin et al. (2013), Barbosa Filho and Pessoa (2014), Mesquita (2014), Serrano and Summa (2015), Arestis and Terra (2015), Lopreato (2015), Terra (2016), De Bolle (2016), Holland (2017), Balassiano (2018), but specially in Pessoa (2016), Borges (2016), Cunha (2018) and Gomes da Silva and Fishlow (2021).

It is hard to minimize the negative effects of the NEM on the Brazilian Economy, but it is also incredibly hard to correctly quantify its effects because of the magnitude of the microeconomic and macroeconomic interventions. It would require an incredible amount of manpower to evaluate the effect of each policy, but there are some examples: Garber et al. (2021) shows that the major credit expansion program through government banks through 2011-2014 has helped to foster the following recession. Regarding Public Investment, the conduction was deficient in proper conduction. in Julio Magreb and Eduardo Zilberman (2012) shows that “depending on the time lag associated to the time-to-build process and the fiscal adjustment policy, PAC could have led to a GDP decrease between 0.2% and 0.4% in up to four years. depending on the time lag used”. Bonomo et al. (2018) provide evidence that the earmarked credit line of the BNDES effectively reduced the efficacy of monetary policy.

However, the direct effects of the NEM and its failure were not restrained to leading to the largest economic crisis of Brazil in decades, but also created a major political and institutional crisis. Developmentalist policies need large coalitions to be supported, and they directly affect the political equilibrium as they promote large appropriations of public resources from selected industrial elites in detriment of the workers which are directly affected by the exchange rate devaluation and the inflation, and, theoretically, the agricultural and commodity-related elites.

This new equilibrium hardly ever holds in democratic systems as it requires constant high economic growth to keep the workers and elites satisfied until the policy goals are achieved, which, if achieved at all, can take decades. This political turmoil was directly felt by

the Dilma's government which faced major waves of protests in 2013 and 2014 in its first mandate, and in 2015 in its second.

The institutional crisis contaminated the whole political and economic system after 2014. While corruption scandals and the fiscal crimes (the "pedaladas") associated with the Dilma mandate, and major social antisystem feelings related to what was perceived as a failure of basic public good provisions which cristalyzed in the "antipetismo" as the Worker's Party was in power for 13 years directly led to the Dilma's impeachment process in 2016, the lack of institutional backing by the elites can explain how Dilma wasn't able to fight it.

This process is evaluated in different perspectives by Limongi (2015, 2017) and Singer (2018, 2019). The general argument here was that even before the crisis, Dilma lost the backing of industrial elites as her economic project was not successful in mitigating production costs, furthermore, it required to the government to broaden its coalition to the physiological parties known in the future as the "centrão", many of them conservative and who didn't share progressive values with the Worker's Party. This opportunistic behaviour led to the backsliding of the Dilma's government, because not only these economic and political elites which composed the coalition weren't satisfied with the economic performance as soon as 2013 as they didn't see eye to eye with the government on many social matters.

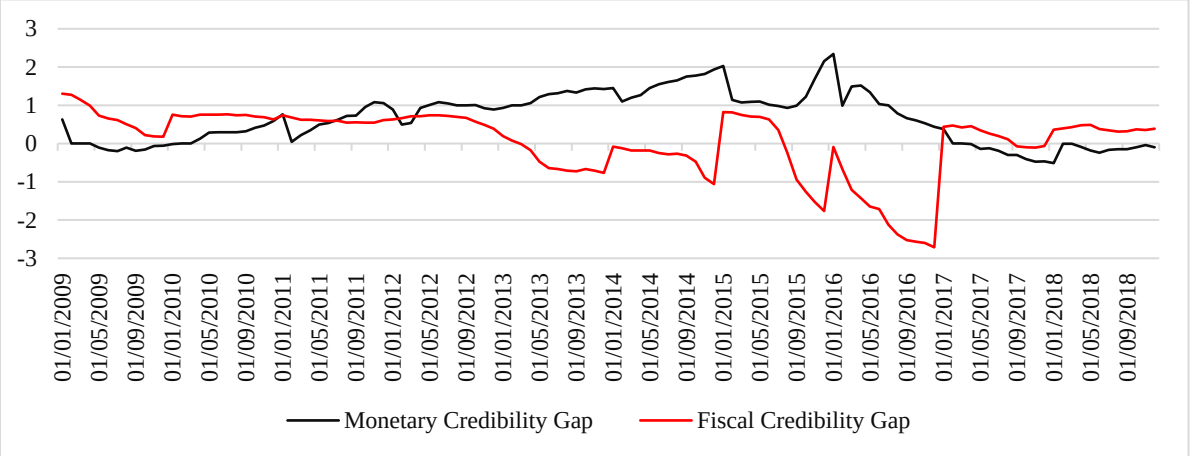
This institutional crisis is directly related to expectations. André Vereta-Nahoum (2019) shows through the analysis of public communications of two industrial associations that the industrial sector had lost faith in the government by 2014 and was pushing a different agenda as soon as 2014, which means that the government had lost its credibility in the sector. We will evaluate the effect of the credibility loss in the period using surveys of the financial sector, however, both are directly linked through the institutional crisis.

The crisis would only be solved, at least in terms of the financial gloom, by 2016 when Dilma was impeached. This marked a direct regime switch for the market, for instance, the ascension of Ilan Goldfajn, a known orthodox hawk, was met by the market with effusive enthusiasm which led to a recuperation in monetary policy credibility, interest rate cuts and disinflation. Furthermore, the period was marked by strong institutional changes and reforms, especially the "Teto de Gastos", a debt ceiling that anchored fiscal expectations and led to a structural change in the long-term interest rates, lowering them (RODRIGUES, 2020).

The period started by the New Economic Matrix led to a depletion both in fiscal and monetary policies, as graph 3 shows. Furthermore, while Temer's government which spanned from mid-216 to the end of 2018 was able to recuperate a good portion of market's credibility in economic policy, he wasn't able to significantly reduce the uncertainty, as graph 4 shows,

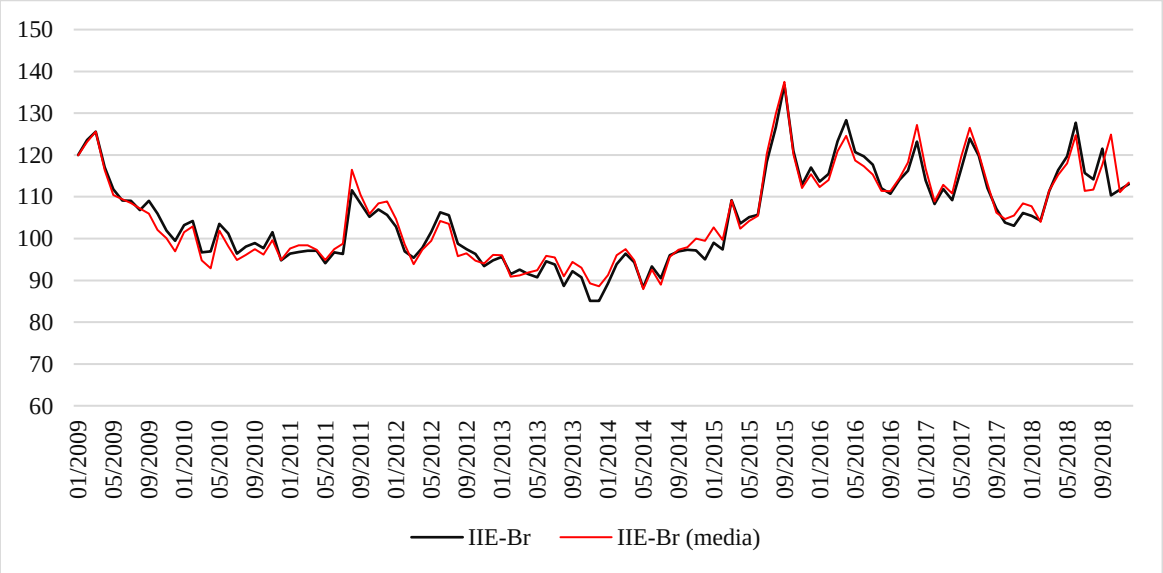
which helps to explain why the Brazilian economy didn't fully recover in the period.

