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Fiscal rules for subnational entities: an analysis of the effectiveness of the rrf spending rule using the synthetic control method

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ABSTRACT

This work analyzes the effectiveness of the expenditure rule imposed by the Fiscal Recovery Regime in controlling the growth of primary expenditures in the Brazilian states that joined the Regime: Goiás, Rio de Janeiro and Rio Grande do Sul. Using the Synthetic Control Method, the study compares the actual trajectories of primary expenditures in these states with counterfactual scenarios, revealing that while Goiás and Rio Grande do Sul significantly reduced their primary expenditures, the expenditure rule proved ineffective in Rio de Janeiro. The analysis highlights limitations in the design of the rule, such as its rigidity and the lack of clear penalties, suggesting that, although the rule was successful in some states, adjustments are needed for its effective application in different fiscal and economic contexts.

Keywords: *Fiscal rules, expenditure rules, subnational governments, fiscal sustainability, synthetic control method.*
JEL: H62, H72, C02

SUMMARY

1. INTRODUCTION

Fiscal sustainability is one of the fundamental pillars for the economic stability and sustainable development of any nation. In Brazil, this issue is particularly important, given the history of fiscal imbalances and economic crises faced in recent decades. Since the implementation of the Real Plan in 1994, which stabilized the economy by controlling hyperinflation, the country has taken important steps to consolidate a more stable macroeconomic environment. However, significant challenges remain, especially with regard to managing the public finances of sub-national entities, which face diverse and often adverse socio-economic conditions.

In this context, the creation of mechanisms to promote fiscal responsibility and the sustainability of public finances has become fundamental. The Fiscal Responsibility Law (LRF), enacted in 2000, was an important milestone in this regard, establishing guidelines for responsible fiscal management at the federal, state and municipal levels. However, the persistence of fiscal problems, especially in the states, led to the creation of the Fiscal Recovery Regime (RRF) in 2017, with the aim of helping states in serious financial crisis to re-establish fiscal balance. The RRF imposes a series of strict conditions on the states that adhere to it, among which is the rule limiting the growth of primary expenditure. This rule aims to contain the increase in public spending by imposing a ceiling that prevents real growth in expenditure. Although the RRF was created to restore fiscal sustainability to states in difficulty, its effectiveness has been the subject of debate.

This paper aims to analyze in depth the effectiveness of the RRF spending rule in containing the growth of primary expenditure in the states that have joined the Regime. To do this, the Synthetic Control Method will be used, a robust technique that allows the construction of counterfactuals from the weighted combination of other control units, making it possible to compare the true state (subject to the RRF ceiling) and its synthetic version (without the intervention, i.e. without subjection to the RRF ceiling). The cases of the states of Goiás, Rio de Janeiro and Rio Grande do Sul will be analyzed, focusing on the fiscal years 2022 and 2023, the first years the spending rule is in force in these states.

In the end, it is hoped that the results of this research can contribute to the debate on the design and implementation of fiscal rules aimed at the sustainability of the public finances of sub-national entities and, in particular, contribute to the debate on the effectiveness of the RRF, specifically its spending rule, in restoring fiscal balance and ensuring the sustainability of state public finances.

Furthermore, this study will not only focus on evaluating the technical effectiveness of the RRF spending rule, but will also explore possible shortcomings in its design, suggesting possible points for improvement. The absence of hard-hitting penalties may have facilitated an environment in which some states, trusting in the possibility that the federal government will intervene to help them, have relaxed their fiscal policies. This behavior creates a significant moral hazard, where the expectation of external support can discourage strict compliance with fiscal rules, weakening the original purpose of the RRF. This analysis is particularly relevant in the case of the state of Rio de Janeiro, where it will be shown how the application of the RRF was not enough to curb the increase in primary expenditure, highlighting the need for a review of its design and implementation.

2. THEORETICAL FRAMEWORK

The sustainability of public finances, both at national and sub-national level, is essential for maintaining economic and social stability. This sustainability implies the ability of governments to manage their fiscal policies and debt levels in such a way that they can meet their present and future obligations, avoiding the need for abrupt fiscal adjustments that could harm economic growth and social welfare.

Unsustainable public finances can lead to the accumulation of leftovers and delays in the payment of debt service and other expenses, due to lower revenue growth, restrictions on credit operations and budgetary rigidity. In addition, as the government's credibility wanes, there is an increase in the cost of contracts for the supply of goods and services and credit operations. Generally, there is also a reduction in investments and spending on social programs, which are more discretionary in nature. In this context, it can be said that social responsibility is not possible without fiscal responsibility, guided by the principle of fiscal sustainability.

In sub-national entities, such as states and municipalities, fiscal sustainability ensures that they can finance essential public services, make necessary investments and service their debt without compromising their financial solvency.

According to Vammalle and Bambalaite (2021), the decisions made by subnational governments regarding their spending and debt levels can threaten national fiscal sustainability. Thus, inadequate regulation of subnational governments' debts can pose a risk to the country's overall fiscal health. The authors also present four types of risks in relation to subnational government debts:

1. Common fund problem: debt creates externalities between levels of government. Debt sustainability is determined by the joint actions of all levels of government. Increases in the debt of one part of the government can increase the debt of the general government, affecting the results and interest rates of the public debt;

2. Contagion risk: the financial problems of a subnational government, however small, can have major contagion effects on municipal and regional bond markets, increasing risk premiums for all subnational governments and even the central government;

3. Subnational public enterprises: subnational governments often own public enterprises whose debt is not accounted for in the national accounts, creating contingent liabilities. If these companies run into financial difficulties, subnational governments are expected to bail them out, which can damage their fiscal position;

4. Central government responsibility: central governments are often held politically responsible for the debts of sub-nationals, often in the form of implicit or explicit bailout guarantees. This can generate moral hazard, since sub-nationals, waiting for a bailout, can adopt unsustainable fiscal policies, increasing the government's overall debt.

In this context, fiscal sustainability requires not only prudence in the discretionary decisions of subnational governments, but also the implementation of institutional mechanisms that set specific limits. Thus, fiscal rules emerge as essential tools for maintaining fiscal discipline and ensuring the long-term sustainability of public finances.

Herrero et al. (2024) state that these rules, when well designed, accompanied by independent monitoring and compliance tools, can mitigate fiscal risks and foster responsible management. They are institutional mechanisms designed to impose numerical and procedural limits on certain fiscal indicators, such as the budget deficit, primary deficit, public debt and/or government spending, with the aim of maintaining fiscal discipline and ensuring the long-term sustainability of public finances. According to Sutherland et al. (2005), fiscal rules can be seen as a set of institutional restrictions on policymakers' discretionary decision-making. Such rules can be imposed on subnational governments by a higher level of government, or subnational governments themselves can adopt them when constitutional arrangements give them the autonomy to do so.

Furthermore, it is important that numerical fiscal rules are associated with a fiscal framework, which has five necessary complementary components: debt targeting, fiscal rules, independent fiscal councils, budget processes and medium-term budgeting (Fall et al., 2015).

Fiscal rules have evolved significantly since the end of the 20th century, with two gene-

rations of rules over time: the first-generation fiscal rules were designed to promote long-term fiscal sustainability, although they demonstrated pro-cyclical effects; in turn, the second-generation rules, implemented after the 2008 global financial crisis, also sought to foster fiscal sustainability, but at the same time protect long-term economic growth (Herrero et al., 2024).

De Biase and Dougherty (2022) argue that they were widely adopted in the early 1990s, initially focused only on central governments with the aim of reducing excessive indebtedness. Over time, these rules expanded to include both central or national levels of government as well as sub-national ones, encompassing a wider range of policy objectives beyond just containing debt and promoting sustainability. For the authors, it is a challenge to design fiscal rules that achieve three main objectives: (i) promoting fiscal sustainability, (ii) fostering economic stability and growth (allowing countercyclical policies), and (iii) improving resource allocation (or avoiding drastic changes in the composition of the budget). It is important to note that there are *trade-offs* in the choice of fiscal rules and, ultimately, the design of these rules is a political choice that favors one or more of these objectives.

To achieve these objectives, various types of tax rules can be adopted:

1. Outcome rules: common at local and regional levels, these rules impose limits on the deficit or require surpluses to control debt;

2. Debt rules: establish numerical limits for public debt, usually as a percentage of revenue or GDP, which are essential to maintain fiscal sustainability in the long term, but can induce pro-cyclical policies;

3. Spending Rules: limit the growth of public spending to defined rates, usually linked to GDP or revenue growth. They are often used in combination with Outcome Rules at regional levels to foster counter-cyclical fiscal policies;

4. Revenue rules: these rules establish ceilings or floors on revenue and are intended to boost collection and/or prevent an excessive tax burden. They are not directly linked to public debt control, as they do not restrict spending (Kumar et al., 2009).

When evaluating which type of fiscal rule is most appropriate - whether it is an income, debt or spending rule - it is important to consider the specific objectives and circumstances of each government. De Biase and Dougherty (2022) provide a clear comparison of each type of rule, which can be seen in more detail in Table 8.1, in the APPENDIX, reproduced from the authors' work, presenting, for each type of rule, the different implications in terms of fiscal sustainability, economic growth and budget composition.

The Outcome Rules focus on maintaining a balance between income and expenditure.

They are useful as short-term targets for fiscal policy, especially for adjusting debt levels, but can induce pro-cyclical fiscal policies if they are not well designed. These rules help prevent unsustainable increases in debt by ensuring that spending does not exceed revenues.

On the other hand, Debt Rules seek to limit the accumulation of public debt, usually expressed as a percentage of GDP. These rules serve as long-term goals to ensure fiscal sustainability and stability. However, they may be less flexible in the short term, as significantly reducing debt levels may require longer periods, limiting the government's ability to respond to unexpected economic shocks.

Finally, Spending Rules are designed to limit the growth of public spending and have multiple advantages for effective and transparent fiscal management, as they allow governments to directly manage a variable that is under their immediate influence, addressing the main source of the deficit bias by limiting spending (Herrero et al., 2024). Spending rules can reduce the procyclicality of spending, making fiscal policy more countercyclical during economic fluctuations. One of the factors contributing to this is that spending rules generally exclude so-called "automatic stabilizers", which allows them to mitigate the impacts of economic fluctuations without intensifying them. However, these rules may not directly control the fiscal result or debt levels, as they often do not take into account variations in revenue. Therefore, in order to complement their effectiveness and avoid pro-cyclical effects, spending rules are often integrated with Income or Debt rules, which helps governments to maintain balanced and sustainable fiscal management in the long term.

Given the multiplicity of tax rules that can be implemented, many economies that prioritize fiscal responsibility and the sustainability of their finances, such as the Eurozone and Spain, have implemented tax frameworks that integrate different types of rules. This integration is based on the understanding that combining different rules can significantly improve their individual beneficial effects (Herrero et al., 2024).

Herrero et al. (2024) state that previous literature on fiscal rules has faced significant challenges due to endogeneity. In particular, the passage of a fiscal rule can be indicative of a society or political class that is already more committed to fiscal discipline, which implies that the observed effects of the rule might not be attributable solely to its implementation, but also to pre-existing conditions in fiscal behavior. To deal with the problem of endogeneity, the authors of the study use the *Synthetic Control Method* (SCM), which allows them to control for unobservable factors that may be correlated with the unit being treated. In summary, the problem of endogeneity poses challenges when assessing the effectiveness of fiscal rules, since it makes it

difficult to directly attribute fiscal results to the rules themselves.

Still on the subject of spending rules, it is important to say that transparency and ease of monitoring simplify public and market understanding of fiscal policies, strengthening investor confidence. Although not their main objective, these rules can encourage efficient reforms in the use of public resources, forcing spending to be prioritized.

According to Manescu and Bova (2020), spending rules, as fiscal policy instruments, present a unique set of advantages and disadvantages compared to other types of fiscal rules. These rules can significantly influence the stability of budgetary policy throughout economic cycles. One of their main advantages is their ability to reduce the pro-cyclicality of public spending. This means that they can help prevent governments from excessively increasing spending during good times and drastically reducing it during recessions, thus promoting greater economic stability. In addition, compared to other fiscal rules, spending rules tend to have higher compliance rates. This is because, as said, the spending aggregates covered by this rule are directly under government control, making it easier for governments to adhere to them.

However, the implementation of spending rules can also bring disadvantages. It could cause a change in the composition of public spending, favoring expenditures in areas that are politically difficult to cut, such as wages and public consumption, to the detriment of capital investments, which are more crucial for long-term growth. In addition, these rules could reduce incentives to mobilize revenue and implement fiscal reforms.

