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Intergovernmental coordination and fiscal performance

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Abstract. This article evaluates the intergovernmental coordination of fiscal policy in Brazil, measured in terms of the synchronisation of fiscal responses adopted by the central and state governments between 2004 and 2016. An econometric analysis of Brazilian states' responses to central government fiscal impulses is conducted, controlling for variables that can affect states' fiscal performance, such as output gap, solvency, Dependency on intergovernmental transfers, expenditure decentralisation, and budget rigidity. The results show signs of a pro-cyclical nature in Brazilian states' fiscal outcomes, whereby a 1% increase/decrease in the central government's fiscal impulse leads to a 0.13% increase/decrease in the states' fiscal impulse. Evidence also found that greater dependency on intergovernmental transfers impairs states' fiscal performance. On the other hand, decentralisation of spending, high indebtedness, and greater budget rigidity are factors that lead to better fiscal discipline. The importance of this study consists in highlighting intergovernmental coordination as a strategy to ensure better efficiency of fiscal policy in the stabilizing and allocative functions of the budget.
Keywords. Fiscal federalism, Fiscal coordination, Decentralisation, Public finance.
JEL. H77, H68, E60.

1. Introduction

The world is undergoing social, economic, and cultural transformations while dealing with the effects of the Covid pandemic, environmental issues, and the economic impacts of an ongoing technological revolution. In this context, a global agenda to rebuild the institutional framework that guides countries' fiscal policy is emerging. This agenda was born with the vision that governments should reorganise their fiscal governance models to enable public management strategies focused on the reduction of social inequalities, tax progressivity, universal access to health and education, and the transition to a green economy (IMF, 2022).

This global agenda has been influencing the debate around the revision of the current fiscal framework in Brazil. At the frontier of international debate, Gaspar (2020) supports the simplification of fiscal rules in the European regime, and Blanchard *et al.*, (2021) point to an institutional reform based on governance standards. In the Brazilian case, there are proposals to rebuild the

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fiscal regime, as in Fraga (2022), who proposes a new regime of fiscal rules, unlike Giambiagi & Pires (2022), who support improvements to the existing expenditure cap fiscal rule, approved by Congress in 2016.

In this reformist vein, the implementation of a Fiscal Management Council (FMC) in Brazil presents itself as an alternative for the National Congress agenda, with more than a dozen bills being processed along these lines.

Foreseen in the Fiscal Responsibility Law – FRL (LRF for its initials in Portuguese), but not yet regulated by law, the fiscal management council would have the function of controlling and monitoring the fiscal management system adopted by the Union, states and municipalities, aiming at four objectives: (i) harmonisation and coordination across Federation bodies; (ii) dissemination of good practices; (iii) adoption of consolidating rules and standardisation of public accounts; and (iv) diffusion of analyses, studies and diagnoses. It is also tasked with the function of rewarding and recognising managers who achieve meritorious results in their social development policies.

The FMC was introduced in the original Brazilian FRL bill through a legislative amendment that was inspired by the Advisory Commission on Intergovernmental Relations (U.S ACIR), an independent and bipartisan body that coordinated federal fiscal management in the United States from 1960 to 1980, with important works. This unit of government was created in the United States by law No. 86-380 of 1959 to promote greater effectiveness in the American federative system through coordinated action between national, state, and local governments (Afonso, Ribeiro & Porto, 2021; Kincaid, 2011).

The Brazilian National Congress sought to establish a legal status, specific and dedicated to the coordination and control of the Brazilian fiscal management, when it introduced the FMC in the FRL, with the aim of promoting better fiscal performance for subnational governments. As it has not yet been regulated, it can be said that there is a gap in the Brazilian institutional arrangement to be explored, which gives room to evaluate the degree of coordination of fiscal policy in Brazilian federalism and the factors that influence the fiscal performance of the federative units.

Brazilian federalism may be described as integrated - taxonomy adopted by the Organisation for Economic Co-operation and Development - OECD (Blochliger & Kantorowicz, 2015). In this type of fiscal constitution, subnational governments have high co-determination, or, in other words, strong power to influence the central government's fiscal policy. This is a distinctive feature of the Brazilian federative regime, with two channels of influence standing out: the National Congress and the Federal Supreme Court – FSC (STF for its initials in Portuguese).

In fact, subnational governments in Brazil significantly influence the decision-making process of the National Congress in fiscal matters. From 1992 to 2009, 62 constitutional amendments were passed, 28 of which related to matters of federative interest – the annual amendment rate for this period is 3.6 (Arrecthe, 2012). In turn, the Federal Supreme Court (FSC) has ruled in favour of subnational governments on several occasions when the matter involved federative conflict of a fiscal nature. Between 1988 and 2017, the FSC was sued 472 times by states against the Union in tax matters, ruling in favour of the states in 92.6% of the times (Echeverria & Ribeiro 2018).

In view of this, it can be said that intergovernmental coordination of fiscal policy is even more relevant in the case of integrated federative regimes. In the words of Afonso & Ribeiro (2022), it constitutes the "backbone of federalism."

Given the absence of a body dedicated to the intergovernmental coordination of fiscal policy and the control of subnational public accounts, in a scenario of high fiscal decentralisation and integrated-type federalism, two questions motivated the efforts of the present study, given the recent fiscal crises that affected the balance of public accounts of the general government - Union, states and municipalities - in Brazil: (i) is fiscal policy in Brazil coordinated across government levels? (ii) which factors may influence subnational governments' fiscal policy performance?