Graph 3: 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.

Graph 4: Uncertainty in Brazil, 2009-2018



Source: Getulio Vargas Foundation

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[4] 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[5] (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: σ2. This definition follows the work of Alan Blinder (2000).

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

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

[5] 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, $\pi^e$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 5: 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 3: 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[6].

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

[6] This satisfies the rational agents' hypothesis.

Brazil- has, risen exponentially mainly due to the pressure of the aging population in pension 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[7], going as far as using a lower interest rate than the market benchmark[8].

It is based on the idea that government debt is less risky than private debt[9]. 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).

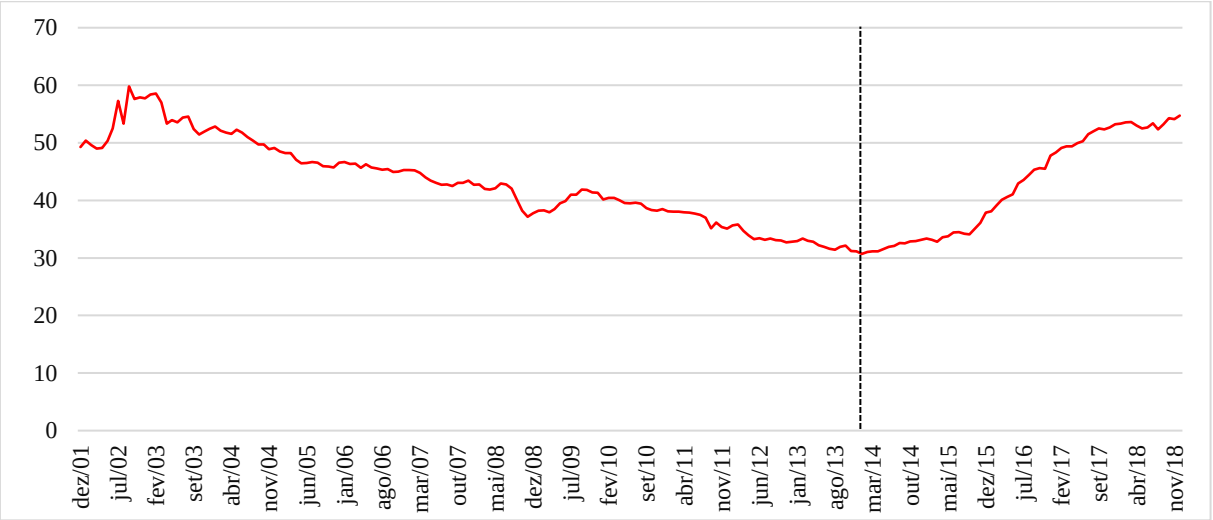
According to Yared (2019), this perspective explains the surge in public debt to counter-react to the 2008 Financial Crisis, however, it is not consistent with the secular growth in debt. Considering the Brazilian case, as shown in the graph below, the growth of public debt was accelerated during the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

[7] 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. (FRISCHTAK et al, 2018)

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

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

Graph 6: Brazilian General Government Net Debt



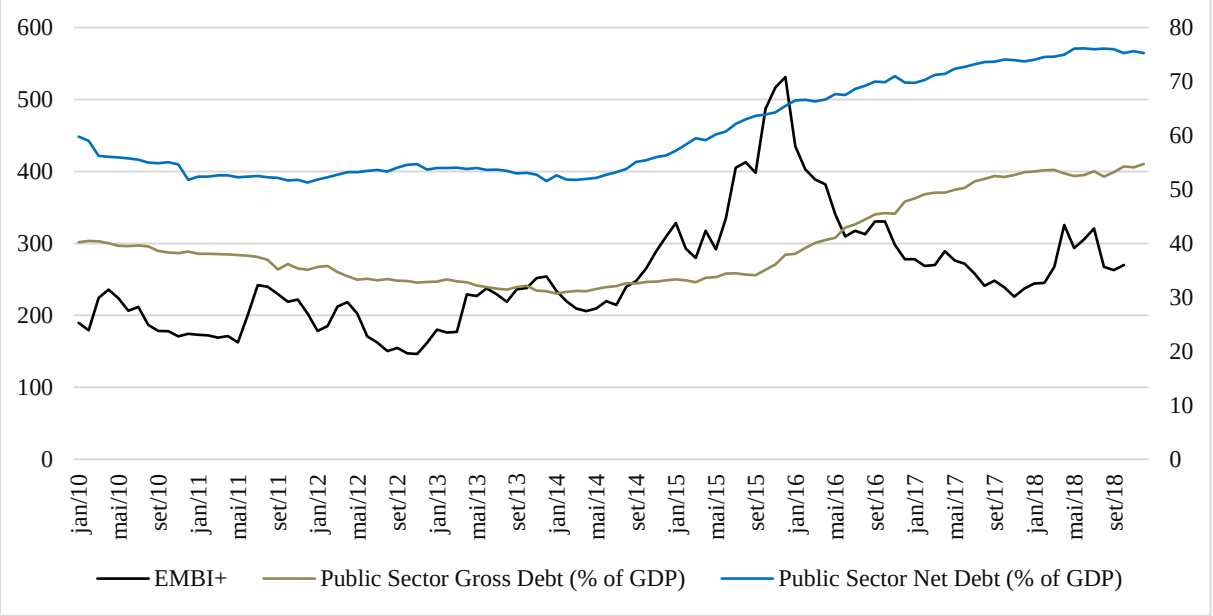
Source: Brazilian Central Bank

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[10]. 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.

[10] 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 7: 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[11]. 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

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

know this, and, therefore, the issuing of present debt alters the decisions of agents, “tilting the 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.

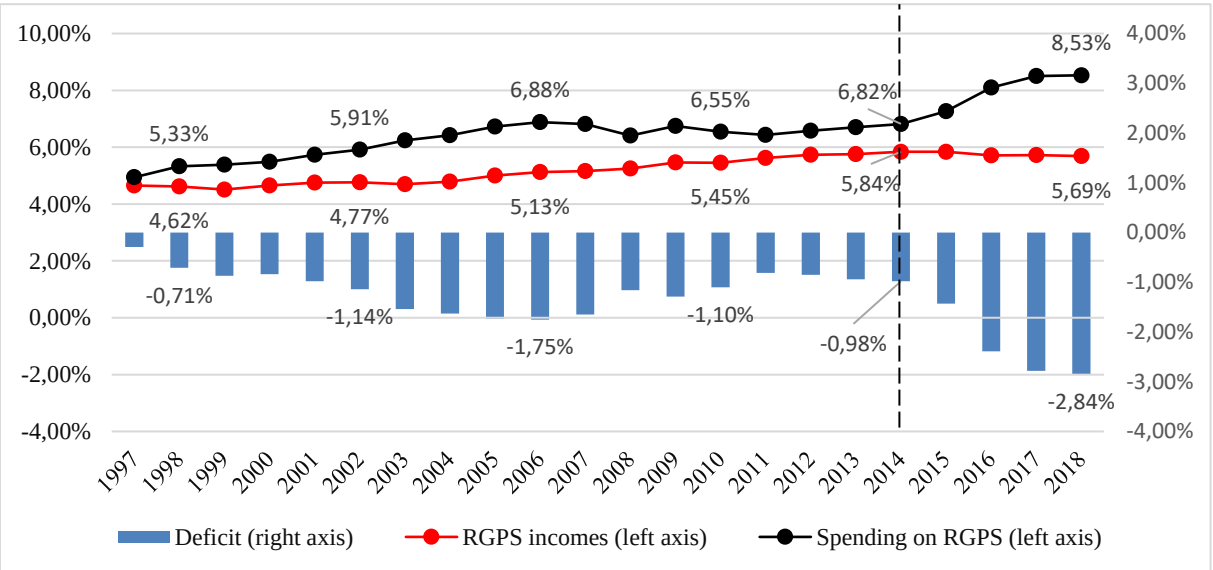
The literature on political economy models of debt is immense and in achieving canonical status in the economic mainstream. This kind of model is becoming a focus of

attention in Brazil, as Brazilian economists are slowly adopting *neoinstitutionalist*[12] 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)[13].