According to De Biase and Dougherty (2022), spending rules, due to their simplicity, seem appropriate for subnational governments, which generally have more limited technical and institutional capacities. However, these rules are less likely to be applied at the sub-national level for several reasons. Firstly, the smaller the level of government, the less autonomy it has to spend - in the case of local governments. In addition, at lower levels of government, the greater the proportion of spending on basic services, such as health and education, which are more difficult to reduce. This is generally the case for regional governments, although despite this difficulty, spending rules have been implemented more frequently in states than in municipalities.

In addition, a substantial part of subnational governments' revenue comes from intergovernmental transfers. Part of this revenue is earmarked for specific expenses, which can make it difficult to comply with spending rules when there is an increase in earmarked intergovernmental transfers. Finally, due to the strong deficit bias at the subnational level, relying solely on spending rules may fail to achieve the objective of improving the fiscal sustainability of subnational entities, since these rules control neither the fiscal result nor indebtedness.

Thus, when applying spending rules to subnational governments, these problems need to be addressed. It may often be necessary to combine spending rules with another fiscal anchor and, in addition, it may be necessary to exclude from the limitation spending financed by tied intergovernmental transfers and other spending of a mandatory nature, such as court decisions.

2.1 Design and effectiveness of tax rules

The heterogeneity between jurisdictions in terms of economic conditions, population size and other factors makes the design of universal fiscal rules complex, and more personalized approaches adjusted to each context may be necessary. This is because subnational governments generally face greater restrictions in obtaining loans and do not have the same capacity as a central government to influence the market, such as issuing national debt or implementing monetary and fiscal policies that can affect market conditions, and cannot take advantage of the same tools and resources as the central government (De Biase and Dougherty, 2022).

Eyraud et al. (2020) highlight some of the challenges of designing fiscal rules for subnational governments. Subnational governments often have limited autonomy over spending, as spending requirements are set by higher levels of government, which hinders their ability to adjust services and reduce deficits. In this context, it should be noted that states are obliged to provide a series of essential public services, such as health, education and access to justice. It is important to say that there have been recent court rulings which have considered that this obligation takes precedence over compliance with fiscal rules. One example is ADI No. 6930-DF, which excludes spending on justice-related funds from the limitation on the growth of primary expenditure in the RRF. In addition, sub-national entities generally have relatively smaller revenue bases, which makes it difficult to generate sufficient funds through taxation to meet their financial obligations.

Subnational budgets are often rigid, with a significant portion earmarked for essential services such as education, health and social support programs, complicating the implementation of fiscal rules, especially if applied to specific budget aggregates such as current expenditure. Data limitations at the subnational level can restrict the types of fiscal rules that can be considered, and delays in financial reporting and the submission of incomplete information can make it difficult to effectively monitor and enforce fiscal rules (Eyraud et al., 2020).

In addition, subnational rules tend to be more intrusive and directive compared to national ones, with strict borrowing restrictions and administrative controls imposed by the central

government, which can limit the autonomy of subnational entities in designing their fiscal rules and policies. Finally, the greater risk of fiscal indiscipline at the subnational level may require stricter deficit containment rules, such as balanced budget rules or borrowing restrictions, to ensure fiscal stability and sustainability. At the same time, these rules should allow flexibility for decentralized decision-making, adapted to local needs.

It is therefore essential that fiscal rules, especially for subnational governments, are well designed. According to De Biase and Dougherty (2022), several authors agree that in order to overcome these difficulties and achieve their objectives, the following institutional elements must be considered:

Imposition of the rule: tax rules can be self-imposed by the subnational entities themselves, imposed by higher levels or negotiated between different levels. Self-imposed rules tend to have greater commitment and can vary between jurisdictions, while imposed or negotiated rules tend to be more homogeneous.

Legal basis: the higher the hierarchy of the legislation that defines the tax rule, the more difficult it is to change and the more likely it is to be applied. Rules laid down in the constitution or complementary laws are stronger than those laid down in legal acts or political compromises.

Monitoring: for tax rules to be effective, accurate and timely tax information is needed. Mandatory corrective action in the event of a risk of significant non-compliance can also improve the effectiveness of the rule. The presence of independent tax institutions that monitor compliance also strengthens enforcement mechanisms.

Reporting: the body that officially verifies compliance with the rules is very important, as sanctions and corrections depend on its decision. These bodies can be higher levels of government, the sub-national entities themselves or an external and independent body, such as courts of auditors or fiscal councils.

Sanctions: sanctions are the most important mechanism for ensuring compliance with the tax rule. Without sanctions, compliance may not be credible. Financial sanctions and corrective measures, institutionalized rescue procedures (which can imply a substantial loss of autonomy for higher levels of government) and the personal liability of officials are some of the types of sanctions adopted in OECD countries.

Supervision: if information on compliance is easily available in a standardized way, politicians and the media can discuss the fiscal performance of subnational entities with the public, increasing public support for the application of the fiscal rule. Public pressure is important, since the sanction can be discretionary and overturned by the supervisor's decision.

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Escape clauses: some fiscal rules can prevent countercyclical fiscal policies in times of recession. Well-designed escape clauses define clear and extraordinary conditions under which compliance with fiscal rules can be temporarily revoked, providing flexibility in the event of shocks.

Accounting standards: having a common budget classification and common accounting standards can improve transparency and allow comparisons between entities.

In order to be well designed, fiscal rules must be clear and transparent, ensuring that their purpose and application are easily understood by all stakeholders. They must demonstrate consistency over time and provide predictability in their application, allowing subnational entities to effectively plan their fiscal activities. It is essential that these rules offer flexibility to respond to diverse local needs, allowing tax policies to be adapted to the specific challenges of each region. In addition, effective fiscal rules strike a balance between the imposition of restrictions necessary to prevent fiscal imbalances and the flexibility for decentralized decision-making. They must also align with the broader national fiscal framework, taking into account the unique characteristics and responsibilities of subnational governments (Eyraud et al., 2020).

Adaptability to changing economic conditions is another important feature, to allow adjustments that avoid pro-cyclical budget policies. They should focus on long-term sustainability, offering lasting constraints without being excessively rigid. Finally, involving relevant stakeholders in the design and implementation of fiscal rules improves their acceptance and effectiveness (Eyraud et al., 2020).

As far as rule selection is concerned, the most common combination of fiscal rules at state level is a balanced budget rule combined with a spending rule. State governments tend to enjoy greater levels of autonomy than local governments, which makes it easier to apply spending rules at this level of government. It is worth noting that the combination of balanced budget rules and spending rules can be particularly useful for promoting a counter-cyclical fiscal policy, as long as there are escape clauses. In periods of economic expansion, government revenues, which are linked to economic performance, tend to grow more than spending, which makes it easier to meet fiscal targets. Without a spending rule, governments could simply adopt a pro-cyclical fiscal policy, increasing spending during a period of economic growth. However, if there is a spending rule, the government will be obliged to limit its spending, generating surpluses that can be used in future recessions, if the escape clauses allow it (De Biase and Dougherty, 2022).

As we have seen, the design of fiscal rules is an essential element in guaranteeing long--term fiscal sustainability, especially for sub-national entities. The ability of states to meet their

fiscal obligations without compromising economic growth or the provision of public services depends on a robust and well-adapted fiscal framework. In Brazil, this challenge is particularly relevant due to the diversity and complexity of economic realities and regional needs among the states. The country has a wide range of socio-economic conditions, from highly developed states with greater fiscal capacity to less economically favored regions that face significant challenges in maintaining fiscal sustainability without compromising the provision of essential public services. The next chapter will analyze the evolution of fiscal rules in Brazil's sub-national entities.

3. EVOLUTION OF TAX RULES IN BRAZIL

The evolution of tax rules in Brazil has been a dynamic and complex process, driven by the need to stabilize an economy marked by periods of hyperinflation and fiscal imbalances. In the 1980s and early 1990s, Brazil faced a critical economic situation, characterized by uncontrolled hyperinflation that exceeded 2000% per year, a constant erosion of the population's purchasing power and macroeconomic instability that affected both consumers and investors. During these years, the country faced persistent fiscal deficits, growing public debt, an environment of uncertainty that made it difficult to develop efficient and sustainable policies, a significant deterioration in the economy, with profound impacts on the quality of life and the government's ability to manage public finances responsibly.

The Real Plan, born in 1994, was a set of economic measures designed to control the hyperinflation that had plagued the country since the 1980s. The main economic implication of the Real Plan was the stabilization of the currency and the drastic reduction in inflation. Before the Plan, Brazil faced hyperinflation that reached 2491% a year. With the introduction of the Real, inflation was reduced to less than 10% a year, creating an environment of greater economic predictability.

The stabilization of inflation brought with it a significant increase in consumer and investor confidence, allowing for greater economic growth, an increase in the population's purchasing power and the expansion of credit. From a fiscal point of view, the Real Plan required a series of adjustments to ensure the sustainability of public accounts. However, reducing inflation alone would not solve the country's fiscal problems. It was necessary to implement measures to contain public spending and increase tax collection.

In the budgetary sphere, the economic stabilization promoted by the Real Plan allowed

for better management of public resources. The predictability of inflation made it easier to draw up more realistic annual budgets (previously, budgets were pieces of fiction) and to implement more efficient public policies. In addition, price stabilization made it possible for the federal government and state and municipal governments to plan and execute their spending more effectively, without the constant erosion of values caused by hyperinflation.

However, it is important to note that price stabilization alone was not enough to solve the fiscal problems of the federation's entities. On the contrary, structural problems relating to debt sustainability, especially in the states, worsened in the 1990s and persist to this day. In the first half of the 1990s, the public sector showed less fiscal imbalance than in the previous decade. The delay in the payment of public expenditures allowed for a reduction in real spending in an environment of high inflation, while tax revenues were reasonably corrected (Caldeira et al., 2016).

During the 1990s, the states faced a fiscal crisis associated with increased spending in the public sector and the growing weight of pensioners, which was aggravated by the high costs of refinancing their securities debts, due to high interest rates, and also by the end of the inflation tax with the implementation of the Real Plan. The renegotiation of the debt in 1993, through Law No. 8.727/1993 (Brasil, 1993), offered momentary relief to sub-national finances, but it was not enough, as it did not cover all the debts, nor did it require a fiscal adjustment counterpart (Almeida, 1996).

The state debt crisis of the 1990s culminated in the restructuring of state debt in 1997 and 1998, which was formalized by Law No. 9,496/1997 (Brazil, 1997), which required entities to meet targets or commitments.

However, even the debt restructuring of 1997-98 was unable to introduce sufficient conditions for the sustainability of the federal entities. In order to ensure long-term sustainability and maintain the gains made, it was necessary to complement them with rigorous fiscal management. In this context, Complementary Law 101/2000 (Brasil, 2000), the Fiscal Responsibility Law (LRF), consolidated this environment of fiscal discipline. The improvement in state debt indicators since the 2000s can be attributed both to the requirements of the LRF and to debt restructuring (Caldeira et al., 2016).

The LRF mandated the publication of detailed fiscal reports and adherence to strict budget limits, making it easier for citizens to monitor government spending and financial performance. Ultimately, the LRF was motivated by the broader goal of promoting sustainable economic growth by creating a stable macroeconomic environment conducive to investment, job creation

and long-term prosperity, while ensuring fiscal discipline and transparency. In order to achieve these objectives, the LRF itself establishes various fiscal rules, designed to impose limits on spending, indebtedness and the granting of tax benefits.

In Brazil, the first significant fiscal rule was the "Golden Rule", established in CF/88 (Brazil, 1988). This rule prohibits the government from contracting credit operations that exceed the amount of capital expenditure, avoiding an unsustainable increase in public debt. Subsequently, the LRF introduced various fiscal and budgetary rules for all levels of government (the Union, states, Federal District and municipalities). In addition, Constitutional Amendment 109/2021 also implemented some fiscal and procedural rules with the aim of guaranteeing the sustainability of subnational governments' debt.

Table 8.2, in the APPENDIX, shows the multiplicity of fiscal rules to which subnational entities are subject. However, even with this great tangle of rules, unsustainable public accounts still represent a significant challenge for Brazil's sub-national entities, which demonstrates the need to re-evaluate the design of these fiscal rules.

In addition, it is important to mention that the Union has created a program to help states in a situation of serious financial imbalance, called the Fiscal Recovery Regime (RRF), which also imposes a set of new fiscal rules.