The answers to these questions may contribute to the strengthening of fiscal policy coordination and control in Brazil, as part of the institutional framework reform agenda in the area of public finances. This topic could become a priority when discussing fiscal management in the country, considering the leading role of subnational governments in consolidated public sector finances and the features of Brazilian integrated federalism: strong fiscal decentralisation combined with strong regulatory presence of the central government.

Thus, the results of this study may offer important contributions to research in the area of fiscal federalism. They may also be important for discussions regarding intergovernmental fiscal relations, and may influence the legislative agenda related to fiscal framework reforms in Brazil and in other countries.

The theoretical framework is presented in the following section. In sections 3 and 4, we present the methodology and data, and in section 5, the results. Finally, section 6 presents the main conclusions.

2. Theoretical framework

An OECD study (2011) explores the importance of coordination across government levels in national strategies for recovery and to overcome challenges after economic crises. The paper presents institutional arrangements for fiscal cooperation, such as intergovernmental committees, management contracts, regional development plans, and mechanisms to promote public-private partnerships, among other instruments, while highlighting that there is no single governance arrangement focused on intergovernmental coordination. For Peter (2015), coordination strategies in the public sector generate cooperation, overcome fragmentation and overlapping of actions, minimise conflict between policies and organisations, increase the efficiency of the resources employed, and create uniformity with regard to citizens' rights.

Intergovernmental coordination involves practices that increase the likelihood of achieving common goals (Bakvis & Brown, 2010). In the view of Bouckaert, Peters & Verhoest (2010), coordination involves instruments aimed at organisations' voluntary or forced alignment of tasks and efforts within the public sector, creating coherence and reducing gaps and redundancies.

The paper by Lledó & Pereira (2015) explores the fiscal performance of subnational governments, from the perspective of intergovernmental fiscal relations, to assess intergovernmental coordination of fiscal policy in OECD countries. The fiscal management synchronisation adopted by subnational and national governments in several countries - unitary and federative - is assumed as a proxy to measure the evolution of intergovernmental coordination in each country, in the period between 1995 and 2012.

The results of the study indicate that synchronisation occurred in federations - but not in unitary countries - and intensified after the 2008 international crisis, as a result of permanent changes in expenditure decentralisation. According to the authors, fiscal autonomy in revenue and the nature of fiscal rules were not significant as an influencing factor on coordination. Intergovernmental transfers, in turn, negatively affected coordination with negligible significance.

The importance of expenditure decentralisation observed by Lledó & Pereira (2015) confirms the evidence presented in the literature. Darby *et al.,* (2005) show that fiscal adjustments promoted by subnational governments among OECD countries are determined by expenditure cuts and not by tax increases, with emphasis on the reduction of the proportion of spending on civil servants' salaries in the total expenditure. The authors also conclude that subnational governments contribute fundamentally to the success of a country's overall fiscal consolidation process.

Blochliger *et al.,* (2010), analyse the impacts of the 2008 economic crisis in several countries. They find that the coordination between the reactions of central and subnational governments is a determining factor to ensure the efficiency of fiscal policy efforts in a stabilising function. Ter-minassian & Fedelino (2010) also verify several coordination initiatives and institutional innovations as a national fiscal policy strategy, indicating that the introduction of these co-operation mechanisms across government levels strengthens the credibility of the fiscal strategy adopted in several countries.

Ter-minassian (2007) also explores the importance of these intergovernmental cooperation arrangements by analysing the effectiveness of fiscal rules as a tool for fiscal discipline at the subnational level. Under certain conditions, fiscal rules can promote transparency and control of public accounts. However, according to the study, cooperative institutions with strong and balanced leadership, capable of promoting dialogue across government levels and making local authorities aware of the fiscal impacts of government decisions, can be more effective than fiscal rules.

Federalism can be explored as an intergovernmental coordination catalyst, based on the understanding that fiscal decentralisation, from a central unit to other jurisdictions, promotes articulation across government levels. In this sense, it is worth noting that the most relevant literature on fiscal federalism, from an economic perspective, not only favours fiscal decentralisation as a public sector efficiency tool, but also explores the topic with an emphasis on the costs involved in intergovernmental coordination. Grewal (2014) presents extensive literature from five economic perspectives: public choices; public goods; market preservation; organisational costs; and incomplete contracts.

From the perspective of public choice theory (Brennan & Buchanan, 1980), fiscal decentralisation functions as a mechanism to contain the expansion of public spending. From the public goods economic perspective (Breton, 1965), there is efficiency when a local public good is provided by a local government (street lighting, for example), just as a national public good (national defence, for example) is provided by the national government. From the perspective of market preservation (Qian & Weingast, 1997), decentralisation generates efficiency in the public sector by creating market conditions under assumptions of the Theory of the Firm.

From the perspective of organizational costs, fiscal decentralisation generates costs (Breton & Scott, 1978). This approach arises as a criticism to the traditional literature on federalism, in which the efficiency of the public sector rests on a hierarchical system of government levels and by the citizens' search for a jurisdiction in which the provision of public goods matches their preferences. From the perspective of incomplete contracts (Grewal, 2010), the distribution of powers in a federation serves as a source of political influence in the negotiation of intergovernmental fiscal arrangements, unlike the view of the traditional literature on federalism, which considers transfers as a simple redistribution of resources.