Graph 8: Public spending on pensions and public assistance (minus public servants and officials)



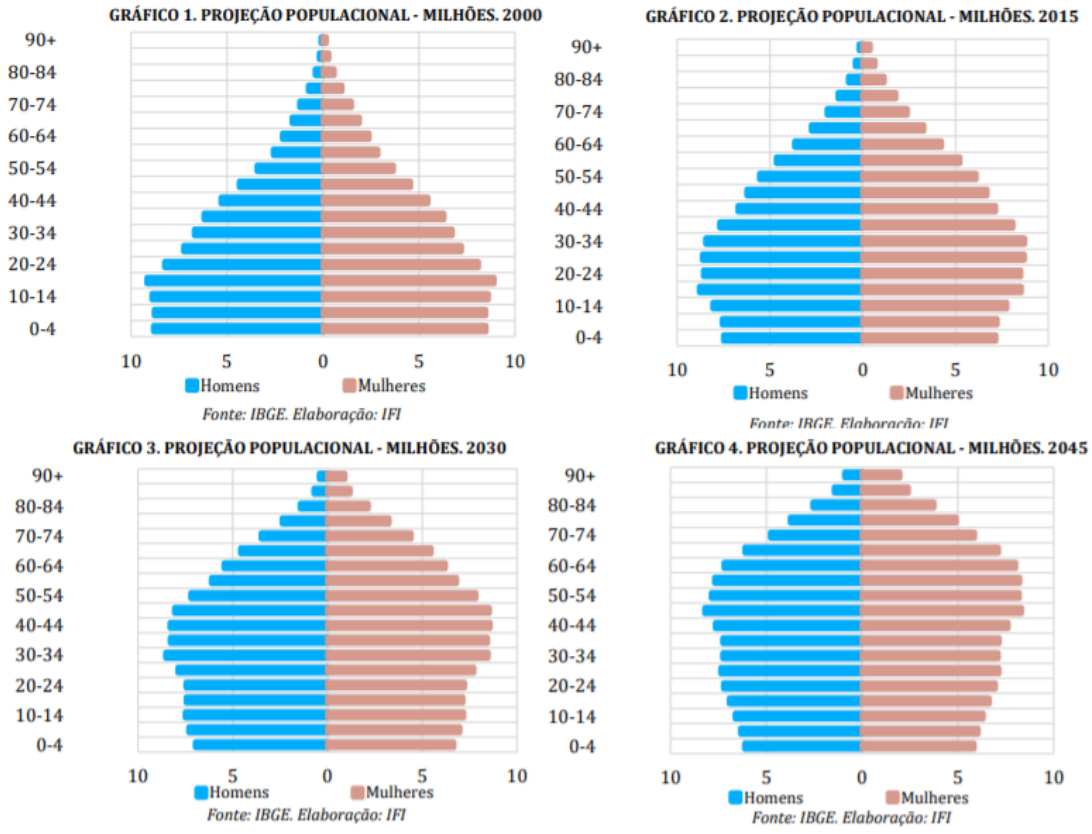
Source: https://www2.senado.leg.br/bdsf/bitstream/handle/id/554772/RAF26_MAR2019.pdf

[13] https://www2.senado.leg.br/bdsf/bitstream/handle/id/554772/RAF26_MAR2019.pdf

Graph 9: 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 1: 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 9 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.

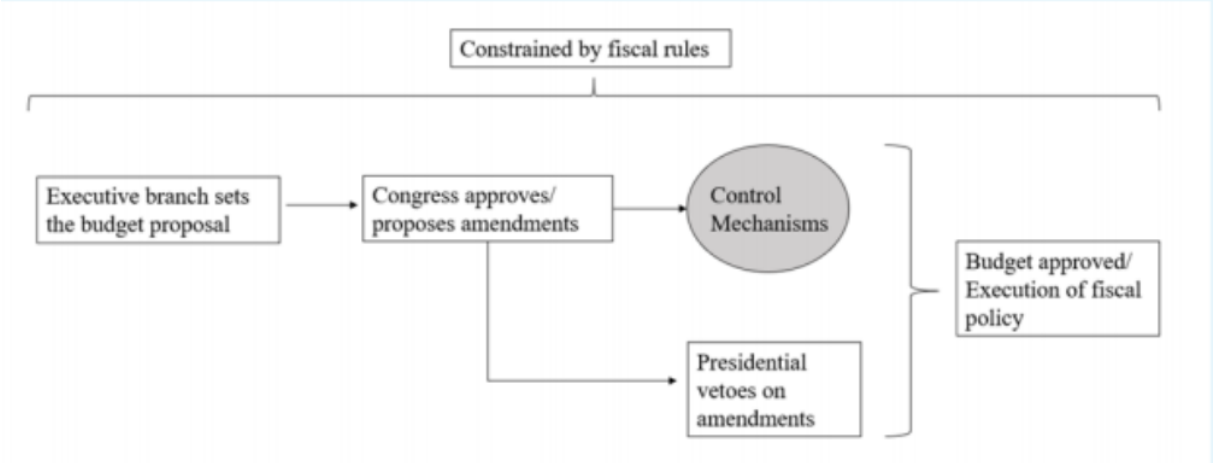
Furthermore, we have only dealt with spending in RGPS and not in public pensions of the public sector (the RPPS system). As Medeiros and Souza (2015) evaluate, by 2014 the difference between pension rules between public and private workers was already a significant driver in inequality. Spending in pensions 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 2: 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

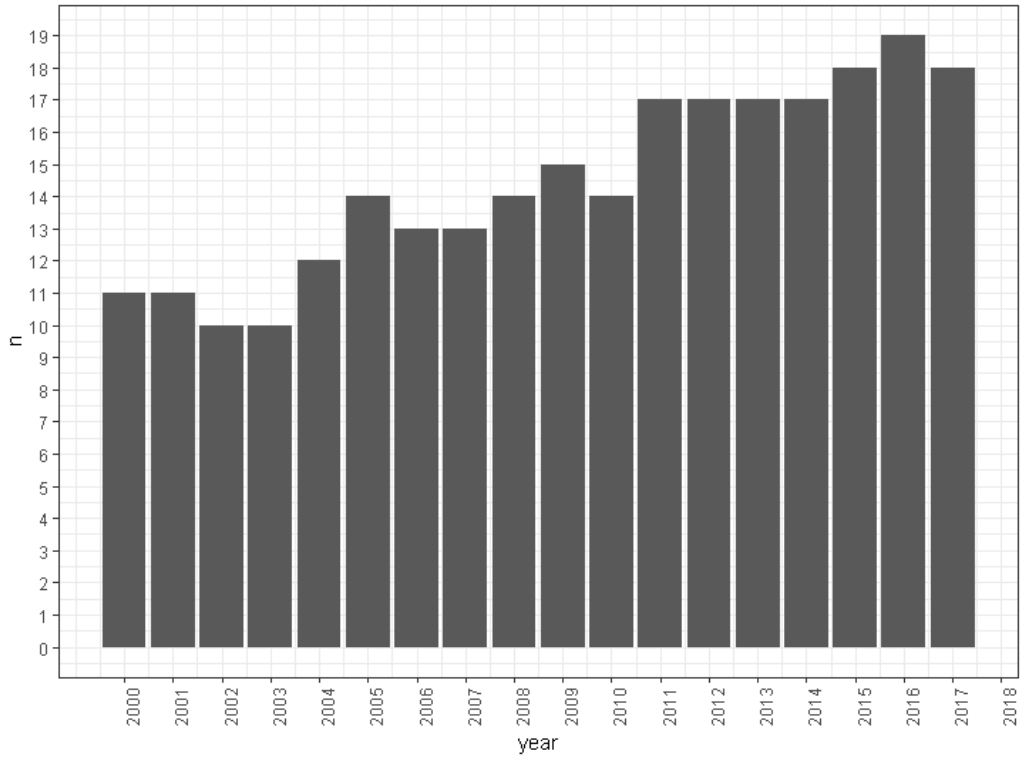
very strong hypothesis by itself). As seen in the graphs below, the legislative success rate of the governments started to decline by the end of the first Lula mandate. Regarding this, Darrieux (2019) proposes that "Lula and Rousseff had more ideologically heterogeneous coalitions than Cardoso, and this 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.