The RRF is a tool created by the federal government, through Complementary Law (LC) No. 159/2017, to deal with the situation of serious financial imbalance faced by some Brazilian states and arises in a context of fiscal crisis, with several sub-national entities facing difficulties in meeting their financial obligations, due to the significant increase in their debt levels and the drop in their ability to generate sufficient revenue to cover their expenses. It is presented as a solution to provide temporary relief and allow states to regain their financial stability. This temporary relief measure is implemented by means of an extraordinary reduction in debt service payments, so that in the first year the state pays nothing (0% payment), and annually the payments increase by 11.11 p.p. until the tenth year or until the state achieves fiscal balance.

However, the RRF is not limited to offering financial relief, but also imposes a series of strict conditions to ensure that the benefiting states commit to implementing fiscal adjustment measures, among which are the reduction of shareholdings in companies, adoption of the rules applicable to federal civil servants, both in the Social Security System and for active civil servants, reduction of tax benefits, implementation of a rule limiting the growth of primary expenditure, among others. In addition to the aforementioned adjustment measures, states that adhere to the RRF are prohibited from adopting measures that: (1) increase spending and indebtedness;

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and (2) create revenue links or reduce revenue collection (see art. 8 of LC 159/2017).

However, it's worth saying that the implementation of the RRF has generated debates around its effectiveness and the repercussions of its requirements on the fiscal autonomy of the states. Although it is undeniable that the Regime offers much-needed relief to states in crisis, the restrictions imposed and the reforms required can be seen as a federal intervention in the management of sub-national public finances, perceived as an erosion of state autonomy and as an imposition of criteria that do not necessarily reflect regional realities.

ADI No. 6930-DF is a clear example of how states have challenged the loss of autonomy under LC No. 159/2017, which established the RRF. This lawsuit was filed by states arguing that the measures imposed by LC 159/2017, by severely restricting the financial and administrative decisions of states adhering to the RRF, violate the principle of federative autonomy guaranteed by Brazil's Federal Constitution. According to the states, these restrictions not only compromise the ability of local governments to respond to the needs of their population, but also constitute an undue invasion by the federal government into competencies that should be exclusive to the states.

In the end, the STF unanimously ruled in ADI No. 6930-DF that all expenses paid with resources destined for the special public funds established by the Judiciary, the Courts of Auditors, the Public Prosecutor's Office, the Public Defender's Office and the Attorney General's Office of the States and the Federal District to carry out their activities are excluded from the limitation on the growth of primary expenses established by Complementary Law No. 159/2017. It also clarified that vacant positions can be replaced, provided that they have already been filled at some point in the past.

Despite these questions, the RRF is a program that has helped some states on their path to fiscal balance. Among the rules, restrictions, adjustment measures and tools provided by the RRF, the fiscal rule that limits the growth of primary expenditure to the variation in inflation stands out. With regard to this rule, it should first be noted that it is a very rigid rule, since primary expenditure cannot grow over the years in real terms. The rule therefore ignores economic and population growth, which may require an increase in the supply of public services.

Although it is a very rigid spending ceiling, there are exceptions to the limitation, established by LC 159/2017 itself: (1) court judgments; (2) expenses covered by transfers from the Union with binding application; (3) expenses with the minimum constitutional applications in health and education; and (4) expenses of the special funds linked to Justice. As for the design of the RRF spending rule, the following aspects should be noted:

Imposition of the rule: in order to join the RRF, the state must institute mechanisms to limit spending through state legislation. Thus, although Complementary Law No. 159/2017 imposes the obligation to implement a spending ceiling, the state that wishes to join the Regime must self-impose the spending rule through state legislation.

Statutory basis: the RRF requires that the spending rule be imposed by legislation of the state that wishes to join the Regime. In Goiás, the rule was materialized in the ADCT of the State Constitution. In Rio de Janeiro and Rio Grande do Sul, the rule was introduced through Complementary Laws.

Monitoring: in Goiás, the Secretariat for the Economy constantly monitors the spending ceiling in order to correct deviations, while in Rio de Janeiro and Rio Grande do Sul this is done through their respective Finance Secretariats. On the other hand, the respective State Audit Courts carry out an independent inspection of compliance with the rule.

Report: the Federal Government's National Treasury officially verifies that all states comply with the spending rule.

Sanctions: there are no explicit sanctions in Supplementary Law 159/2017 for non-compliance with the spending ceiling. It is inferred that non-compliance with this ceiling would constitute a violation of the fiscal commitments stipulated in the Fiscal Recovery Plan and, in this case, the sanction would be the extinction of the RRF after two years of non-compliance.

Supervision: information on compliance is available both on the website of the Secretariat for the Economy or its equivalent in the states, and on the website of the National Treasury Secretariat.

Escape clauses: there are no escape clauses.

Accounting standards: LC 159/2017 requires states that adhere to the RRF to observe the accounting standards issued by the central accounting body of the Union.

With regard to the design of the Fiscal Recovery Regime's spending rule, the strengths are the imposition of the rule, the statutory basis, monitoring, supervision, reporting and accounting standards. Weaknesses include the absence of effective sanctions for non-compliance and the lack of an escape clause. In addition, the spending ceiling is measured in the aggregate of the state and not by branch or autonomous body, which means that responsibility for compliance with the ceiling falls mainly on the executive branch.

Finally, it is worth mentioning that there are currently three states with the Fiscal Recovery Regime in force: Goiás, Rio de Janeiro and Rio Grande do Sul. These states have been under RRF regulation since 2022.

Considering that the RRF spending rule is fundamental to rebalancing the finances of states under the Fiscal Recovery Regime, this study aims to evaluate the effectiveness of this rule. To this end, the Synthetic Control Method will be used, which will be explained in more detail in the next chapter, to compare the actual primary expenditure trajectories of the three states currently under the RRF with the primary expenditure trajectory of the counterfactual.

4. QUANTITATIVE THEORETICAL FRAMEWORK AND METHODOLOGY

The evaluation of public policies has established itself as a fundamental practice in government, aimed at identifying how a set of government actions influences specific variables. Typical methodologies include comparing the unit targeted by the policy with other unaffected units, or a temporal comparison of the same unit before and after the implementation of the policy. However, these comparisons present inherent challenges, especially in the context of the social sciences, where conducting randomized experiments is complex.

Simple comparisons between results before and after the implementation of a public policy can be influenced by time trends in the outcome variable or by the interference of events other than the policy that occurred between the two periods. However, when only part of the population is exposed to the public policy, an untreated comparison group can be used to identify the temporal variation in the outcome that is not due to exposure to the treatment.

Some methods use variations on this idea, such as the *Difference in Differences* (DiD) estimator, *Propensity Score Matching* (PSM) and the *Synthetic Control Method* (SCM). All these methods are used to try to estimate the causal effect of a treatment or intervention, controlling in some way for endogeneity or possible biases. The DiD method is simpler and focuses on temporal differences; the PSM focuses on pairing treated and untreated units based on observable characteristics, while the SCM constructs a synthetic or counterfactual unit, formed by a weighted combination of several (untreated) control units, which resemble the treated unit as much as possible.

An important example of an experiment using the *difference-in-differences* method is the pioneering work by Card and Krueger (1994), which evaluated the impact of an increase in the minimum wage in New Jersey on employment levels in the *fast food* industry, compared to Pennsylvania, which did not experience a similar wage increase. The authors found no evidence that the increase in the minimum wage led to an increase in unemployment. In fact, the increase in the minimum wage correlated slightly with an increase in employment in New Jersey, com-

pared to Pennsylvania, where the minimum wage remained constant at 4.25 dollars per hour.

However, in some cases, the use of difference comparison techniques can be hampered by the existence of a small number of treated and/or comparison units. Considering that you generally don't want a comparison before and after the policy, but a comparison with and without the policy, an alternative is to compare a treated unit with a very similar but untreated unit.

This strategy presents two main difficulties: (1) which dimensions to use to determine whether two units are similar; and (2) how to avoid the peculiarities of the chosen unit. Abadie and Gardeazabal (2003) faced these problems when assessing the impact of terrorism in the Basque Country. In the early 1970s, the Basque Country was one of the richest regions in Spain, but at that time a wave of terrorism began which lasted until 2011. After thirty years of terrorism, the Basque Country fell to sixth place in GDP per capita. The authors wanted to determine how much of this drop was due to terrorism.

A before and after comparison could confuse the effects of the recession that affected Spain during the 1970s. A comparison with other regions could ignore specific factors that could have made those regions grow more than the Basque Country, even without terrorism. The authors then solved these problems by using regions of Spain to create a synthetic version of the Basque Country and comparing the observed data for this region with the simulated data for the synthetic version. This method became known as the *Synthetic Control Method* (SCM).

The SCM, developed by Abadie and Gardeazabal (2003) and later expanded by Abadie, Diamond and Hainmueller (2010), makes it possible to compare the trend of a region affected by a policy with a synthetic region created from multiple observed regions. The synthetic control unit is configured as a weighted average of the available control units that best replicate the characteristics of the treated unit before treatment.

The Synthetic Control Method has been applied in several studies to evaluate the effects of shocks and public policies. Abadie, Diamond and Hainmueller (2010) used the method to evaluate the impact of Proposition 99 on cigarette consumption in California. Proposition 99 increased the tax on cigarettes by 0.25 dollars per pack and earmarked the revenue generated for health, education and anti-tobacco advertising. To create the synthetic unit, they used a panel of data from US states between 1970 and 2000. As Proposition 99 came into force in January 1989, the pre-intervention period was nineteen years. To construct the synthetic unit, states that adopted strong measures against cigarette consumption in the same period were excluded from the sample. The results indicate that, in 2000, annual cigarette sales per capita in California were approximately 26 packs lower than they would have been without the intervention. In

addition, they carried out placebo tests to validate their findings, showing that the probability of obtaining results as extreme as those seen for California, if the intervention state was selected at random, was very low (0.026).

Possebom (2017) analyzes the economic impacts of the Manaus Free Trade Zone (ZFM) on real GDP per capita and sectoral production in Manaus throughout the 20th century. Using the SCM, the author constructs a counterfactual for Manaus based on control regions. Among the main conclusions is the significant positive effect of the ZFM on the city's real GDP per capita, indicating that this policy promoted regional economic growth. In the last year observed (1999), the estimated impact on GDP per capita was R$ 2,880, while Manaus' real GDP per capita was R$ 6,593, implying that the impact of the ZFM represented 44% of the result achieved. The economic effect of the Manaus Free Trade Zone has a p-value of 6.12% for real GDP per capita, 6.52% for total production per capita in Agriculture, 63.64% for total production per capita in Industry and 2.50% for total production per capita in Services. The lack of significance in the results for the industrial sector suggests that the policy failed to achieve its main objective.

Ardanaz et al. (2019) investigate the impact of fiscal rules in several Latin American countries using the SCM, focusing on the role of these rules in stabilizing economies that are highly dependent on volatile commodity prices. In the case of Panama and Peru, the period analyzed covers 1999 to 2015, with 2005 being the year of the intervention in Panama and 2003 in Peru. For Colombia, the study covers the period from 2007 to 2015, with the intervention taking place in 2010. The IMF's 2017 fiscal rules database was used to exclude countries that had some kind of fiscal rule. The period of analysis begins in 1999 and ends in 2015, covering a total of 40 countries in the control group. The results of the study indicate that countries with well-designed fiscal rules, supported by a solid legal and institutional framework, tend to experience greater fiscal discipline and economic stability. Robustness tests confirm the reliability of these results. The p-values for Panama, Peru and Colombia are 0.025, 0.026 and 0.1, respectively.

Pfeil and Feld (2016) investigate the effectiveness of Switzerland's federal debt rule, using the SCM to assess the impact of the debt brake on Swiss federal finances. They compare actual fiscal outcomes with a synthetic control unit, created from a weighted average of other OECD countries. The pre-intervention period covers 1995 to 2002, while the post-intervention period is limited to five years (2003-2007). Initial analyses suggest that the probability of finding a country in the control group with a post/pre-intervention MSPE ratio the size of Switzerland's or higher is 1/24, i.e. a p-value of 0.042. When excluding 7 countries from the sample, a p-value of 0.067 (1/15) was obtained. These values indicate statistically significant results, suggesting

that the improvement observed in Switzerland's budget result is unlikely to be due to random variation. The results of the study indicate that the introduction of the Swiss debt brake improved the cyclically adjusted budget result by approximately 3.6 percentage points of GDP on average over the five years following its implementation.