A more careful analysis presented by the literature yields two relevant reflections. First, based on the perspective of organisational costs, intergovernmental coordination presents costs as well as benefits. Thus, proposals that establish new institutional arrangements for coordination should be assessed from a cost-benefit perspective.

Second, the incomplete contracts approach serves as a theoretical foundation for the negative correlation observed by Lledó & Pereira (2015) between intergovernmental transfers and coordination, considering that transfers can be used by the central government as weapons of power struggle. This approach is close to the theoretical framework that navigates the terrain of political science and that draws attention to the following dilemma regarding coordination, pointed out by Jaccoud (2020): it favours interaction and enables the predictability of institutional behaviour, but it can interfere and structure power relations with the potential to generate conflict and tension.

This theoretical framework suggests that fiscal decentralisation and innovative institutional arrangements for intergovernmental cooperation strengthen fiscal coordination across government levels. On the one hand, fiscal decentralisation confers greater autonomy to subnational governments to adopt counter-cyclical fiscal policies in coordination with the central government. On the other hand, in periods of fiscal consolidation, greater fiscal autonomy in subnational governments provides greater budget discipline. According to Blochliger & Kantorowicz (2015), federations with a higher degree of decentralisation show better fiscal results, especially when they operate with more coherent institutions.

It is worth noting that fiscal decentralisation in Brazilian federalism is high, compared to other countries, in the criterion that corresponds to the share of revenue and public expenditure available to subnational governments (OECD/UCLG, 2016). However, the strong centralisation of normative power in public finance compromises the autonomy of subnational governments (Arrecthe, 2012).

Ter-Minassian & Mello (2016) point out that, despite Brazil being a fairly decentralised federation in terms of resources available to subnational governments, intergovernmental fiscal cooperation in Brazil is limited when compared to what is observed in other federations. For the authors, this gap in the Brazilian institutional arrangement entails at least three negative consequences: policy decisions made without careful analysis of their adverse effects on other government levels; subnational governments with no room to discuss cross-cutting issues and common agendas across government levels;

and compromising efforts to disseminate knowledge and best practices in the federation.

Carvalho & Afonso (2018) also address the relevance of promoting institutional reforms in the country that make relations across government levels in the Brazilian federation more harmonious. They present arguments in favour of institutional mechanisms of horizontal competition between states, as an initiative to strengthen vertical competition mechanisms. In this vein, Grewal (2014) advocates in favour of horizontal coordination arrangements, but also emphasises the importance of establishing an independent research centre focused on technical and empirical aspects of fiscal federalism.

The development of new intergovernmental coordination arrangements in Brazil can take place within the framework of a broader reform that points to a new model of fiscal federalism, along the lines suggested by Rezende (2016), for whom a more ambitious proposal for the reform of Brazilian federalism should observe three principles: equal capabilities for the proper exercise of responsibilities and meeting the demands of citizens; harmonisation of actions and instruments applied; and cooperation in the formulation and management of public policies.

However, it should be clear that the set of reforms to strengthen intergovernmental coordination arrangements in a federation may be the result of the natural evolution of a process of structural changes (Mourshed *et al.,* 2011). Against this background, it may be difficult to measure the causality connecting fiscal decentralisation to any outcome of intergovernmental coordination indicators for fiscal policy or the performance of subnational governments. As Treisman (2007) points out, it is no easy task to find a set of conditions under which the empirical evidence for fiscal decentralisation is robust.

Fiscal decentralisation in Brazil

Table 1, presented below, indicates that the tax burden of the states and municipalities, after the mandatory constitutional transfers, represents 41.6% of the total volume collected by the Federation as a whole in 2019.

Table 2 shows that 39.9% of the public sector consolidated expenditure is incurred by subnational governments. In this table, the expenditure was considered on an accrual basis, excluding interest and intergovernmental transfers to avoid double counting when consolidating accounts. 41.6% refers to the proportion of total tax burden destined for subnational bodies, 33.2% of the GDP, and 39.9% refers to the proportion of expenditure by states and municipalities from the total expenditure, 47.7% of the GDP.

According to OECD/UCLG (2016), Brazil is one of the most decentralised countries in the world.

Table 1. *Tax burden after compulsory constitutional transfers in Brazil (in % of GDP)*

Federative unit	2011	2012	2013	2014	2015	2016	2017	2018	2019
Union	20.1%	19.9%	19.7%	19.1%	19.1%	19.0%	19.1%	19.6%	19.4%
States (A)	7.7%	7.7%	7.2%	7.3%	7.3%	7.4%	7.4%	7.7%	7.8%
Municipalities (B)	5.3%	5.2%	5.5%	5.4%	5.6%	5.8%	5.7%	5.9%	6.0%
Total (C)	33.1%	32.8%	32.5%	31.8%	32.0%	32.2%	32.3%	33.1%	33.2%
[(A) + (B)] / (C)	39.3%	39.3%	39.3%	40.0%	40.2%	41.0%	40.8%	41.0%	41.6%

Source: Brazilian Public Sector Accounting and Fiscal Information System and Brazilian Gross Tax Burden Estimate. Authors' calculations.