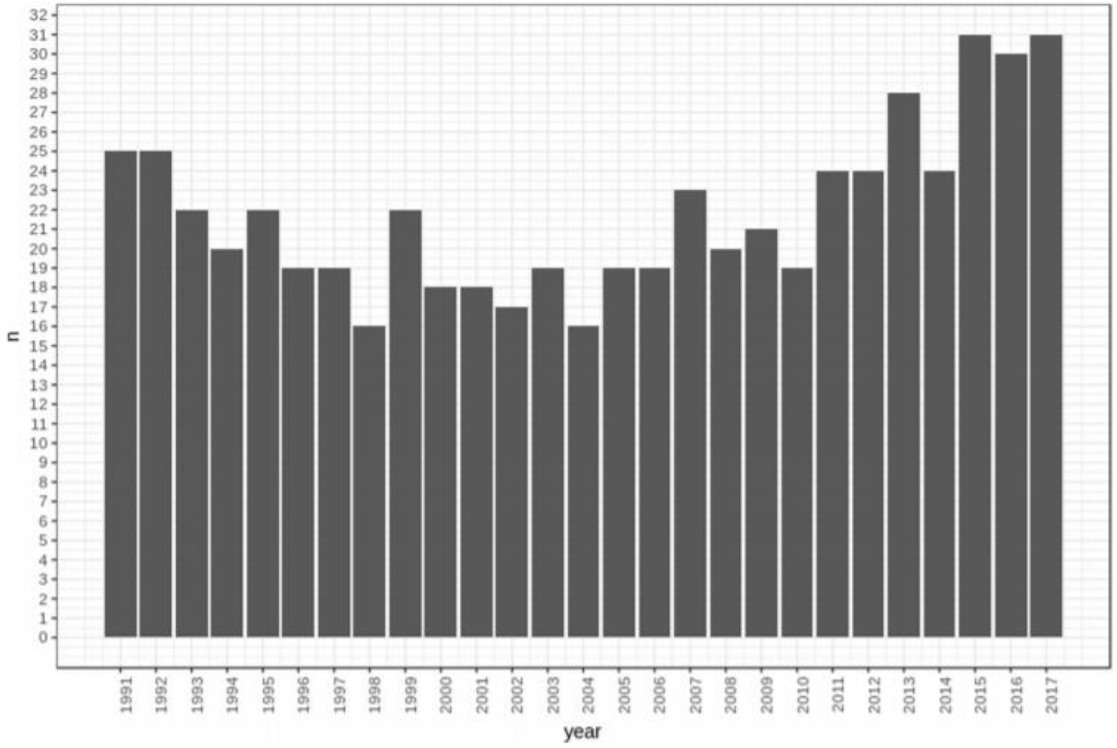
These findings in general corroborate Pierre Yared's point regarding polarization and fragmentation. However, the transmission mechanism is more complex than, for instance, in the USA where Congress has the power to alter 100% of the budget if so they wish. Furthermore, the coalition system allied with 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 10: Number of Parties in the Senate (2010-2018)



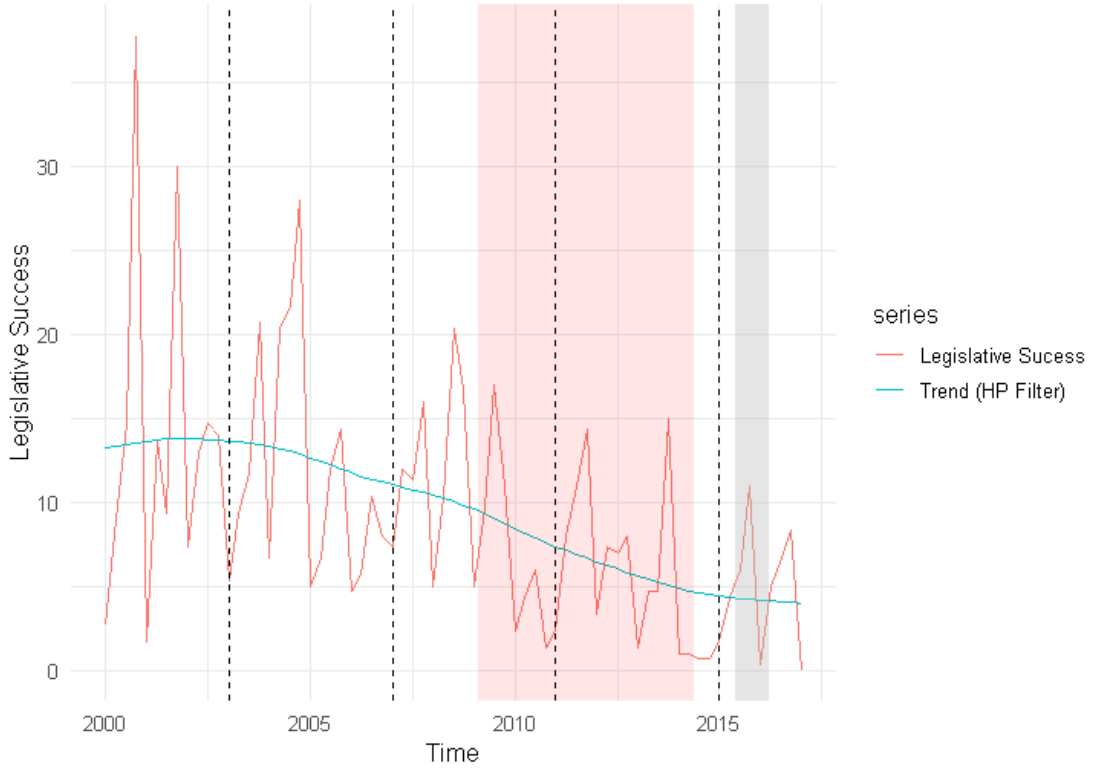
Source: Author's calculation using Brazilian Senate nominal votes and the congress by package developed by McDonnel et al. (2017).

Graph 11: Number of Parties in the Chamber (2010-2018)



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

Graph 12: Legislative Success (quarterly) (2000-2018)



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

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[14] 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

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. As such, it is important that governments take in consideration the fiscal credibility.

Fiscal credibility is especially important in times when borrowing is needed. To quote the IMF "When lenders trust that governments are fiscally responsible, they make it easier and cheaper for countries to finance deficits. This buys time and makes debt stabilization less painful."[15], thus fiscal credibility directly affects the interest rates, which are relevant as a mechanism in disinflation, also. This can possibly explain the correlation found in Montes et al. 2019 for the Brazilian Case.

[14] 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.
[15] https://blogs.imf.org/2021/10/07/when-it-comes-to-public-finances-credibility-is-key/

Recent analysis conducted by IMF fiscal team shows that if fiscal policy is credible, measured as a fiscal credibility gap, as we have used in this monograph, borrowing costs can fall temporarily by as much as 40 basis points (IMF, 2021).

Nevertheless, as exposed before, the conduction of fiscal policy is far from optimal. This indicates that it suffers from a classical time-inconsistency problem, and credibility building is relevant, both under macroeconomic and game theory perspectives (DRAZEN, 2000). This indicates that, in line with Yared (2019), fiscal policy should have rules rather than discretion as much as monetary policy.