Kraemer and Lehtimäki (2023) use the SCM to analyze the impact of European integration and the creation of the European Union's fiscal framework on the public debt of member states. The sample used in the study covers data from 1972 to 2019, with 21 years of pre-treatment, from 1972 until the formation of the European Union in 1993. The study suggests that the European Union's fiscal rules have had a significant restrictive effect on the growth of public debt. However, country-specific factors, as well as monetary policy arrangements, also appear to have had an influence. One of the main robustness tests carried out in the study includes extending the comparison sample to 13 additional countries outside the OECD and the European Union, where data is available, in order to verify that the results are not biased by the initial selection of comparison countries. Another robustness test involves the use of spatial placebos, where each country in the control group is treated as if it were the "treated country". Finally, the study employs a "placebo in time", where the intervention is hypothetically set to different pre-intervention years. The placebo tests confirm that the observed impacts of European integration and fiscal rules on public debt are not due to chance.

Strong (2023) uses the SCM to assess the impact of adopting numerical fiscal rules on the debt/GDP ratio in CFA zone countries[1]. This debt rule establishes an explicit limit that acts as a ceiling for the ratio of public debt to GDP; in the case of the CFA zone countries, this ceiling is set at 70% of GDP. The data used in the analysis covers 49 countries from 1980 to 2013, of which 13 are CFA zone countries (the treated units) and 36 are non-CFA zone countries. Of these 36 non-CFA countries, 9 are non-African countries. Of the 13 CFA zone countries, 5 had the intervention year in 2002 (Central Africa region), and 8 countries had the intervention in 2000 (West Africa region). The results show that the implementation of strict numerical fiscal rules generates a statistically significant decrease in public debt in several countries, especially in the West African region (5 out of 8 countries). In the Central African region, only Congo, out of a total of 5 countries, showed statistically significant results, although these were slow to manifest themselves. The author points out that these results are due to the fact that the countries in the West African region have stricter enforcement mechanisms and, on average, stronger

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1   The CFA zone is the largest monetary union in Africa and the second largest in the world, after the euro zone. It refers to the regions of Africa where the CFA Franc is the official currency.

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institutions than the Central African countries.

Finally, Herrero et al. (2024) presents an investigation, for both general and local government, of the Spanish spending rule, in force since 2012, using the SCM. It was found that the rule effectively limited the growth of current and primary expenditure in both general and local government. In general government current expenditure, statistical inference shows that the results obtained are unlikely to be due to chance, with standardized p-values of 0.05 in the first year and 0 in subsequent years. For local government current expenditure, the synthetic unit showed a weaker fit, with lower statistical significance and non-significant results in 2013 and 2017. However, the results were significant in the other years. With regard to general government primary spending, the analysis of the post-MSPR/pre-MSPR ratio clearly highlights Spain, with a significantly higher ratio than any other control country. In local government primary expenditure, the first three post-treatment years showed highly significant impacts, with standardized p-values of less than 0.01, and Spain occupying the second position in the post-RMSPE/pre-RMSPE ratio, surpassed only by Hungary, which indicates that the results observed are not the result of chance.

As we have seen, the SCM emerges as a powerful technique, especially in situations where the number of units treated is limited and a solid counterfactual is needed to infer causal impacts. The following section will deal with the mathematical formulation of this model, providing the necessary theoretical bases for its correct application in economic and fiscal impact studies.

4.1 Formalization of the Synthetic Control Method

The formal presentation of the method can be found in Abadie, Diamond and Hainmueller (2011): consider that $j = 1,..., J+1$ units are observed in periods t = 1, ..., T, and that the first unit has been subjected to a certain intervention, so that the remaining units are used to form the synthetic control. The group of control units is called the *donor pool*. Define Y_{it}^N as the values of the variable of interest for unit i in period t if the unit has not undergone the intervention, and Y_{it}^I as the values of the variable if the unit has undergone the intervention. The synthetic unit must be able to reproduce the treated unit not only in the variable of interest, but in a set of relevant variables. The aim is to estimate the effect of the intervention on the outcome of the treated unit in the post-intervention period, which can be defined as the difference between the two potential outcomes $\alpha_{1t} = Y_{1t}^I - Y_{1t}^N$ for the periods $T_0+1, T_0+2,...,T$, where T_0 is the period

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before the intervention. It would be desirable to construct a synthetic control that resembles the treated unit in all relevant characteristics before the intervention. To formalize this idea, let Ui a vector $r \times 1$ of relevant variables observed for each unit, also define the vector $K = (K_1, ..., K_{T0})'$ as the weights of a linear combination for the relevant variable before the intervention: $\bar{Y}_i^K = \sum_{s=1}^{T_0} K_s Y_{is}$ These combinations can be used to control characteristics whose effects vary over time.

To build the synthetic control unit, it is necessary to create a vector of $(J \times 1)$ of weights $W = (w_2, ..., w_{J+1})'$ with $w_j \geq 0$ y $\sum_{j=2}^{J+1} w_j = 1$ 2re each element of the vector represents the weight of an observed control unit. Abadie and Gardeazabal (2003) and Abadie, Diamond and Hainmueller (2010) propose choosing the vector of weights W^*, such that the synthetic control unit obtained best approximates the unit that underwent the intervention in relation to U_i and $M \leq T_0$, linear combinations for the variable of interest before the intervention. Formally, W^* is such that

$$\sum_{j=2}^{J+1} w_j^* \bar{Y}_j^{K_1} = \bar{Y}_1^{K_1} \cdots \sum_{j=2}^{J+1} w_j^* \bar{Y}_j^{K_M} = \bar{Y}_1^{K_M} \quad y \quad \sum_{j=2}^{J+1} w_j^* U_j = U_1$$ Thus: $\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}$; the estimator of α_{1t} in the periods after the intervention.

To implement the synthetic control estimator numerically, it is necessary to define a distance between the synthetic control unit and the treated unit. To do this, simply combine the characteristics of the treated unit in the matrix, (k x 1), $X_1 = (U_1', \bar{Y}_1^{K_1}, ..., \bar{Y}_1^{K_M})'$, and the values of the same variables for the control units in the matrix X_0, (k x J), with the jth row $(U_j', \bar{Y}_j^{K_1}, ..., \bar{Y}_j^{K_M})'$ Note that $k = r + M$. The vector of weights is calculated so as to minimize:

$$\|X_1 - X_0 W\|_V = \sqrt{(X_1 - X_0 W)'V(X_1 - X_0 W)}$$

where $V_{k \times k}$ is symmetric positive semidefinite. An optimal choice of V assigns weights that minimize the mean square error of the synthetic control estimator, i.e. the expectation of $(Y_1 - Y_0 W^*)'(Y_1 - Y_0 W^*)$. In the procedure proposed by Abadie and Gardeazabal (2003) and expanded by Abadie, Diamond and Hainmueller (2010), V^* is chosen from among all the matrices defined as positive and diagonal, so that the *Mean Squared Prediction Error* (MSPE) of the outcome variable is minimized in some set of periods prior to the intervention. In other words, let Z_1 be the vector $(T_P \times 1)$ with the values of the outcome variable for the treated unit for some set of periods prior to the intervention, and Z_0 be the analogous matrix $(T_P \times J)$ for the control units, where T_P $(1 \leq T_P \leq T_0)$ is the number of periods prior to the intervention over which the MSPE is minimized. Then V^* is chosen to minimize:

$$[Z_1 - Z_0 W^*(V)]'[Z_1 - Z_0 W^*(V)]$$

where ϑ is the set of all defined positive diagonal matrices and the weights for the synthetic control are given by W^*.

Once the synthetic unit has been obtained, it is important to assess the significance of the estimates, checking whether or not they are due to chance. To this end, placebo tests can be carried out, applying the Synthetic Control Method to states that did not implement the intervention during the sample period. If the placebo tests create *gaps* of a magnitude similar to that estimated for the treated unit, it can be inferred that the analysis does not provide significant evidence of a real effect of the intervention. If, on the other hand, the placebo tests show that the gap (difference between the results of the treated unit and those of the synthetic unit) estimated for the treated unit is unusually large compared to the gaps of the *donor pool* units, it can be inferred that there is significant evidence of a real effect of the intervention.

To assess the significance of the estimates, Abadie, Diamond and Hainmueller (2010) suggest carrying out a series of placebo tests, iteratively applying the SCM to each of the other states in the *donor pool*, which did not implement the intervention. In each iteration, the intervention is supposed to be assigned to one of the other states in the control group. The estimated effect associated with each placebo run is then calculated. This iterative procedure provides a distribution of the estimated gaps for the states where no intervention was carried out. After this, a visual representation of all the placebos can be obtained. In this procedure, it is important to choose a cut-off point that excludes from the placebo runs those units that did not show a good pre-intervention fit.

Another way of assessing the gap of the treated unit in relation to the gaps obtained in the placebo runs is to look at the distribution of the ratios between post- and pre-intervention MSPE. The main advantage is that this avoids the need to choose a cut-off point for excluding poorly adjusted placebo runs.

To calculate the probability of obtaining a ratio as large as that of the treated unit, divide the number of states with a post/pre-intervention MSPE ratio greater than or equal to that of the treated unit (including the treated unit itself) by the total number of states in the *donor pool* plus one (which represents the treated unit).

4.2 Selection of treatment and control units

This paper aims to assess the effectiveness of the spending rule established in the RRF. Only three states adhered to the new Regime, all of which came into effect in 2022, so there are two post-intervention fiscal years: 2022 and 2023.

Therefore, in order to assess the effectiveness of the RRF spending rule, only the three

states for which the rule has been in force since 2022 will be considered as treatment units: Goiás (GO), Rio de Janeiro (RJ) and Rio Grande do Sul (RS).

Abadie, Diamond and Hainmueller (2010) state that researchers trying to minimize the biases caused by interpolation between regions with very different characteristics can restrict the *donor pool* to regions with characteristics more similar to the region exposed to the intervention of interest.

It should be noted that among the 27 Brazilian states, including the Federal District, São Paulo is the most developed and has very distinct characteristics from the other Brazilian states, with the highest tax collection, urbanization and industrialization of all the states. São Paulo alone is responsible for around 30% of the country's GDP and approximately 22% of the national population. Because it is so different from other Brazilian states, the state of São Paulo will be excluded from the *donor pool*. The 23 states that make up the *donor pool* are:

Table 4.1 - *Donor pool*

#	UF	State	#	UF	State
1	AC	Acre	13	PA	Pará
2	AL	Alagoas	14	PB	Paraíba
3	AM	Amazonas	15	PE	Pernambuco
4	AP	Amapá	16	PI	Piauí
5	BA	Bahia	17	PR	Paraná
6	EC	Ceará	18	RN	Rio Grande do Norte
7	DF	Federal District	19	RO	Rondônia
8	ES	Holy Spirit	20	RR	Roraima
9	MA	Maranhão	21	SC	Santa Catarina
10	MG	Minas Gerais	22	SE	Sergipe
11	MS	Mato Grosso do Sul	23	TO	Tocantins
12	MT	Mato Grosso			

4.3 Identification of predictor variables, sources and data processing

To obtain the synthetic unit, some predictors were included that attempt to address socioeconomic and financial characteristics of the states contained in the *donor pool*. The construction of the artificial states of Goiás, Rio de Janeiro and Rio Grande do Sul included the following predictor variables: natural logarithm of the population, unemployment rate, Net Current Revenue (RCL), cash availability as a percentage of Net Current Revenue, personnel expenses as a percentage of Net Current Revenue and a *dummy* variable (south_southeast), which reflects whether a state belongs to the South or Southeast regions, the most developed in the country, but with states with a higher level of indebtedness.

The dependent variable is adjusted committed primary expenditure. Both the predictor

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variables and the dependent variable are at constant 2021 values, deflated by the Broad Consumer Price Index (IPCA).

As for the period of analysis, data from 2015 to 2023 was used. The pre-treatment period runs from 2015 to 2021, seven years, and the treatment year coincides with the start of the RRF in the treated states, i.e. 2022.

The data used in this study was obtained from the Brazilian Public Sector Accounting and Fiscal Information System (Siconfi). Siconfi is a digital platform that centralizes the fiscal and accounting information of subnational entities in Brazil, allowing access to a vast financial database.