Table 2. *Expenditure based on fiscal statistics and intermediate accounts (% of GDP)*

Government Sphere	2011	2012	2013	2014	2015	2016	2017	2018	2019
General Government (A)	41.9%	41.8%	42.6%	44.4%	49.3%	48.7%	48.3%	47.5%	47.7%
Union	25.2%	24.5%	25.1%	26.3%	30.9%	30.0%	30.0%	29.0%	28.6%
States (B)	8.9%	9.1%	9.8%	10.0%	10.0%	10.1%	10.0%	10.0%	10.0%
Municipalities (C)	7.8%	8.2%	7.7%	8.2%	8.4%	8.7%	8.3%	8.6%	9.1%
Subnational Part. [(B) + (C)] / (A)	40.0%	41.3%	41.1%	40.9%	37.3%	38.4%	37.9%	39.0%	39.9%

Source: Public Finance Statistics and Government Intermediate Account, Brazil National Treasury Secretariat. Authors' calculations.

3. Materials and methods

To ascertain to what extent the fiscal federative design in Brazil leads to coordination across government levels, the present study relies on the econometric panel data analysis method with fixed effects. This section discusses further details of the methodology used.

This paper sets out to adapt the tests proposed by Lledó & Pereira (2015) to assess fiscal policy coordination in European countries to the Brazilian case. This is an econometric exercise to test fiscal policy coordination in Brazilian federalism, in terms of the synchronisation of fiscal responses adopted by the central and state governments, controlling for variables that influence the cyclical conditions of the economy and the long-term solvency of subnational bodies, along with those affecting the fiscal performance of state governments. This model represents the following ex-post reaction function:

$$\Delta RSUB_{it} = \alpha_0 + \alpha_{1i} + \lambda_j \Delta RGC_t + \beta_1 RSUB_{it-1} + \beta_2 Gap_{it} + \beta_3 Debt_{it-1} + \beta_4 Dependency_{it} + \beta_5 Descentralisation_{it} + \beta_6 Rigidity_{it} + \beta_7 Credit_{it} + \epsilon_{it} \quad (1)$$

Where *RSUB* indicates the cyclically-adjusted discretionary fiscal result (as a percentage of the potential GDP) in state governments, in a state of the federation i (i = 1, 2, ..., I) in year t (t = 1, 2, ..., T). RGC represents the cyclically-adjusted fiscal result (as a percentage of the potential GDP) in the central government, considering possible lags of j periods (j = 0, 1, ..., J). Gap corresponds to the output gap. *Debt* indicates the state debt stock (as a percentage of the state's own revenue). *Dependency* is equivalent to the percentage of intergovernmental transfers in relation to the state's total collection. *Decentralisation* measures the percentage of municipal expenditure in relation to the total amount of municipal and state expenditure. *Rigidity* refers to the percentage of expenses for payment of public salaries and interest payment in relation to the total expenses of each state. *Credit* corresponds to the volume of credit operations authorised by the Brazilian National Treasury Secretariat in relation to the state's own revenue. And ϵ corresponds to a random error.

The ΔRSUB, which measures state fiscal impulses in terms of changes in the cyclically-adjusted fiscal result, is expected to respond to changes in the ΔRGC (central government fiscal impulse), considering the indicated control variables. The term "α_{1i}" corresponds to the intercept to capture state fixed effects, considering a panel data model for Brazilian states and the central government in the period from 2004 to 2016.

The λ coefficient evidences fiscal coordination: if positive and statistically relevant, it signifies that Brazilian states follow the same path as the central government, revealing fiscal coordination; if negative and significant, it indicates that state fiscal responses act in the opposite direction to the central government's intention, pointing, as in the case of lack of statistical significance, to failure in intergovernmental fiscal coordination.

The calculated fiscal impulses, both for state governments and the central government, are measured by the difference between the primary result of one year and the previous year for each federative unit. Mendonça & Pinton (2012), explore several methodologies for calculating fiscal impulse. For this study, we adopted the standard calculation methodology adjusted for (IF) = (Tt - Gt) - (Tt-1 - Gt-1), where T is primary revenue, excluding intergovernmental transfers, and G is primary expenditure. The result was adjusted to the economic cycle (elasticity "1" for revenue and "0" for expenditure).

The fiscal results, in turn, were adjusted to the economic cycle (variation in potential GDP), considering elasticity "1" for revenue and "0" for expenditure, assuming that Brazil's budget rigidity does not allow for short-term adjustments in spending.

To measure the coordination of fiscal responses adopted by federal units, intergovernmental transfers were excluded from the states' revenue each fiscal year. The aim is to measure the degree of coordination "at the discretion of the manager", in a context in which managers are encouraged to operate independently from the economic cycle, given that intergovernmental transfers in Brazil are basically defined by law and based on formulas that relate the volume transferred to the proportion of central tax collection (income tax - IT and tax on industrialised products – IPI, for its initials in Portuguese), whose collection varies according to the economic cycle. Thus, it is understood that each manager may or may not relate to the central government in a coordinated way, trying to limit, as much as possible, the influences arising from the economic cycle.

In every estimation, the model specification uses panel data with fixed effects for each state. Therefore, the effects of marginal changes in the fiscal impulses of each state from the central government's impulses were evaluated by fixing the effects for each state, to guarantee that the results are not confounded by particularities in each federative unit under analysis. It should be noted that the present study applies the Hausman Test (1978) to decide between the model with fixed or random effects. The null hypothesis of the test is that the random model is preferred to the alternative model with fixed effects. The value obtained was less than 0.05, indicating the use of the model with fixed effects.