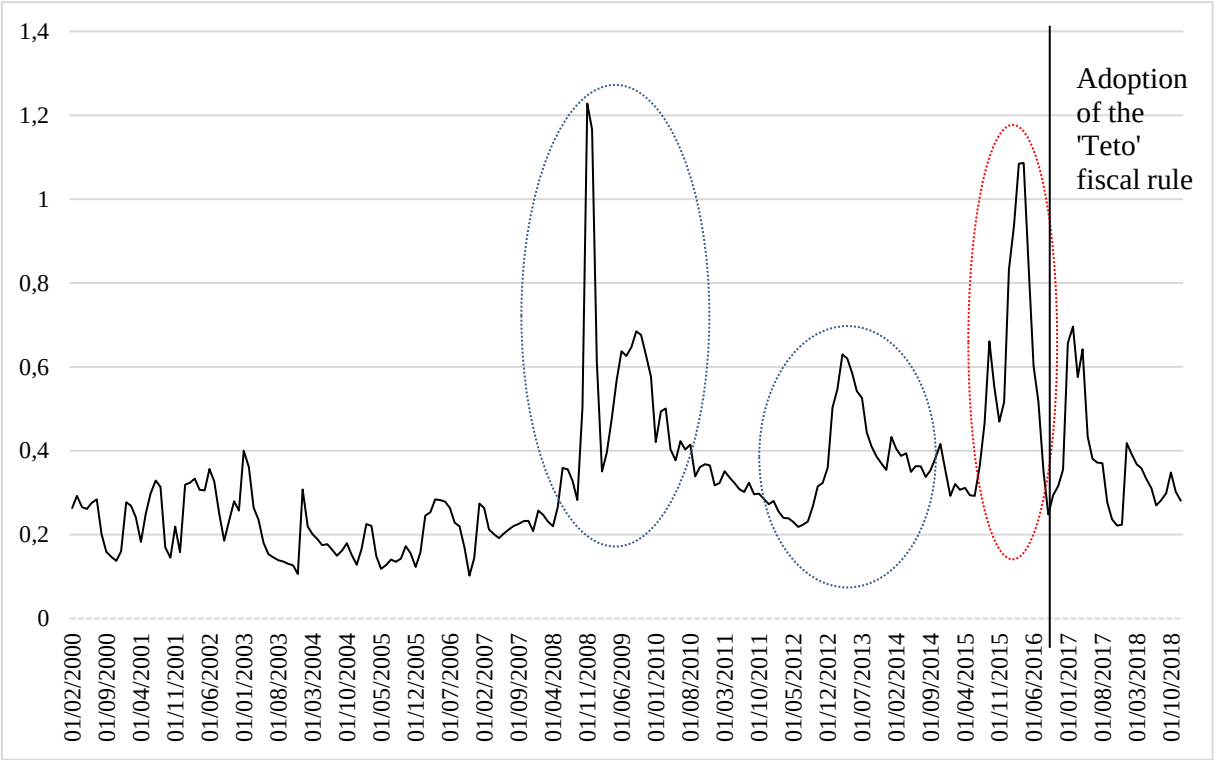
However, it may be harder to develop efficient fiscal rules in some societies. Fiscal policy deals with the provision of public goods and involves many agents and institutions (in a liberal democratic system, it envolves at least the Executive and the whole Congress). This however is determined by the general perception that fiscal discipline is important, to quote Alberto Alesina and Roberto Perotti "it should be clear that no institution will (or should, perhaps) prevent a government or legislature from running deficits, if this is what they are determined to do." (ALESINA & PEROTTI, 1996).

This helps to explain the fiscal deterioration of Brazil and the loss of credibility loss even with a fiscal rule in place (The LRF and primary result target system). The government was determined to run expansionist policies even when it was clear that they wouldn't work and violate the fiscal rules.

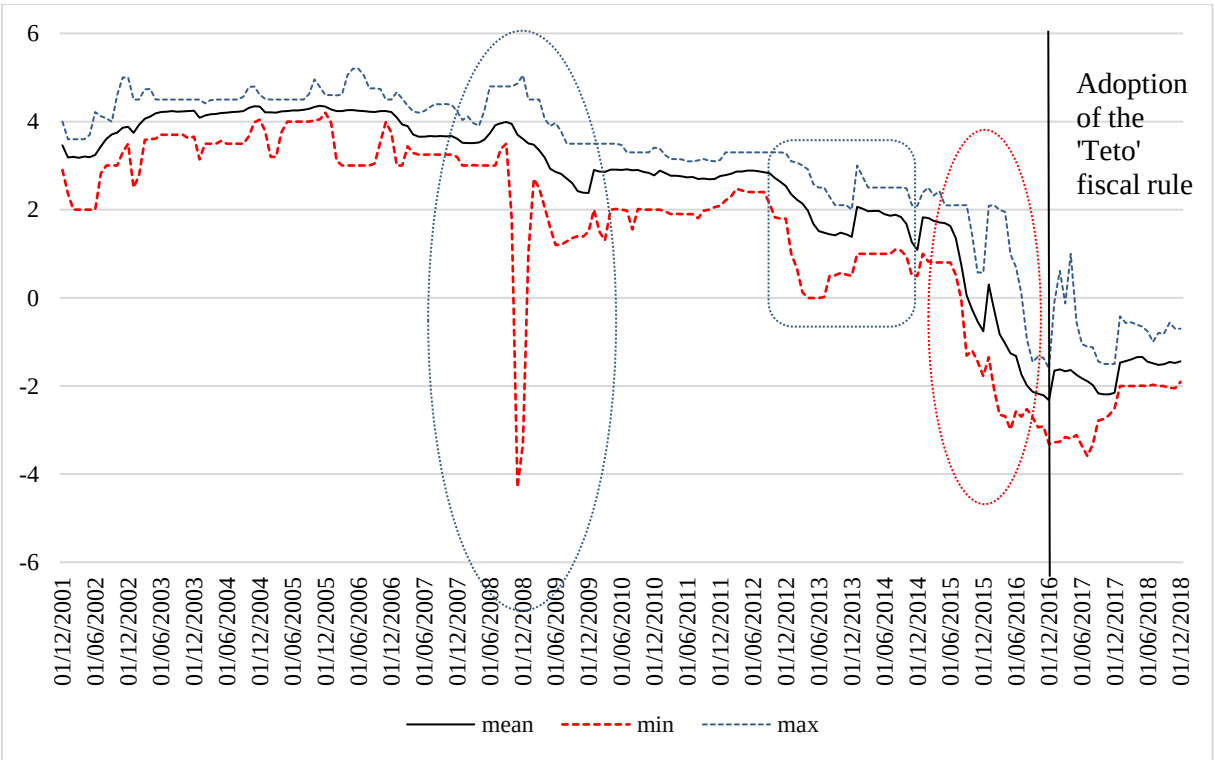
But, considering the political economy analysis and the role of the economic and political elites in shaping institutions, it also explains why it is so hard to reform the Brazilian economy, and the character of such reforms. In line with the Brazilian historian Sergio Buarque de Holanda in its classic *Raízes do Brasil* of 1936, in Brazil reforms usually have the bitter taste of counter-reforms.

However, one could argue that the reformists period of FHC-Lula and Temer anchored fiscal expectations. If evaluate the standard deviation of the primary result expectations, we can clearly see that the deterioration is clearly correlated with the institutional deterioration of the heterodox dominance period. And this is reflected in the fiscal credibility gap.

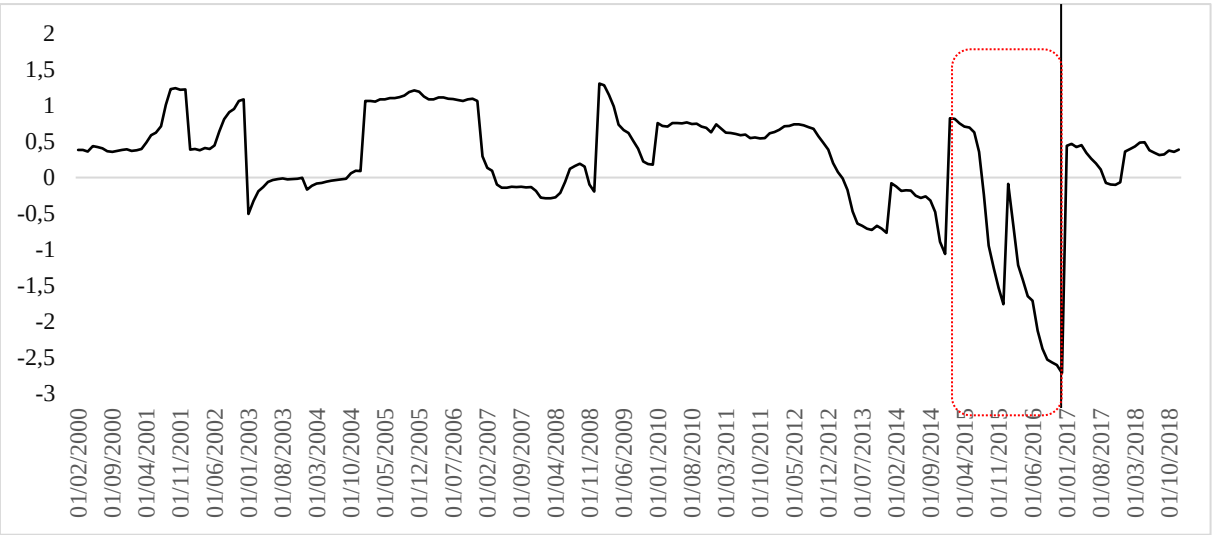
Graph 13: Fiscal Expectations Standard deviation



Graph 14: Fiscal Expectations descriptive statistics



Graph 15: Fiscal Credibility Gap full sample



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. 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)[16] 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.