In the context of the Fiscal Responsibility Law, the Federal Government, states and municipalities are required to prepare and submit two main reports: the Budget Execution Summary Report (RREO) and the Fiscal Management Report (RGF). The data from these two reports is integrated into the Siconfi platform, allowing it to be consulted publicly. It is important to note that the historical series used in this study begins in 2015, the year from which the data began to be systematically reported and consolidated in Siconfi, which guarantees the consistency and comparability of the information over time.

However, it was necessary to make some adjustments to the data, due to the differences between the states in accounting for constitutional transfers to municipalities and due to the exceptions to the RRF spending ceiling, established in LC 159/2017, as well as the particularity that occurred in the state of Goiás in 2018, where the payroll for November and December 2018 was committed and paid only in 2019. Therefore, the following adjustments were made to the data:

1. Adjustment in personnel expenses and, consequently, in primary expenses, to deduct Prior Year Expenses (FTE) for personnel. In Goiás, around R$1.7 billion was added in 2018 and subtracted in 2019, corresponding to personnel expenses in November and December 2018, which were only committed and paid in 2019;

2. Adjustment to primary expenditure to exclude court judgments, which are an exception to the RRF spending limit, as well as excluding constitutional transfers to municipalities from primary expenditure (7 states treat transfers as expenditure, while the others treat them as a deduction from revenue);

3. Adjustment to primary expenditure so that the figures for 2023 are compatible with the methodology used until 2022. Until 2022, intra-budgetary expenditure was not included in primary expenditure, but expenditure from sources linked to the RPPS was included. From

2023 onwards, intra-budgetary expenditure was included and expenditure from RPPS sources was excluded.

Once these adjustments had been made, the *Synth* and *SCTools* packages in the R *Studio* software were used to implement the Synthetic Control Method. The results obtained for the states of Goiás, Rio de Janeiro and Rio Grande do Sul are presented and discussed in the next chapter.

5. RESULTS AND DISCUSSIONS

As mentioned, the aim of this study is to analyze the effectiveness of the RRF spending rule in containing the growth of primary expenditure by the states. For this analysis, the Synthetic Control Method was used, which allows the impact of the spending rule to be isolated from other relevant impacts that occur simultaneously.

The analyses will be carried out individually in the subsequent sections, for the states of Goiás, Rio de Janeiro and Rio Grande do Sul, and will include, in addition to the impact, the robustness tests suggested by Abadie, Diamond and Hainmueller (2010).

The dependent variable in this analysis is committed primary expenditure, adjusted as explained in the previous chapter. It is important to note that both the dependent variable and the independent variables are expressed in real values, with the base year in 2021.

### *5.1 Evaluation of results and robustness tests for Goiás*

Synthetic Goiás was constructed as a combination of states from the *donor pool* that most closely resembled Goiás in terms of the predictors. Table 8.3 compares the pre-treatment characteristics of real Goiás with those of synthetic Goiás, as well as with the average of the same variables of the 23 states in the *donor pool*. It can be seen that all the synthetic Goiás values are closer to the real Goiás values than the average values in the *donor pool*.

Table 8.4 shows the weights of each state in the control group in the synthetic Goiás. The weights reported indicate that the trend in primary expenditure before the implementation of the RRF spending ceiling is best reproduced by a combination of BA, MG, MT and PA. All the other states in the *donor pool* were assigned a W weight of zero.

Figure 5.1 (a) below shows primary expenditure for Goiás and the counterfactual between 2015 and 2023. It can be seen that, in the pre-RRF period, real Goiás and synthetic Goiás show

a very similar trajectory in terms of primary expenditure. However, as primary expenditure growth begins to be limited, the two lines begin to diverge. It can be seen that synthetic Goiás has a considerably higher level of primary spending, which indicates that the RRF spending ceiling has been effective in containing primary spending in Goiás.

Figure 5.1 - Goiás' primary expenditure trajectory
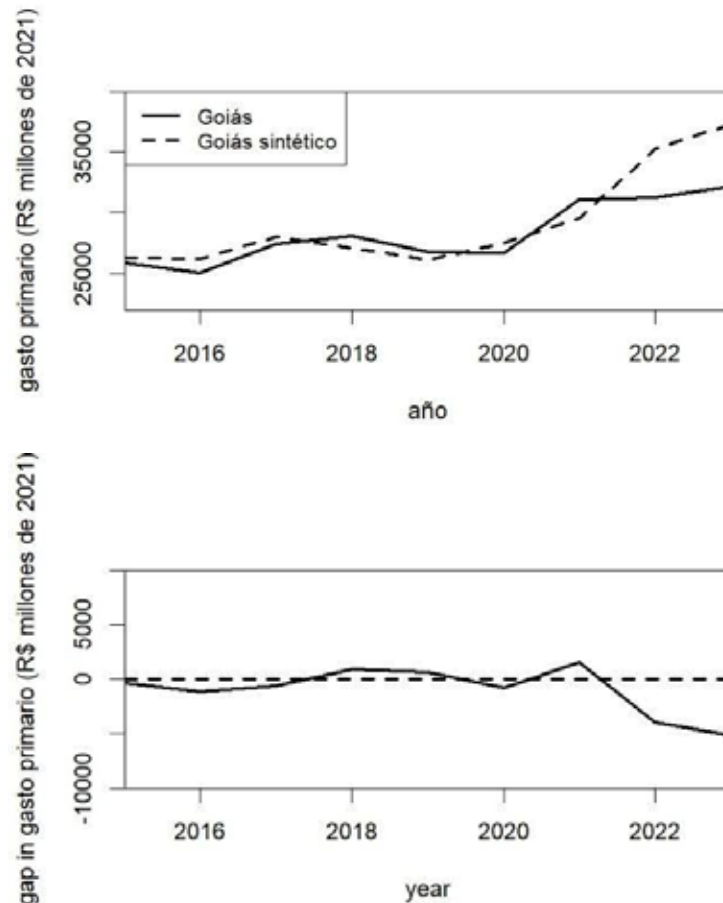
(a) GO vs. GO ynthetic   (b) Primary expenditure gap in GO

Figure 5.1 (b) and Table 5.3 show the estimated impact of the RRF spending ceiling on Goiás' primary expenditure, by demonstrating the primary expenditure gap. It can be seen that in the two years in which the state was subject to the RRF spending ceiling, Goiás' primary spending was more than 10% lower each year than it would have been in the counterfactual scenario. The estimated impact, shown in Table 5.3, is the difference between Goiás' actual primary expenditure and its synthetic version. In 2022, if the spending limitation had not been implemented, primary spending in Goiás would have been R$4 billion higher (11.3% lower than the counterfactual). In 2023, primary spending in Goiás would have been more than R$5 billion higher (13.8% lower than the counterfactual).

Table 5.3 – Impact on Goiás. Estimated gap in R$ million

Year	Goiás	Synthetic Goiás	Estimated impact	Estimated impact (%)
2022	31.289,95	35.272,38	-3.982,43	-11,3%
2023	32.140,91	37.294,02	-5.153,11	-13,8%

To assess the statistical significance of the estimates, you can use the two procedures suggested by Abadie, Diamond and Hainmueller (2010). The first procedure consists of running the placebo test for each of the states in the *donor pool*. Figure 8.1, in the APPENDIX, shows the results of the placebo test for Goiás. The gray lines represent the gap associated with each of the 23 runs of the placebo test. In other words, the gray lines show the difference in primary expenditure between each state in the *donor pool* and its respective synthetic version. The superimposed black line denotes the difference estimated for Goiás. As is clear from the figure, the estimated gap for Goiás during 2022 and 2023 is unusually large compared to the distribution of differences for the *donor pool* states. Figure 8.1 (a) presents the placebo tests eliminating states with pre-intervention MSPEs 20 times higher than Goiás, while Figure 8.1 (b) eliminates states with pre-intervention MSPEs 2 times higher than Goiás.

The other procedure proposed by Abadie, Diamond and Hainmueller (2010) consists of calculating the post/pre-intervention MSPE ratio, shown in Figure 8.2 in the ANNEX. As can be seen in this figure, Goiás has the highest ratio of all the states in the donor pool. Considering that Goiás has the highest post/pre-intervention MSPE ratio, the p-value obtained is 0.04166667 (1/24), which shows that the results achieved were not obtained by chance, but are a direct consequence of the limitation on the growth of primary expenditure imposed by the RRF.

### 5.2 Evaluation of results and robustness tests for Rio de Janeiro

The same study carried out in the previous section for Goiás is conducted in this section for Rio de Janeiro. Table 8.5 compares the pre-treatment characteristics of real Rio de Janeiro with those of the synthetic version. It can be seen that, with the exception of the *Personnel Expenditure/RCL* variable, all the other variables in the synthetic version are closer to the real values than the average values of the *donor pool*.

Table 8.8 in the ANNEX shows that the trend in primary spending before the RRF ceiling is best reproduced by combining BA and MG.

Figure 5.2 (a) shows primary expenditure for Rio de Janeiro and the counterfactual over the period 2015 to 2023. It can be seen, both in the pre-RRF and post-RRF periods, that real RJ

and synthetic RJ show a similar trajectory in relation to primary expenditure, which indicates that the RRF's limitation on the growth of primary expenditure has not fulfilled its role. In other words, the RRF spending ceiling was not effective in containing primary spending in Rio de Janeiro.

Figure 5.2 - Trajectory of primary expenditure in Rio de Janeiro
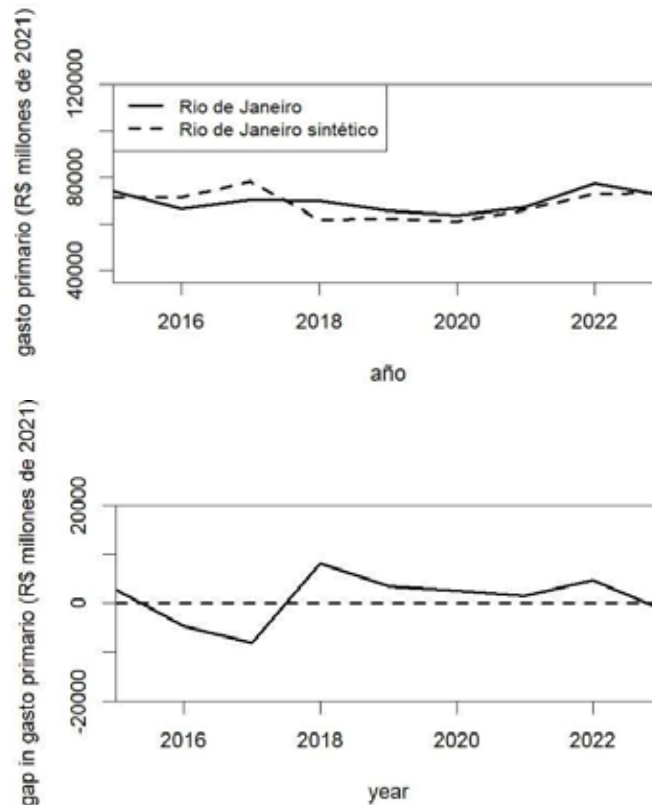
(a) RJ vs. synthetic RJ   (b) Primary expenditure gap in RJ

Figure 5.2 (b) and Table 5.6 show the estimated impact of the RRF spending ceiling on primary spending in Rio de Janeiro, by demonstrating the gap in primary spending. It can be seen that Rio de Janeiro's primary expenditure in 2022 was 6.5% higher than it would have been in the counterfactual scenario, and in 2023 it was only 1.6% lower than the counterfactual. This indicates that the trajectory of primary spending in the real state of Rio de Janeiro is practically the same as in the counterfactual scenario, which shows that the spending rule was not effective.

Table 5.6 - Results in Rio de Janeiro. Estimated gap R$ million

Year	RJ	Synthetic RJ	Estimated impact	Estimated impact (%)
2022	77.609,05	72.890,13	4.718,92	6,5%
2023	72.240,07	73.422,99	-1.182,92	-1,6%

Figure 8.3 shows the results of the placebo test for the state of Rio de Janeiro and demonstrates that the estimated gap is similar in magnitude to the gaps estimated for the states in the *donor pool*. Figure 8.3 (a) shows the placebo tests, eliminating only the states with pre-intervention MSPEs 20 times higher than Rio de Janeiro, while Figure 8.3 (b) eliminates the states with pre-intervention MSPEs 2 times higher than Rio de Janeiro.