Preliminary data analysis shows that the evolution of the conventional fiscal result (difference between all primary revenues and expenditure) of the public sector, in the period between 2004 and 2016, presented in figure 1, indicates that the result was generally positive in the three spheres of government until 2013, reverting to a negative balance in the three subsequent years for the Union. The states and municipalities showed a negative result only in 2014.

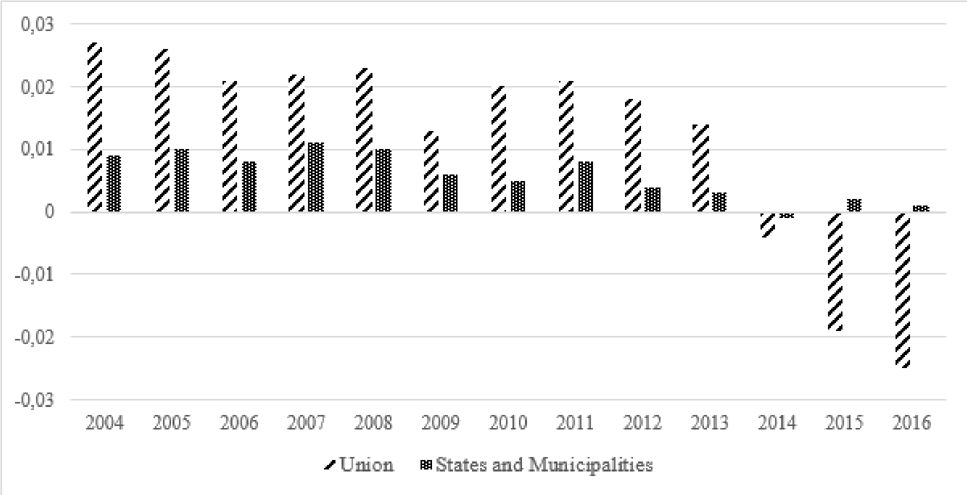

Figure 1. *Conventional fiscal results in % of GDP: Union, states and municipalities.*
Source: Economic Policy Secretariat, Brazilian Ministry of Economy (Structural Fiscal Result). Authors' calculations.

Figure 2 below presents the fiscal impulse observed in the central government and state governments between 2004 and 2016. Comparing the results for union and states, there is evidence that fiscal policy was operationalised in a coordinated manner in the following years: 2004, 2005, 2006, 2008, 2009, 2011, 2013 and 2014. It is observed that fiscal policy operated in the opposite direction in the years 2007, 2010, 2012, and in the 2015-2016 biennium.

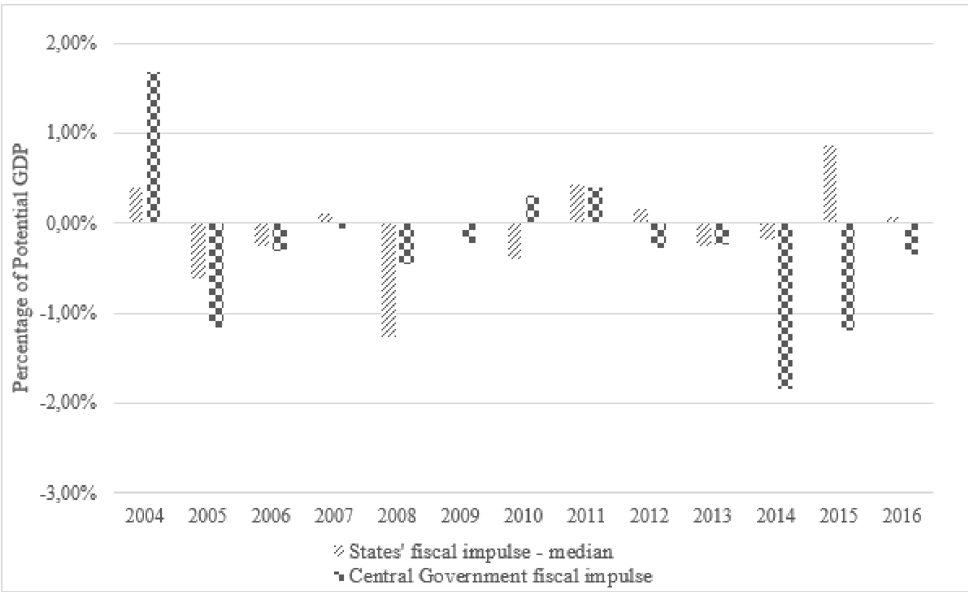

Figure 2. *Central and state governments fiscal impulses and gap variation.*
Source: Brazil National Treasury Secretariat (Annexes I and II of PAF 2000, 2016). Authors' calculations.

The estimation model to assess intergovernmental coordination of fiscal policy in Brazil comprises a public database held in the following Brazilian government agencies: National Treasury Secretariat (STN, for its initials in Portuguese), Economic Policy Secretariat (SPE, for its initials in Portuguese), Central Bank of Brazil (BCB, for its initials in Portuguese) and the Brazilian

Institute of Geography and Statistics (IBGE, for its initials in Portuguese). Open data released by the Independent Fiscal Institution (IFI) of the Federal Senate were also used.