In terms of monetary credibility, the policy implications are clear, the Central Bank observes the credibility gap directly and reacts to it. This is due to its mandate to try to achieve the inflation target, and, following the Taylor Rule, he must react to inflation expectations directly. If the inflation expectations are equal to the target sequentially, the monetary policy has the possibility of affecting the demand with near zero inflationary consequences. This hyperbolic case is akin to the "hyper-keynesian" state as proposed by Hazell et al. (2021).

However, this is a hyperbolic case, and as basic literature shows, expectations are not stable over time. However, a more realistic and practical approach is that, if the monetary policy is credible, the inflationary cost of using it to stabilize the business cycles is mitigated.

In terms of fiscal credibility, the effects on business cycle using a simple three equation New Keynesian model are indirect. Mainly it affects the exchange rate variation through the risk premia and the aggregate demand through the fiscal expansion as it deteriorates the fiscal multiplier[17]. However, it also affects omitted variables such as credit conditions, growth expectations, liquidity as it affect bond prices, etc… therefore, a simple three equation aggregate model is not sufficient to capture its effects. It would be required an augmented model with microfundamentations and with restrictions on transmission channels.

[16] https://www.bcb.gov.br/content/ri/relatorioinflacao/202012/ri202012b9p.pdf
[17] As previously exposed, a loss in fiscal credibility makes borrowing more expensive, therefore, it affects the optimal fiscal plan as it requires stronger austerity in the wake of a fiscal stimulus.

6. Empirical Analysis

6.1. VARX model

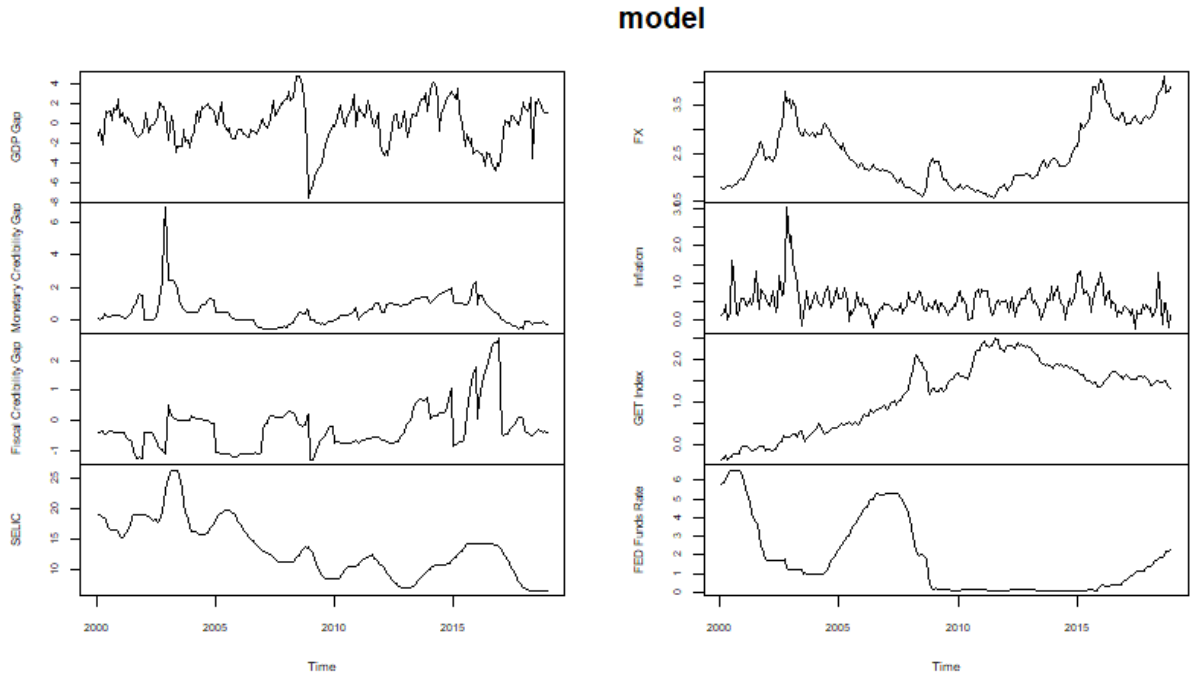
Since Sims (1980), Vector Auto Regression models have been the standard basic tool for macroeconomists. In general, this class of models enables researchers in time series to easily evaluate contemporaneous and past effects simultaneously, in a multivariate analysis.

In this work we use a VARX, which means a VAR with (weakly) exogenous variables. By definition, a VAR endogenizes every variable in the equation system, however, sometimes it is necessary to impose exogeneity restrictions. As such the model is defined as

$$Y_t = a_0 + \sum_{p=1}^{n} A_p Y_{t-p} + \sum_{q=1}^{n} B_q X_{t-q} + U_t$$

Where Y represents a matrix of endogenous variables, a a vector of intercepts and X a matrix of exogenous variables. To guarantee that the model is truly a VARX, Y must not granger cause X, which would guarantee weak exogeneity and, ideally, should not have contemporaneous causal effects over X, leading to a strong exogenous condistion.

GRAPH 16: Series used in the model.



The endogenous series used in the model are the standard variables used for short term macroeconomic analysis. For monthly inflation we used the IPCA which is the standard CPI for Brazil. For the GDP gap, we took the cyclical component from a Hodrick Prescott filter from the monthly GDP indicator developed by the Getulio Vargas Foundation Brazilian Institute of Economy. For the exchange rate we took the average monthly rate of the spot rate

USD/Real, and after an Augmented Dickey-Fuller test, we took the first difference. Finally for the interest rates, we used the Selic rate, set by the BCB.

For the exogenous variables we aimed to incorporate the critics works that posit that the Brazilian economy is too dependent of global cycles. As such we use the Federal Reserve funds rate which should account for global liquidity cycles. And we also use the Good Economic Times index, as proposed by Daniela Campello and Cesar Zucco in their book *The Volatility Curse: Exogenous Shocks and Representation in Resource-Rich Democracies* (CAMPELLO & ZUCCO, 2020). This index aggregates commodities prices and international interest rates and is highly correlated with political and volatility in Latin America; we then used the Hodrick Prescott filter to extract its cyclical component to make it stationary.

6.2. Results

The general results are in line with the literature. Table 4 summarizes the reduced form estimation results.