The other procedure proposed for assessing the statistical significance of the estimates consists of calculating the post/pre-intervention MSPE ratio, shown in Figure 8.4 in the ANNEX. Considering that Rio de Janeiro has the 22nd highest post/pre-intervention MSPE ratio, out of a total of 24 states, the p-value obtained is 0.9166667 (22/24), which shows that the results achieved are not statistically significant, reinforcing the assessment that the RRF spending ceiling was not effective in containing the growth of primary spending in Rio de Janeiro.

5.3 Evaluation of results and robustness tests for Rio Grande do Sul

Table 8.7 compares the pre-treatment characteristics of the real Rio Grande do Sul with those of its counterfactual. It can be seen that all the values for the synthetic Rio Grande do Sul are closer to the actual values for that state than the average values for the *donor pool*.

Table 8.8 in the ANNEX shows that the trend in primary expenditure before the implementation of the RRF spending ceiling is best reproduced by a combination of MA, MG, MS, PA, PR, RN and SC.

Figure 5.3 (a) shows the primary expenditure of Rio Grande do Sul and the counterfactual over the period 2015 to 2023, showing that in the pre-RRF period, real RS and synthetic RS show a very similar trajectory in terms of primary expenditure. However, with the beginning of the limitation on the growth of these expenses, the two lines begin to diverge, which indicates that the RRF spending ceiling was also effective in containing primary expenses in Rio Grande do Sul.

Figure 5.3 - Trajectory of primary expenditure in Rio Grande do Sul
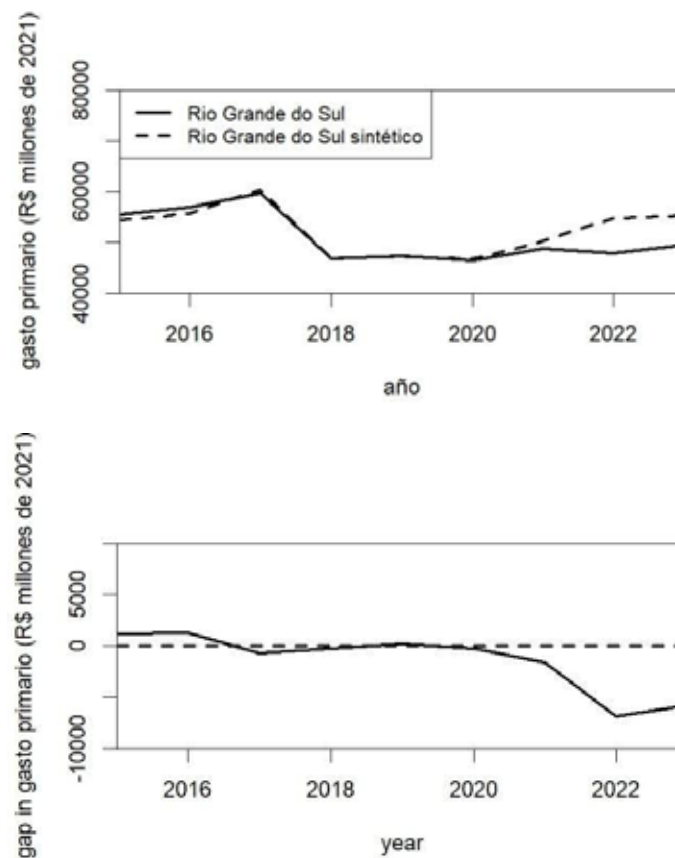
(a) RS vs. synthetic RS   (b) Primary expenditure gap in RS

Figure 5.3 (b) and Table 5.9 show the estimated impact of the RRF spending ceiling on primary spending in Rio Grande do Sul, demonstrating the primary spending gap. It can be seen that in the two years in which the state was subject to the RRF spending ceiling, Rio Grande do Sul's primary spending was more than 10% lower than it would have been in the counterfactual scenario. According to Table 5.9, in 2022, primary spending in Rio Grande do Sul would have been R$7 billion higher (12.6% lower than the counterfactual) if the spending limitation had not been implemented. In 2023, primary spending in Rio Grande do Sul would have been almost R$6 billion higher (10.4% lower than the counterfactual).

Table 5.9 - Results in Rio Grande do Sul. Estimated gap in R$ million

Year	RS	Synthetic RS	Estimated impact	Estimated impact (%)
2022	47.885,00	54.795,79	-6.910,79	-12,6%
2023	49.492,86	55.233,58	-5.740,72	-10,4%

Figure 8.5, located in the APPENDIX, shows the results of the placebo test for the state

of Rio Grande do Sul. The figure shows that the estimated gap for Rio Grande do Sul during the period 2022 and 2023 is exceptionally large compared to the distribution of gaps for the states in the *donor pool*. Figure 8.5 (a) shows the placebo tests, eliminating only states with pre-intervention MSPEs 20 times higher than Rio Grande do Sul, while Figure 8.5 (b) eliminates states with pre-intervention MSPEs 2 times higher than RS.

The other procedure proposed for assessing the significance of the estimates consists of calculating the post/pre-intervention MSPE ratio, which is shown in Figure 8.6, located in the APPENDIX. Considering that RS has the highest post/pre-intervention MSPE ratio, the p-value obtained is 0.04166667 (1/24), which shows that the results achieved were not obtained by chance, but are a consequence of the limitation on the growth of primary expenditure imposed by the RRF.

5.4 Final discussions on the results

The analysis of the results of the implementation of the Fiscal Recovery Regime in the states of Goiás, Rio de Janeiro and Rio Grande do Sul reveals significant differences in the effectiveness of the spending ceiling. While the RRF proved to be effective in containing the growth of primary expenditure in Goiás and Rio Grande do Sul, this was not the case in the state of Rio de Janeiro.

In the case of Goiás, the analysis shows that the spending rule was effective, resulting in a significant reduction in primary spending compared to what would have been observed without the implementation of the RRF. Specifically, the statistically significant results indicated that, in 2022 and 2023, primary spending in Goiás was 11.3% (-R$ 4 billion) and 13.8% (-R$ 5.2 billion) lower than the counterfactual scenario, respectively.

Rio Grande do Sul presented results similar to those of Goiás, also statistically significant, and showing a reduction in primary expenditure of 12.6% (-R$ 7 billion) in 2022 and 10.4% (-R$ 5.7 billion) in 2023, compared to the counterfactual scenario. As in Goiás, the RRF in Rio Grande do Sul met its objective of containing primary expenditure.

On the other hand, the situation in Rio de Janeiro was different. Despite the implementation of the RRF, primary spending in Rio de Janeiro was not effectively contained. In 2022, primary spending was 6.5% (+R$4.7 billion) higher than the counterfactual, and in 2023, although there was a slight decrease of 1.6% (-R$1.2 billion), this was not enough to indicate effective spending control. Furthermore, the placebo tests and the calculation of the p-value showed that

the results obtained were not statistically significant.

The ineffectiveness of the spending rule in Rio de Janeiro can be explained by two main reasons. Firstly, returning to the discussion on endogeneity presented by Herrero et al. (2024), it is possible that politicians in Goiás and Rio Grande do Sul were already more committed to fiscal responsibility even before they joined the RRF. This prior commitment may have facilitated the effectiveness of the rule in these states, making the impact of the RRF more significant.

Secondly, in this context, it is worth saying that endogeneity occurs more frequently in cases of poorly designed rules, which may fail in their objective, particularly in states that are not fully committed to fiscal responsibility. Thus, non-compliance with the RRF spending rule in Rio de Janeiro may indicate flaws in its design, i.e. in the case of the Regime's spending rule, some deficiencies in the rule's design may have contributed to its ineffectiveness. The lack of clear sanctions in the event of non-compliance may have weakened the application of the rule, since the incentives to comply with it were not strong enough: even if it failed to comply with the spending rule, the state could remain in the Regime, taking advantage of the reduction in debt service payments.

The absence of clear sanctions in the RRF spending rule fosters moral hazard, since states, trusting in an eventual bailout by the Union, can relax their fiscal discipline. This encourages more aggressive spending policies, under the expectation that the central government will cover its debts, perpetuating the cycle of unsustainable indebtedness.

In addition to the lack of clear sanctions, which encourage entities to increase their spending while remaining in the RRF, taking advantage of the benefits of reduced payments, it should also be mentioned that the Regime's spending rule is very strict, which in the medium term makes it impossible to comply with. The RRF spending rule requires primary spending to remain at the same level as in the base year (2021) in real terms, i.e. it prohibits any real growth in primary spending. This is not feasible, as economic and population growth require greater provision of services to the population, especially in health, education and public safety, with a consequent real increase in primary spending. Thus, the RRF spending rule is only viable in the short term, and it is not possible for states to comply with this rule for the entire duration of the Fiscal Recovery Regime, which can last up to 10 years. Finally, another possible deficiency in the design of the rule is the complexity of having to carry out the entity's spending while observing an as yet unknown limit, since the IPCA used is that of the year of the limitation, which will only be known in mid-January of the following year, when it is released by the Brazilian Institute of Geography and Statistics.

In view of these possible shortcomings, in order to improve the effectiveness of the spending rule, the following specific changes could be made to LC 159/2017, with the aim of improving its design:

1. Inclusion of clear sanctions for entities that fail to comply with the primary expenditure growth limitation;

2. Inclusion of mandatory corrective actions in the event of a risk of non-compliance;

3. Allow some real growth in primary expenditure, in order to make compliance with the rule more feasible.

In conclusion, although the RRF has proved effective in some states, such as Goiás and Rio Grande do Sul, Rio de Janeiro's experience highlights the limitations and challenges of the spending rule when faced with different institutional, fiscal and economic realities. It is essential to review and adapt the design of the spending rule so that it can be applied more effectively in all contexts, thus guaranteeing its purpose of expenditure containment and fiscal sustainability.

6. FINAL CONSIDERATIONS

The research carried out into the effectiveness of the RRF spending rule in the states of Goiás, Rio de Janeiro and Rio Grande do Sul provides significant conclusions about its ability to control the growth of primary spending and promote fiscal sustainability. Using the Synthetic Control Method, it was possible to accurately assess the impact of the rule in the first two years of its implementation, corresponding to fiscal years 2022 and 2023.

In the case of Goiás, the results indicated the high effectiveness of the spending rule, which managed to significantly contain the growth in primary spending. Specifically, in 2022, primary spending was 11.3% lower than in the counterfactual scenario, which resulted in a reduction of R$4 billion. In 2023, this containment was intensified, with a reduction of 13.8%, or R$5.2 billion, compared to what would have occurred without the limitation imposed by the RRF. These results show that, in Goiás, the RRF spending rule has been effective in fulfilling its objective of fiscal containment.

In Rio Grande do Sul, similar behavior to that of Goiás was observed, with the spending rule also proving effective. In 2022, the state managed to keep primary spending 12.6% below the counterfactual, which represents a reduction of R$7 billion. In 2023, although the reduction was slightly smaller, primary spending remained 10.4% below the scenario without intervention, with a drop of R$5.7 billion. These figures reinforce the idea that the RRF has succeeded

in imposing fiscal discipline in this state, helping to control spending.

However, the situation in Rio de Janeiro was different. Despite being subject to the same restrictions as the RRF, the state was unable to contain the growth in primary spending effectively. In 2022, spending was 6.5% higher than the counterfactual, with an increase of R$4.7 billion, indicating that the spending rule was unable to curb growth. In 2023, although there was a slight reduction of 1.6%, with a small drop of R$1.18 billion, this reduction was not enough to conclude that the spending rule had a significant impact on containing spending in Rio de Janeiro.

The variability of results between the states analyzed suggests that the effectiveness of the RRF is not uniform and that its success depends on contextual factors specific to each federal entity. The effectiveness of the rule in Goiás and Rio Grande do Sul may be related to endogenous factors, such as their leaders' prior commitment to fiscal discipline. On the other hand, the ineffectiveness of the rule in Rio de Janeiro may be associated with deficiencies in the design of the rule itself. In this context, the lack of clear sanctions and the rigidity of the rule may have limited its effectiveness.

This study highlights the importance of reviewing and adapting the design of the RRF spending rule so that it can be more effective in a wider variety of contexts. It is crucial to consider the possibility of introducing greater flexibility into the rule, allowing for adjustments to allow for real growth in spending, taking into account economic growth and demographic needs. It is also essential to make changes to the current rule to implement clearer sanctions to encourage compliance, as well as to include mandatory corrective actions in the event of a risk of significant non-compliance. In addition, strengthening institutional capacity and commitment to fiscal responsibility in the states is essential for the success of any expenditure containment policy.