Below, we describe the information of the variables that make up the econometric model (equation 1), summarised in table 3 as follows:

Table 3. *Described statistics of the econometric model variables.*

Variable	Minimum	Median	Average	Maximum
ΔRSUB	-0.0709	-0.0004	0.0002	0.0637
ΔRGC	-0.0184	-0.0027	-0.0028	0.0168
RSUB	-0.3528	-0.0573	-0.0798	0.0000
Gap	-0.0621	0.0059	0.0030	0.0300
Debt	0.1028	0.9755	1.2375	4.7672
Transfer dependency	0.0903	0.3697	0.3993	0.8226
Rigidity	0.3700	0.5704	0.5704	0.7646
Authorised credit operations	0.0000	0.0007	0.0628	1.9401
Expenditure decentralisation	0.1691	0.4395	0.4165	0.5450

Source: Brazil National Treasury Secretariat (Annexes I and II of the PAF 200-2016, Brazilian Public Sector Accounting and Fiscal Information System) and IFI/Federal Senate (product gap). Authors' calculations.

Cyclically-adjusted discretionary fiscal result (as a percentage of potential GDP) in state governments (RSUB)

The primary fiscal result represents the difference between primary revenues and primary expenditures. When cyclically adjusted, this result is recalculated considering the elasticity of tax revenue and expenditure in relation to the output gap, with the aim of measuring the fiscal policy not influenced by the dynamics of economic activity. Adopting the same methodology used by Lledó & Pereira (2015), the elasticity of tax revenue and expenditure with respect to the output gap corresponds to "1" and "0" (does not oscillate with spending rigidity), respectively. Furthermore, in order to capture only the discretionary responses of the states, transfers received were deducted from revenues, so as to consider only the fiscal efforts made with own revenue-raising initiatives. For each Brazilian state, the annual result obtained in the period between 2004 and 2016 was calculated.

Cyclically-adjusted fiscal result (as a percentage of potential GDP) in the central government (RGC)

As previously explained, the government's cycle-adjusted fiscal result is an economic indicator created to measure the government's primary result, disregarding the effects of economic oscillations on the fiscal result. For the central government, the annual result obtained between 2004 and 2016 was collected from the STN database.

Fiscal impulses in the central government (ΔRGC) and state governments (ΔRSUB)

They were calculated based on the annual variation in the respective cyclically adjusted fiscal results.

Output Gap (Gap)

The output gap is the indicator that measures cyclical oscillations in the economy based on the difference between the economy's observed output

(GDP) and its estimated potential output. If the GDP is above its potential, the output gap is positive. In this case, there is a tendency for inflation to rise and unemployment to fall below its natural rate. But if the GDP is below its potential, the output gap is negative, there is unused production capacity, with less inflationary pressure and an unemployment rate above the natural rate. This study used the potential output calculated by the Independent Fiscal Institute (IFI, 2022) of the Federal Senate. The gap for each state was calculated from its share in the computation of the national GDP, as if the economic cycle of each federative unit were the result of a weighting of the dynamics observed in the national cycle.

States' debt

The public debt stock for each Brazilian state in the period between 2004 and 2016 was obtained from the Central Bank of Brazil database. Its inclusion in the model aims to control the influence of this variable on the fiscal responsiveness of subnational entities. The model considered debt in relation to each state's own revenue, following the criterion adopted by Lledó & Pereira (2015).

Transfer dependency

The share of transfers received from other federal bodies in relation to the total volume of state revenue is a proxy for measuring fiscal dependency, according to Lledó & Pereira (2015). This indicator measures, for each year of the period between 2004 and 2016, the relationship between total revenues from transfers and the total revenues of the respective state. As with all the other variables described, its inclusion in the model aimed to capture factors commonly pointed out in the literature as capable of influencing the performance of subnational governments in a federation.

Local Expenditure Decentralisation

This indicator measures, for each year of the period between 2004 and 2016, the relationship between the total expenditure in each municipality in the respective state and the total expenditure in the municipalities and the state. That is, this variable measures the degree of local decentralisation of spending in each state from the share of expenditure held by municipalities. In the Brazilian case, where municipalities enjoy the status of a federative entity and play an important role in public finances, this variable becomes an important factor to be regarded as a conditioning factor of the state's fiscal performance.

State budget rigidity

The state's budget rigidity is obtained from the relationship between expenditure for payment of public salaries, interest payment, and total expenditure, excluding debt amortization. Data for each year of the period between 2004 and 2016 was collected from the Brazilian National Treasury Secretariat database (STN, 2022).

Authorised Credit

The granting of new financing is equivalent to the number of resources authorised by the National Treasury from 2004 to 2016, for each Brazilian state, as new loans, according to norms established in the Brazilian Fiscal Responsibility Law.

4. Results

The results are summarised in Table 4. For comparison purposes, results for OECD countries are also presented, based on the findings of Lledó & Pereira (2015). To test the robustness of the econometric results, the estimations were calculated considering three different functional forms: linear, Cobb-Douglas, and a hybrid model (linear and Cobb-Douglas). In the latter, logarithmic transformations were applied only to the following variables: ΔRSUB, ΔRGC, RSUB and output gap. The results presented were corrected, after detecting heteroscedasticity and serial autocorrelation in the generated residuals. The Arellano method (Torres-Reyna, 2010) was used to control heteroscedasticity and serial autocorrelation in the regression residuals, detected by means of the Breusch-Pagan tests (Breusch, 1978; Breusch & Pagan, 1980; Godfrey, 1978).