Table 4: VAR Results

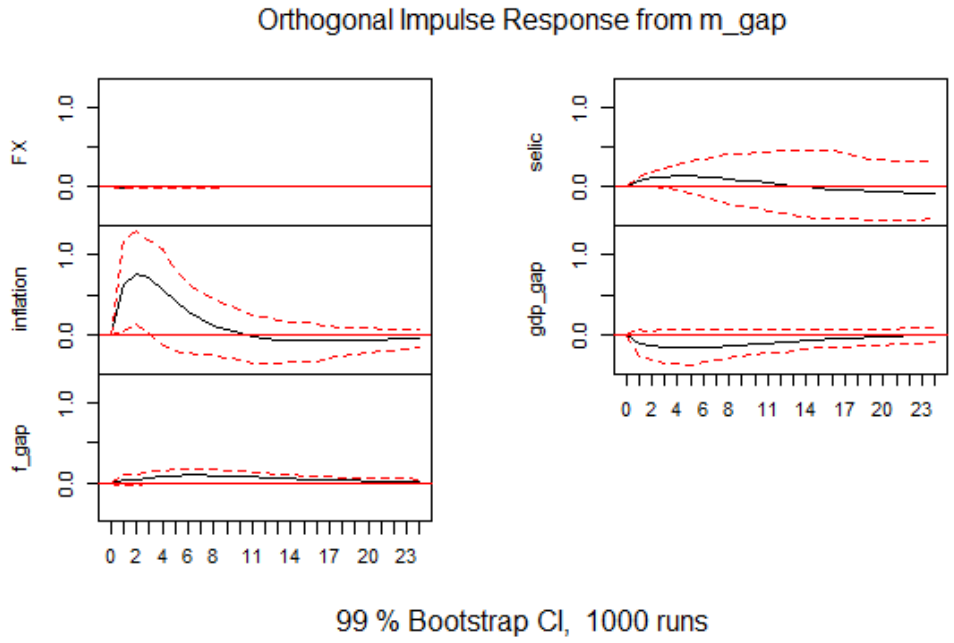
	Dependent variable:					
	(FX)	(Selic)	(inflation)	(gdp gap)	(monetary credibility)	(fiscal credibility)
FX.l1	0.298***	0.219	11.320***	1.107	0.482*	−0.062
	(0.069)	(0.183)	(2.458)	(0.771)	(0.260)	(0.233)
selic.l1	−0.005	1.676***	1.182*	0.122	0.163**	−0.077
	(0.018)	(0.047)	(0.635)	(0.199)	(0.067)	(0.060)
inflation.l1	−0.001	0.004	0.524***	0.017	0.021***	−0.004
	(0.002)	(0.005)	(0.070)	(0.022)	(0.007)	(0.007)
gdp_gap.l1	−0.001	0.010	0.029	0.758***	0.018	0.030
	(0.006)	(0.016)	(0.218)	(0.068)	(0.023)	(0.021)
f_gap.l1	0.001	−0.040	−0.738	−0.164	0.011	0.924***
	(0.020)	(0.053)	(0.715)	(0.224)	(0.076)	(0.068)
m_gap.l1	−0.027	0.196***	1.680***	−0.320*	0.891***	0.083
	(0.017)	(0.045)	(0.599)	(0.188)	(0.063)	(0.057)
FX.l2	−0.018	−0.060	0.850	−0.520	1.112***	−0.440*
	(0.074)	(0.196)	(2.630)	(0.825)	(0.279)	(0.249)
selic.l2	0.003	−0.687***	−1.086*	−0.146	−0.154**	0.066
	(0.018)	(0.047)	(0.627)	(0.197)	(0.066)	(0.059)
inflation.l2	−0.0005	0.014***	−0.157**	−0.011	−0.027***	0.010
	(0.002)	(0.005)	(0.069)	(0.022)	(0.007)	(0.007)
gdp_gap.l2	0.009	0.017	−0.033	0.051	−0.020	−0.032
	(0.006)	(0.016)	(0.219)	(0.069)	(0.023)	(0.021)
f_gap.l2	−0.006	0.050	0.402	0.137	0.0005	−0.063
	(0.020)	(0.053)	(0.705)	(0.221)	(0.075)	(0.067)
m_gap.l2	0.030*	−0.209***	−0.205	0.122	−0.074	0.001
	(0.017)	(0.045)	(0.605)	(0.190)	(0.064)	(0.057)
const	0.032	0.024	1.778**	0.436*	0.020	0.021
	(0.023)	(0.061)	(0.815)	(0.256)	(0.086)	(0.077)
geti_gap	−0.055	0.010	2.207	1.554***	0.191	−0.095
	(0.047)	(0.125)	(1.682)	(0.527)	(0.178)	(0.159)
fed_rates	−0.070	0.059	−0.966	1.285***	−0.088	−0.234
	(0.043)	(0.115)	(1.542)	(0.483)	(0.163)	(0.146)
Observations	224	224	224	224	224	224
R^2	0.165	0.997	0.552	0.749	0.829	0.810
Adjusted R^2	0.110	0.997	0.522	0.732	0.818	0.798
Residual Std. Error (df = 209)	0.100	0.267	3.574	1.121	0.379	0.339
F Statistic (df = 14; 209)	2.960***	4,542.266***	18.419***	44.567***	72.577***	63.792***
Note:						*p<0.1; **p<0.05; ***p<0.01

As we can see, the monetary credibility gap is one of the most relevant variables in or model, affecting the interest rate and the inflation with 99% level of confidence, and the GDP gap with 90% of confidence. Fiscal credibility gap does not have any statistically significant effect; however, one must be wary because this is a reduced-form VAR estimation. We have not imposed any theoretical or narrative restrictions.

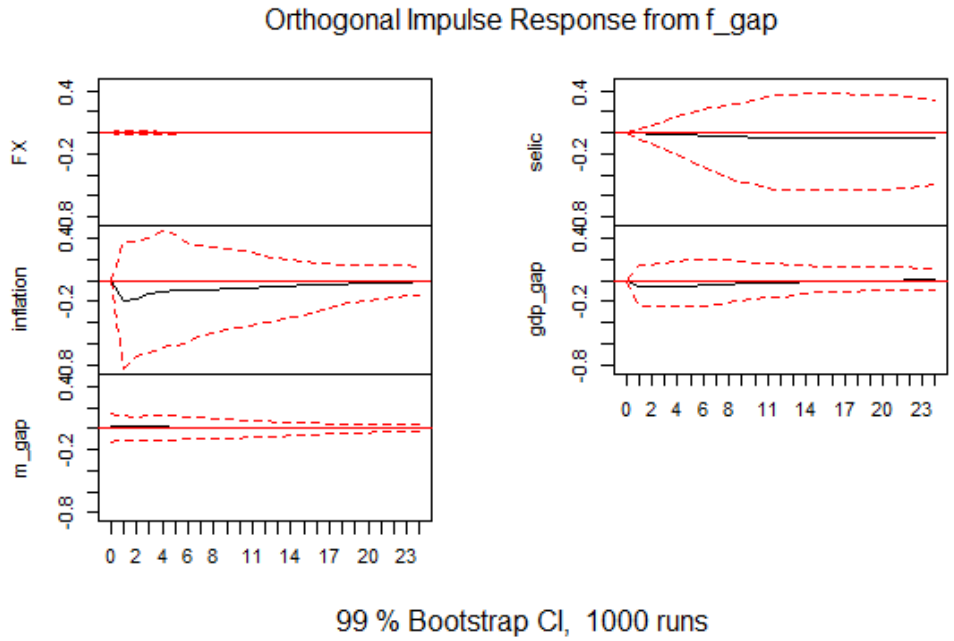
In fact, a good critique of the model is that the number of the variables usually used in VAR models is low, which may not reflect the information that the Central Bank and market agents use (BERNANKE et al, 2005). As we are using fiscal expectations, the information space is very relevant, and the fiscal expectations can affect the economic outcome through transmission mechanisms that are omitted. Por possible future research, this model could be enriched by using a Factor Augmented Vector Auto Regression.

The impact of the variables can also be evaluated through their Impulse Response Function. For the full sample the results are what literature would indicate: higher inflation, and a positive shock in interest rates. Furthermore, there is a slight impact in fiscal credibility, this is probably due to the uncertainty in the policy reaction, the impact of the interest rates on fiscal policy and the negative effect on the GDP gap.