In summary, the analysis carried out highlights both the successes and limitations of the RRF in Brazil, providing valuable lessons for the formulation of fiscal policies in similar contexts. It is essential to adjust the design of the rule and continue to investigate and monitor its implementation to ensure that subnational entities achieve a balance between fiscal austerity and the ability to offer essential public services to their populations.

7. BIBLIOGRAPHICAL REFERENCES

ABADIE, Alberto; DIAMOND, Alexis; HAINMUELLER, Jens. Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program. Journal of the American Statistical Association, v. 105, n. 490, p. 493-505, 2010.

ABADIE, Alberto; DIAMOND, Alexis; HAINMUELLER, Jens. Synth: An R package for synthetic control methods in comparative case studies. Journal of Statistical Software, v. 42, n. 13, 2011.

ABADIE, A.; GARDEAZABAL, J. The economic costs of conflict: A case study of the Basque Country. American Economic Review, v. 93, n. 1, p. 113-132, 2003.

AFONSO, José Roberto. A history of the Brazilian fiscal responsibility law. Direito Público, RDU, Porto Alegre, Special Edition, v. 13, p. 126-154, 2016.

ALMEIDA, Anna Ozorio. Evolution and crisis of state public debt. Rio de Janeiro: Institute for Applied Economic Research (Ipea), 1996 (Text for Discussion n. 448).

BRAZIL. Federal Constitution of Brazil, October 5, 1988. Available at: https://www.planalto.gov.br/ccivil_03/constituicao/constituicao.htm. Accessed on August 13, 2024.

BRAZIL. Law No. 8.727, of November 5, 1993. Available at: http://www.planalto.gov.br/ccivil_03/leis/l8727.htm. Accessed on July 15, 2024.

BRAZIL. Law No. 9.496, of September 11, 1997. Available at: https://www.planalto.gov.br/ccivil_03/leis/L9496.htm. Accessed on July 15, 2024.

BRASIL. Complementary Law no. 101, of May 4, 2000. Available at: https://www.planalto.gov.br/ccivil_03/leis/lcp/lcp101.htm. Accessed on July 14, 2024.

CALDEIRA, Alessandro Aurélio et al. Sustainability of the Brazilian state debt: an analysis of the net debt and primary result ratio. Revista de Administração Pública, v. 50, p. 285-306, 2016.

CARD, David; KRUEGER, Alan B. Minimum wages and employment: A case study of the fast food industry in New Jersey and Pennsylvania. American Economic Review, v. 84, p. 772-793, 1994.

DE BIASE, Pietrangelo; DOUGHERTY, Sean. The past and future of subnational fiscal rules: An analysis of fiscal rules over time. OECD Publishing, n. 41, oct. 2022.

EYRAUD, Luc et al. How to design subnational fiscal rules: a primer. International Monetary Fund, 2020.

FALL, Falilou et al. Prudent debt targets and fiscal frameworks. OECD Economic Policy Paper, n. 15, July 2015.

HERRERO-ALCALDE, Ana et al. Fiscal rules to the test: The impact of the Spanish expenditure rule. European Journal of Political Economy, v. 81, p. 102501, 2024.

KUMAR, Manmohan et al. Fiscal rules-anchoring expectations for sustainable public finances. IMF staff paper, Washington DC, 2009.

MANESCU, Cristiana Belu; BOVA, Elva. National Expenditure Rules in the EU an Analysis of Effectiveness and Compliance. European Economy-Discussion Papers, n. 124, 2020.

POSSEBOM, Vítor. Free trade zone of Manaus: An impact evaluation using the Synthetic Control Method. Brazilian Journal of Economics, v. 71, p. 217-231, 2017.

SUTHERLAND, Douglas; PRICE, Robert; JOUMARD, Isabelle. Fiscal rules for sub-central governments: Design and impact. OECD Economics Department Working Papers, 465, 2005.

VAMMALLE, Camila; BAMBALAITE, Indre. Fiscal rules for subnational governments: The devil's in the details. OECD Publishing, n. 35, Mar. 2021.

8. ANNEX

8.1. Comparative tables on tax rules

Table 8.1 - Tax rule definitions and *trade-offs*

Tax Rule	Definition	Does it promote fiscal sustainability?	Does it affect macroeconomic stabilization?	Does it affect the composition of the budget?
Result rules				
Current and capital (budget result)	It allows new loans to finance the deficit towards a target and to refinance the debt.	Yes, if the objectives are well designed.	Compliance can lead to pro-cyclical fiscal policies.	Neutral
Current surplus (golden rule)	It allows new loans for capital expenditure, but prevents new loans for current expenditure and debt refinancing.	Yes, but it can lead to unsustainable debt if investments are greater than the capacity to generate income.	Compliance can lead to pro-cyclical fiscal policies, but allowing investments minimizes this tendency.	It can encourage investment spending
Current result (operating)	It allows new loans for capital expenditure and debt repayment, but prevents loans for current expenditure.		It can lead to pro-cyclical fiscal policies.	Neutral
Cyclically adjusted result	The fiscal deficit is adjusted taking into account the position of the economic cycle (output gap).	Yes, but in the case of prolonged recessions it can lead to excessive indebtedness.	It allows counter-cyclical fiscal policy.	Neutral
Debt Rules/Debt Restrictions				
Debt Level	Numerical limits for public debt, nominal or as a percentage of revenue.	Yes, but when not linked to debt rules, the measure is unable to control the trajectory of fiscal results.	It can lead to pro-cyclicality when: (1) the rules are binding in recessions, limiting the use of borrowing to stimulate the economy; (2) the rules are binding in expansions, allowing for expansive fiscal policies; and (3) tied to revenues, since decreases in revenues can force reductions in spending.	Neutral
Debt Service	Numerical limits for debt service, nominal or as a percentage of revenue.	It can promote fiscal sustainability, as debt services are directly linked to debt levels.	Debt servicing rules can lead to pro-cyclicality, as interest rates are inversely correlated with the cycle.	Neutral
Spending rules				

General	Numerical limits for public spending, nominal or as a percentage of revenues or related to real growth rates.	Not in isolation, since it doesn't control revenue.	It allows counter-cyclical fiscal policy in expansions and recessions. If it is linked to revenue, it can lead to pro-cyclical fiscal policies.	It can affect the composition of the budget, leading to a reduction in investments.
Current	Numerical limits for current spending, nominal or as a percentage of revenue.	No, since it doesn't control revenue or capital expenditure (investments and depreciation).	It allows counter-cyclical fiscal policy in expansions and recessions, through variations in revenues and investments. If it is linked to revenue, it can lead to pro-cyclical fiscal policies.	It can encourage investment spending
Individual	Numerical limits for certain spending items, nominal or as a % of revenue.	Not in isolation, since it doesn't control income and other spending.	It's not clear (it depends on the expense items).	Yes, but this is generally the aim of the rule

Source: reproduced from De Biase and Dougherty (2022)

Table 8.2 - Fiscal rules in force in Brazil affecting sub-national entities

Rule	Description	Type	Standard	Legal basis	Reach
Golden Rule	Prohibits credit operations that exceed the amount of capital expenditure.	Debt	CF/88	CF (Art. 167, III); LRF (Art. 12, § 2º); Res. SF 48/2007	All entities
Limit on current expenditure	Article 167-A of the Federal Constitution sets limits on the current spending of states, the Federal District and municipalities, in relation to their current revenues.	Spending	CF/88	CF (Art. 167-A, ADCT)	States and municipalities
Generation of social security costs	It prohibits the creation, expansion or extension of social security benefits without a source of funding.	Spending	CF/88	CF (Art. 195, § 5º)	All entities
Primary result target	Each year, the budget guidelines law sets the primary result target to be pursued in the financial year to which it refers.	Results	LC	LRF (Art. 4º, § 1º)	All entities
Generation of mandatory ongoing expenditure	It prohibits the creation or increase of compulsory expenditure of a continuing nature without a demonstration that there will be resources to finance it. The financial effects must be offset by a permanent increase in revenue or a permanent reduction in expenditure.	Spending	LC	CF (Art. 113, ADCT; LRF Art. 17)	All entities
Revenue foregone	It prohibits the granting of revenue waivers without demonstrating that the benefit will not affect fiscal targets and without compensatory measures.	Recipes	LC	CF (Art. 113, ADCT; LRF Art. 14)	All entities

Limit on personnel expenditure	It sets limits for total personnel expenditure in relation to net current revenue. The limits are set by the LRF for each entity of the federation, and for each of its powers and autonomous bodies.	Spending	LC	CF (Art. 169, § 1º; LRF Arts. 19 até 23)	All entities
Consolidated debt limit	It sets overall limits for the amount of the consolidated debt of the Union, the States, the Federal District and the Municipalities. The limits are set by the Federal Senate, on a proposal from the President of the Republic.	Debt	Resolution	CF (Art. 52, VI); LRF (Art. 30, I); Res. SF 40/2001	Union: not instituted; Other entities: in force
Securities debt limit	It sets overall limits for the amount of the federal, state, federal district and municipal securities debt. The debt limits are set by the Federal Senate, on a proposal from the President of the Republic. The other entities are prohibited from contracting securities debt.	Debt	Union: Ordinary law; Other entities: Resolution	CF (Art. 52, IX); LRF (Art. 30, I); Res. SF 40/2001	Union: not instituted; Other entities: in force
Limit for external credit operations	It sets overall limits for external credit operations by the Union, the States, the Federal District and the Municipalities. The limits are set by the Federal Senate, on a proposal from the President of the Republic.	Debt	Resolution	CF (Art. 52, VII); LRF (Art. 30, I); Res. SF 43/2001	All entities
Guarantee limits	Sets limits for granting guarantees in external and internal credit operations. The limits are set by the Federal Senate, at the proposal of the President of the Republic.	Debt	Resolution	CF (Art. 52, VIII); LRF (Art. 30, I); Res. SF 48/2007	All entities

8.2. Predictor variables and state weights in the synthetic unit

Table 8.3 - Synthetic Goiás. Predictor variables

	Treaty	Synthetic	Media
Personnel costs / RCL	0,623	0,624	0,614
ln(population)	15,732	15,789	15,144
RCL	26.976,853	26.311,618	19.860,833
Cash Availability / RCL	0,143	0,169	0,228
south_southeast	0,000	0,019	0,217
Unemployment rate	9,829	10,723	11,704

Table 8.4 - State weights in synthetic Goiás

ID	Unit	Weights	ID	Unit	Weights
1	AC	0,000	14	PA	0,503
2	AL	0,000	15	PB	0,000
3	AM	0,000	16	PE	0,000
4	AP	0,000	17	PI	0,000
5	BA	0,178	18	PR	0,000
6	EC	0,000	20	RN	0,000
7	DF	0,000	21	RO	0,000
8	ES	0,000	22	RR	0,000
10	MA	0,000	24	SC	0,000
11	MG	0,019	25	SE	0,000
12	MS	0,000	27	TO	0,000
13	MT	0,300			

Table 8.5 - Synthetic Rio de Janeiro. Predictor variables

	Treaty	Synthetic	Average
Personnel costs / RCL	0,584	0,699	0,614
ln(population)	16,641	16,744	15,144
RCL	68.106,628	61.072,893	19.860,833
Cash Availability / RCL	0,159	0,152	0,228
south_southeast	1,000	0,649	0,217
Unemployment rate	14,314	12,560	11,704

Table 8.6 - State weights in the synthetic Rio de Janeiro

ID	Unit	Weights	ID	Unit	Weights
1	AC	0,000	14	PA	0,000
2	AL	0,000	15	PB	0,000
3	AM	0,000	16	PE	0,000
4	AP	0,000	17	PI	0,000
5	BA	0,351	18	PR	0,000
6	EC	0,000	20	RN	0,000
7	DF	0,000	21	RO	0,000
8	ES	0,000	22	RR	0,000
10	MA	0,000	24	SC	0,000
11	MG	0,649	25	SE	0,000
12	MS	0,000	27	TO	0,000
13	MT	0,000			

Table 8.7 - Rio Grande do Sul summary. Predictor variables

	Treaty	Synthetic	Average
Personnel costs / RCL	0,723	0,72	0,614
ln(population)	16,241	16,016	15,144
RCL	45.764,895	46.700,999	19.860,833
Cash Availability / RCL	0,176	0,177	0,228
south southeast	1,000	0,609	0,217
Unemployment rate	7,814	9,341	11,704

Table 8.8 - State weights in the synthetic Rio Grande do Sul

ID	Unit	Weights	ID	Unit	Weights
1	AC	0,000	14	PA	0,001
2	AL	0,000	15	PB	0,000
3	AM	0,000	16	PE	0,000
4	AP	0,000	17	PI	0,000
5	BA	0,000	18	PR	0,087
6	EC	0,000	20	RN	0,065
7	DF	0,000	21	RO	0,000
8	ES	0,000	22	RR	0,000
10	MA	0,001	24	SC	0,006
11	MG	0,515	25	SE	0,000
12	MS	0,322	27	TO	0,000
13	MT	0,000			

8.3. Robustness tests

Figure 8.1 - Placebo tests for Goiás.