Table 4. *Fiscal policy intergovernmental coordination in Brazil and the OEDC*

Variables	Brazil			OECD	OECD
	Lineal	Hybrid	Cobb-Douglas	(Federations)	
ΔRGC	0.13 *	0.13 *	0.10	0.09 **	-0.04 **
RSub (t-1)	-0.66 ***	-0.50 ***	-0.50 ***	- 0.11	-0.50 ***
Gap	-0.09 ***	-0.09 ***	-0.08 ***	0.03	-0.02
Debt / own revenue (t-1)	0.007 ***	0.006 ***	0.005 **	0.00	0.002 *
Transfer dependency	-0.22 ***	-0.21 ***	-0.05 ***	-0.09 ***	-0.06 ***
Expenditure decentralisation	0.10 ***	0.11 ***	0.03 ***	-0.25 ***	-0.10 ***
Budget rigidity	0.12 ***	0.12 ***	0.08 ***	N/A	N/A
Authorised credit	-0.004	-0.004	-0.0003	N/A	N/A
R^2	0.5428	0.5189	0.4744	0.77	0.57

Note: *** p < 0.01; ** p < 0.05; * p < 0.1. The dependent variable in the models for Brazil is the cyclically-adjusted discretionary fiscal outcome, as a percentage of potential GDP in state governments (ΔRSUB). The variable RSUB(t-1) is the lagged state governments' discretionary fiscal outcome. The data comprise the period from 2004 to 2016. The models for OECD (Federations) and OECD are presented for comparison purposes (Lledó & Pereira, 2015), the former with fiscal coordination estimated only for countries structured as federations, and the latter with all countries (federative and unitary).

In the models with linear and hybrid functional forms, the responses in Brazilian states to the central government's fiscal impulses (λ) are synchronised - with a positive and statistically significant coefficient (+ 0.13), indicating evidence of intergovernmental coordination. This means that in the period analysed (2004 to 2016), the fiscal results of the central government and the states moved in compatible directions, with a 1% increase or decrease in the central government's fiscal impulse promoting an increase or decrease, on annual average, of 0.13% in the fiscal impulse of the states, taking into account the discretionary fiscal policy.

In the Cobb-Douglas functional form model, no evidence of coordination was found, since the parameter obtained (+ 0.10) is not statistically significant. For OECD, there is evidence of fiscal coordination between the central and subnational levels in federations (+ 0.09), with no coordination when unitary countries were included (-0.04), which favours federalism as an intergovernmental coordination catalyst (Breton & Scott, 1978).

There is also a negative relationship between the fiscal result in states, observed in a given fiscal year, and the fiscal impulse in the following year (-0.50, in the models with hybrid and Cobb-Douglas functional forms, and even more marked in the linear model, with -0.66). In other words, a positive or negative result tends to generate fiscal impulse in the opposite direction in the following year. A similar result was observed for OECD countries (- 0.50).

Measuring the effects of the output gap, we observed that the discretionary fiscal policy in the Brazilian states had a pro-cyclical nature in the period analysed. The output gap coefficient (-0.09, in the models with linear and hybrid functional forms, and -0.08 in the Cobb-Douglas model) reveals that negative (positive) fiscal results accompanied the expansion (retraction) of economic activity in relation to the potential GDP. Giuberti & Rocha (2008) found evidence of states pro-cyclical fiscal policy when analysing public accounts in the period between 1997 and 2004, also showing that the Fiscal Responsibility Law (FRL), enacted in 2000, contributed to weaken the policy's pro-cyclical nature. For OECD, no significant statistical relevance was found for this effect.

As for the effects of the "debt/own revenue" relationship as an indicator of public sector solvency, a tendency towards greater fiscal consolidation efforts is noted in the case of states with higher debt/own revenue ratios (positive and significant coefficients in all models, and with a value of +0.007 in the linear functional model), as also observed in OECD countries (+0.002). As expected, when the degree of debt relative to the capacity to generate its own cash flow is higher in a given fiscal year, the subnational governments tend to manage their public accounts in favour of the fiscal discipline in the subsequent fiscal year. Intuitively, there seems to be a loosening of the fiscal policy in more favourable situations regarding the solvency of the state. In other words, it can be inferred that the advantageous position of the state in terms of its degree of indebtedness can create incentives for expansionary fiscal policy, either by increasing primary expenditure or reducing its own revenues, including through tax incentives.

The adopted econometric model measures the degree of intergovernmental coordination between the federal government and state governments, controlling for variables that can affect the fiscal performance of states: intergovernmental transfer dependency, expenditure decentralisation, budget rigidity, and authorisations for credit operations.

Firstly, it can be seen that Brazilian states that are more dependent on transfers from the federal government tend to have a lower fiscal effort (significant coefficients in all models and a value of -0.22 in the model with a linear functional form). The same tendency was verified in OECD countries (-0.09 and - 0.06), but with greater statistical significance in the Brazilian case. Indeed, the literature on federalism from an economic perspective explores intergovernmental transfer as a factor that compromises accountability and fiscal performance (Grewal, 2014).