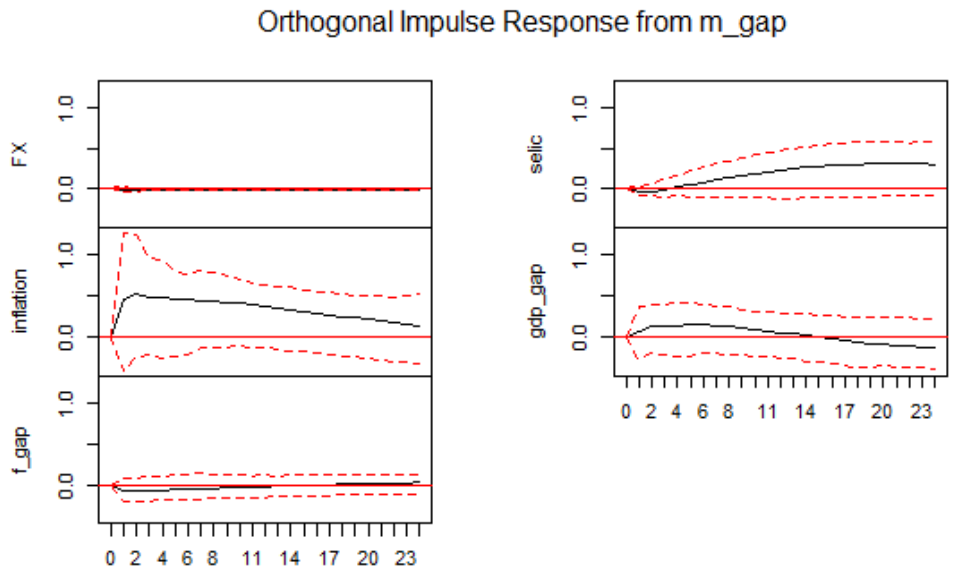
Graph 17: IRFs, full sample



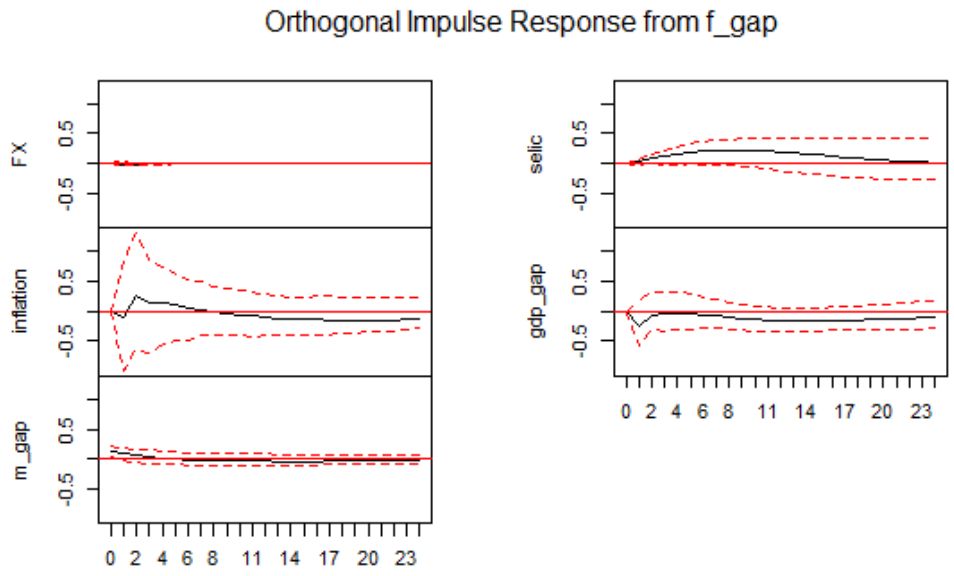
On the other hand, the fiscal credibility shock shows highly dubious effects when considering the full sample. This is probably due to the fact that in the 18 years of analysis, Brazil went through many different shocks, and the 2002 and 2008 turmoil points may be dirtying the sample.



A simple solution for this was to restrict the sample from 2012 onwards. The effects now are more in line with the general theory. The inflation and interest rates shocks from the monetary credibility are more protuberant, and there is a dubious effect on the GDP gap, which is in line with the possibility of an expected monetary stimulus.



A shock in the fiscal credibility gap for the subsample shows effects in line with expected results from the theoretical analysis. If agents expect higher deficit than the target set by the government, this leads to an inflation invariance, which then affects the monetary policy, it also leads to a reaction from the Brazilian Central Bank raising the interest rates and it negatively affects the GDP, probably due to investment decisions.



Finally, Tables 5 and 6 provide Blanchard-Quah decompositions of the VAR models, both full sample and the reduced from 2012 onwards. In a Blanchard-Quah model (BLANCHARD & QUAH, 1989) the matrix of the long-run effects is assumed to be lower-triangular. This means that the ordering of the variables restricts the long-term effects, as the second variable cannot affect the first, the second cannot affect the third and so on… this is achieved through a Choelesky decomposition. For further analysis, this monograph could use variable reordering to test the robustness, as the long-term restrictions represent different theoretical settings.

Table 5: Blachard-Quah estimation of the structural model parameters, full sample

Estimated contemporaneous impact matrix, full sample						
	FX	selic	inflation	gdp_gap	f_gap	m_gap
FX	0.07576	0.04779	0.01709	-0.04013	0.01158	-0.00376
selic	-0.12881	0.17974	-0.07022	-0.12937	-0.01437	0.01666
inflation	-148.326	101.066	229.842	0.45095	-0.44953	-196.541
gdp_gap	0.02500	0.65925	-0.03049	0.82720	0.25582	0.26479
f_gap	-0.04436	-0.02851	-0.06165	-0.07462	0.30037	-0.11102
m_gap	-0.09388	0.01673	0.22538	-0.07280	0.13818	0.24317

Estimated identified long run impact matrix:						
	FX	selic	inflation	gdp_gap	f_gap	m_gap
FX	0.1346	0.000	0.0000	0.0000	0.0000	0.000
selic	-74.277	26.929	0.0000	0.0000	0.0000	0.000
inflation	-0.1765	8.861	59.399	0.0000	0.0000	0.000
gdp_gap	11.830	-0.578	-11.828	49.851	0.0000	0.000
f_gap	-0.0829	-1.269	0.4896	-0.9276	27.045	0.000
m_gap	0.2877	1.071	10.991	-0.5040	0.9203	1.332

Table 6: Blachard-Quah estimation of the structural model parameters, 2012-2018

Estimated contemporaneous impact matrix:						
	FX	selic	inflation	gdp_gap	f_gap	m_gap
FX	0.07535	0.05832	-0.011616	-0.01033	0.03654	0.01505
selic	-0.02888	0.05533	-0.106386	-0.05821	-0.03019	-0.11305
inflation	0.47274	-0.18845	1.461.189	-164.309	0.93138	-215.767
gdp_gap	0.11426	0.20666	-0.031221	104.287	0.40005	-0.50386
f_gap	-0.24159	-0.01070	-0.249427	-0.09903	0.30433	0.08136
m_gap	-0.19241	0.10909	0.001228	-0.01448	0.06775	0.05340

Estimated identified long run impact matrix:						
	FX	selic	inflation	gdp_gap	f_gap	m_gap
FX	0.1418	0.0000	0.000	0.0000	0.0000	0.000
selic	-41.216	95.646	0.000	0.0000	0.0000	0.000
inflation	0.5851	60.522	6.797	0.0000	0.0000	0.000
gdp_gap	33.602	-30.745	1.214	49.343	0.0000	0.000
f_gap	-18.929	0.5958	-1.718	-12.142	12.626	0.000
m_gap	-0.6242	16.567	1.203	0.3247	-0.6328	1.075

Conclusion:

In this monograph we aimed to build upon the literature that evaluates the effect of institutional change on macroeconomic performance. Brazil is most certainly a complex country to analyze, but it is also one with good surveys of expectations, so it provides a good playground for empirical macroeconomists.

While our identification strategy is quite simple, and possibly subject to criticism, it is a starting point on conjoint analysis of fiscal and monetary deterioration. In general, the results by using the credibility directly in the model and not as discrete exogenous regimes as many in the literature shows that a continuous deterioration of credibility bears very negative effects for the economy. This complements the regime switching literature, is not a substitute, as the regime switching literature lacks the capacity to evaluate the continuous process (as it evaluates two states: credible and non-credible) and our work does, on the other hand, they can capture non-linear effects that our analysis cannot.

This is a preliminary work that aims to start a research agenda of the effect of institutional deterioration on credibility and the business cycle. As such, preliminary results as positive as these, even if the identification strategy is not the best and as consistent as the one found on the frontier of macroeconomic and political economy research, is auspicious.

The general findings of this paper show that institutional deterioration leads to a change in agents' perception of the economy, and that the political scenario directly affect their economic decision. This effect may be more relevant than many Brazilian policymakers and analysts consider until it is too late.

The major policy implications are that fiscal and monetary responsibility, which means, following the rules, is fundamental for the stabilization of the business cycles. Furthermore, major economic policy changes lead to major political equilibrium changes which in turn hinder the ability to correct the deviations of rules, therefore, the cost of deviating from the rules is not confined to the usual time-inconsistency problem evaluated by macroeconomists.

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