— Control units — GO

— Control units — GO
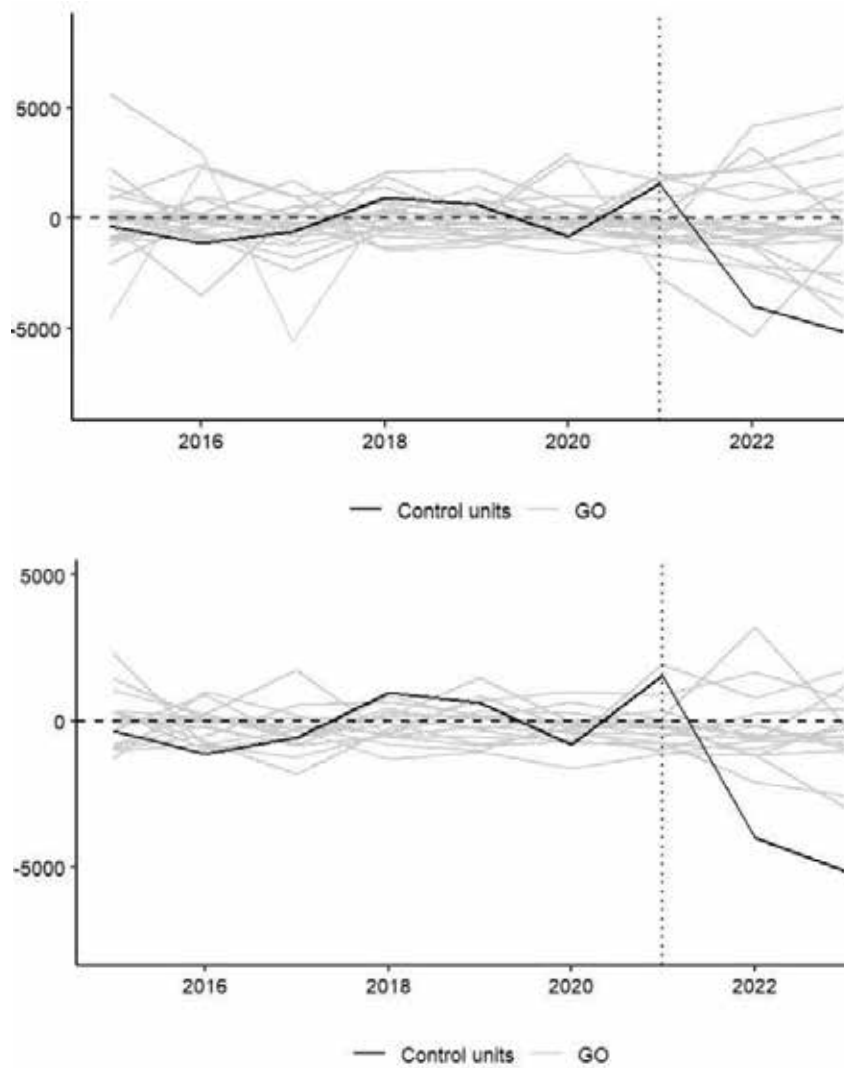
(a) pre-intervention MSPE 20 times ≤ that of Goiás   (b) pre-intervention MSPE 2 times ≤ that of Goiás
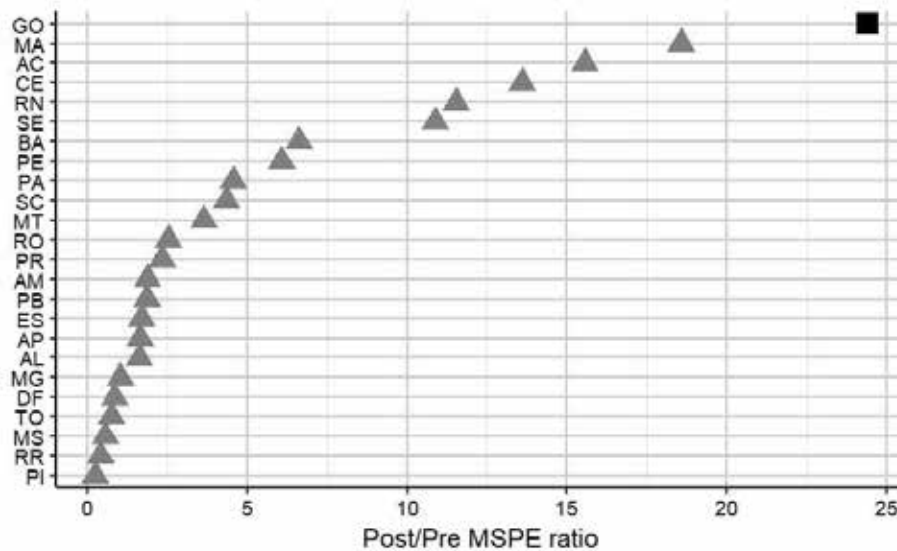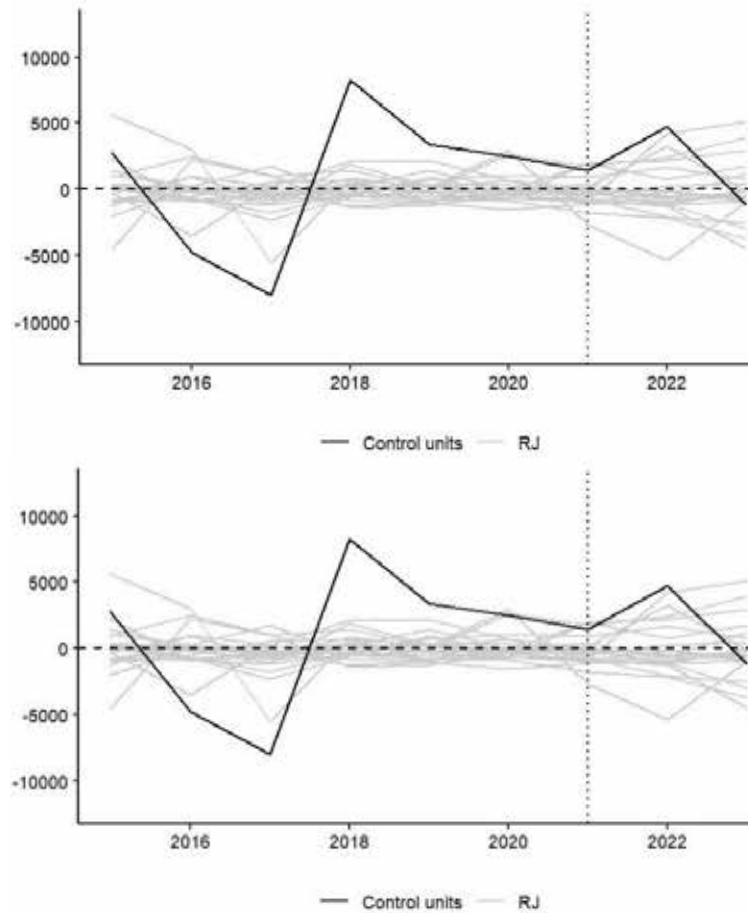
Figure 8.2 - MSPE post/pre-Intervention for Goiás

Figure 8.3 - Placebo tests for Rio de Janeiro.

(a) pre-intervention MSPE 20 times ≤ than RJ   (b) pre-intervention MSPE 2 times ≤ than RJ

Figure 8.4 - Post/Pre-Intervention MSPE for Rio de Janeiro
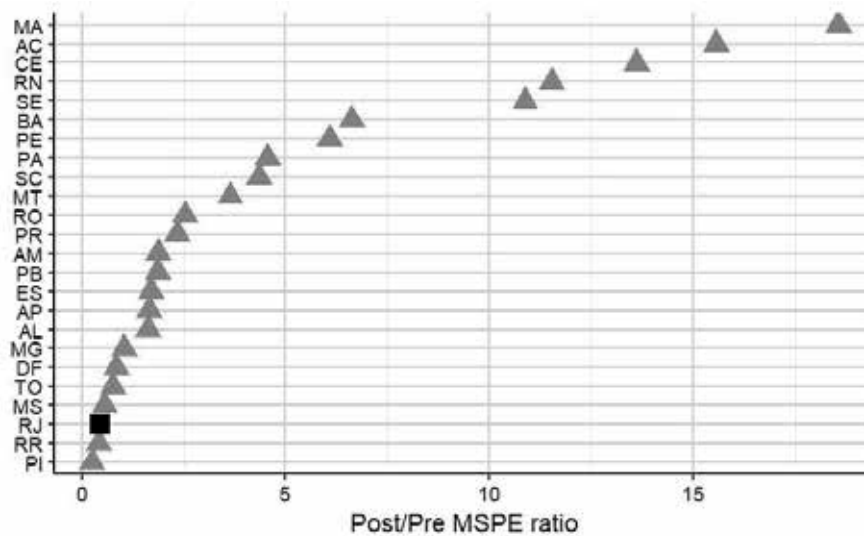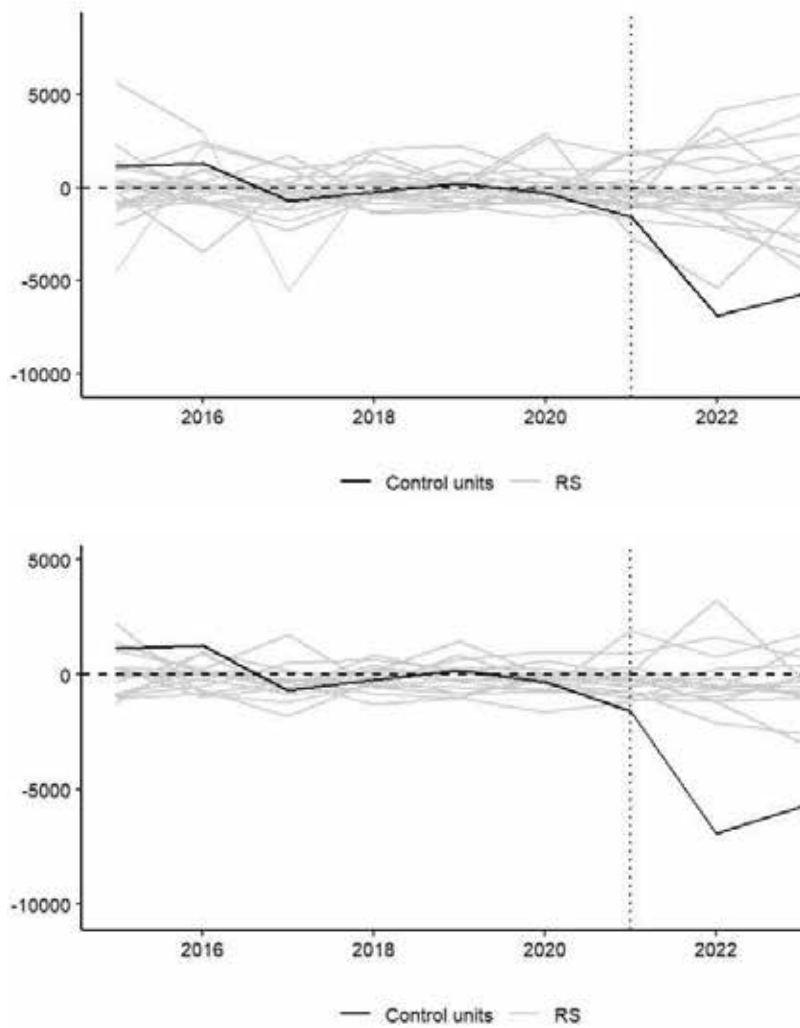
Figure 8.5 - Placebo tests for Rio Grande do Sul.

(a) pre-intervention MSPE 20 times ≤ that of RS   (b) pre-intervention MSPE 2 times ≤ that of RS

Figure 8.6 - MSPE post/pre-intervention for Rio Grande do Sul