In turn, the results for local expenditure decentralisation in Brazil point to greater fiscal effort in the more decentralised bodies (statistically significant coefficients in every version, with a value of + 0.11 in the hybrid functional model). In other words, in states where the share of total expenditure (states plus municipalities) is more concentrated in the municipal sphere (greater decentralisation), the fiscal results tend to be more positive. According to Public Choice Theory (Brennan & Buchanan, 1980), fiscal decentralisation functions as a mechanism to contain the expansion of public spending. However, an inverse relationship is observed between decentralisation and fiscal outcome in OECD countries (-0.25 and -0.1), which can be explained by the lag between expenditure and revenue, as shown by Escolano *et al.,* (2012).

Budget rigidity is also a factor that explains the fiscal performance of Brazilian states. Rigidity in spending, measured in terms of public salaries and interest payment expenditure in the total budget, compromises the room for manoeuvring fiscal policy, being one of the most decisive factors in the reduction of states' investment capacity (Anjos, 2016). With a positive and statistically significant coefficient in all models (with a value of + 0.12 in the models with linear and hybrid functional forms), it is observed that states with greater budget rigidity tend to be more fiscally disciplined. Further research is needed for this assertion. However, the reasoning behind this result is the following: a lower degree of freedom in fiscal management implies a greater fiscal effort to keep public accounts in balance. The effects of rigidity on the fiscal performance of subnational governments were not subject to analysis as an explanatory variable in the model built by Lledó & Pereira (2015).

Finally, the results indicate that there is no evidence of a relevant effect of credit conditions on states' fiscal performance. There was no statistical significance - in either of the three models - for the coefficient that measures the effects of authorisations from the National Treasury Secretariat for state credit operations.

It is worth noting that the three models used presented consistent results for all variables analysed, with the exception of parameter λ, which measures the degree of intergovernmental coordination in Brazilian fiscal policy. In this case, two models pointed to the existence of coordination, but with significance below what is conventionally required, while the third ruled out coordination entirely. In all cases, the value of the estimated coefficient proved to be low, raising doubts about the real capacity of the central government to influence the fiscal trajectory of subnational entities.

5. Conclusion

The present study sought to measure the synchronisation of fiscal responses adopted by the central and state governments between 2004 and 2016, with the aim of assessing fiscal policy coordination capacity across government levels in Brazil. Through econometric examination based on panel data models, the direction of Brazilian states' responses to the central government's fiscal impulses was estimated, along with the effects of variables that can affect states' fiscal performance, such as output gap, solvency, dependency on intergovernmental transfers, expenditure decentralisation, budget rigidity, and subnational credit availability.

The background to this econometric exercise was the importance of intergovernmental coordination as a strategy for government performance, to guarantee greater fiscal policy efficiency efforts on the budget's stabilising and allocative functions. Brazil is a federation with a large number of subnational federative units and a high degree of fiscal decentralisation, when compared to other federations. Moreover, the Brazilian federative regime is integrated, given that the central government has strong decision-making power in defining the rules that control intergovernmental fiscal relations. In this context, coordination across government levels should be treated as a key element in the reform agenda for the Brazilian institutional framework, especially given the institutional gaps, the benefits of intergovernmental coordination presented in the literature, and the rich international experience of OECD countries in this area.

The results of the econometric estimations were not conclusive regarding the central government's ability to promote strong intergovernmental coordination in Brazil. Among the factors that influence the states' fiscal performance, the oscillatory component of the fiscal results calculated in the previous period is the most important, signalling a pro-cyclical fiscal management in relation to the output gap.

This dynamic shows weaknesses in the decision-making process in the area of intergovernmental coordination of fiscal policy, which add to other factors that compromise the balance of public accounts for subnational governments in the medium and long term.

Budget rigidity and high debt generate better fiscal performance, according to the econometric estimates of this study. This phenomenon indicates that subnational governments in a more favourable position - fiscal flexibility with better solvency - act with less fiscal discipline. In this vein, fiscal consolidation processes tend to occur only when the federative unit is in an unfavourable fiscal condition - high rigidity and debt.

The results also show the effects of other variables that affect states' fiscal performance in Brazil, confirming positions consolidated in the literature on federalism. In the Brazilian case, dependency on intergovernmental transfers compromises the fiscal performance of the states, just as local fiscal decentralisation tends to promote greater control over public finances. Thus, those federative units with greater fiscal capacity and high local decentralisation of resources have a better fiscal performance.

Research limitations must be acknowledged, which suggest further studies on the subject. The current study was restricted to measuring coordination between central and state governments, leaving municipalities out of the scope of the analysis. In addition, local output gaps were not calculated considering the economic reality of each federative unit, assuming that the effects of the economic cycle in each locale are proportional to their contribution to the national GDP. Fiscal rules were not used as a control variable due to the difficulty in finding a suitable indicator for Brazil, but it is known that such governance instruments can influence the fiscal performance of the states.

This paper has opened paths for further analysis in the institutional reform agenda discussed in several countries. Based on the findings of specialised literature and international experience, coordination instruments across levels of government in federalism may present themselves as alternatives to make intergovernmental fiscal relations more consistent and effective. Ultimately, fiscal decentralisation combined with institutional arrangements for intergovernmental coordination can promote fiscal national strategies capable of fostering macroeconomic stability and sustainability of public accounts in the country.

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