

Intergovernmental Transfers in Hard Times: Evidence from Brazilian local governments in the COVID-19 crisis.

Felipe B. Granai, Luciano M. Salomão,

Gustavo F. Ladeira¹ Elaine T. Pazello e Alexandre C. Nicolella²

Abstract

The socioeconomic impact of fiscal transfers to local governments in developing countries is a subject of controversy in the literature. However, there is a lack of studies investigating the impact of those resources in exceptional circumstances, such as during crises and public emergencies. This article aims to evaluate whether the intergovernmental transfers impacted the response of Brazilian municipalities to the COVID-19 pandemic. To achieve this objective, we focused on the main transfer to local governments, the Fundo de Participação dos Municípios (Municipal Participation Fund - FPM). Considering the program allocation rule, which increases resources to municipalities that experience changes in their population range, we employed a Regression Discontinuous Design. This approach can identify the impact of the FPM on the number of COVID-19-related deaths, hospitalizations, and healthcare expenditures. The findings suggest that higher per capita transfer from the FPM had a significant impact in mitigating the number of deaths and serious hospitalizations, as well as increasing healthcare expenditures, with primary care spending being the main channel. These results indicate that during crises, increased access to local resources is beneficial, which challenges some empirical findings and models suggesting that intergovernmental transfers in developing countries are always susceptible to capture by elites.

Keywords: *FPM, Intergovernmental transfers, COVID-19, RDD, natural experiment*

JEL: H71, H51, H75

1. Introduction

The impact of intergovernmental transfers to subnational governments in developing countries is a subject of controversy. Nevertheless, these transfers finance approximately 60% of subnational entities' expenditures (SHAH, 2007). There is a range of theoretical models and arguments, especially in the case of developing countries, that suggest intergovernmental transfers are more susceptible to resource capture by local elites, having poorer investment allocation, lower bureaucratic quality, and fiscally irresponsible behaviors (PRUD'HOMME, 1995; BARDHAN; MOOKHERJEE, 2000 and 2006, VIGNEAULT, 2007).

¹ Graduate Student in Applied Economics - University of São Paulo (USP), CAPES-DS Scholarship. Email: felipebauer@usp.br, lucianomans98@usp.br, gustavoladeira@usp.br

² Professor at the Department of Economics - University of São Paulo (USP). Email: epazello@usp.br, nicolella@usp.br

On the other hand, there is a range of models indicating that the inherent incentives of receiving these transfers can lead to socially optimal or suboptimal resource utilization, depending on the existence of checks and balances mechanisms. One of these mechanisms, for example, is voter scrutiny, which pressures politicians to be accountable for their actions (PERSSON; TABELLINI, 2002; BESLEY, 2006), contributing to transparency in resource allocation that aligns better with local preferences (TIEBOUT, 1956; OATES, 1999; BOADWAY, 2007).

In Brazil, the focus of this case study, fiscal transfers from the federal government to local governments through the Fundo de Participação dos Municípios (FPM) represent nearly a third of municipal revenues, making it a primary source of income for many Brazilian municipalities (CORBI et al., 2019).

As predicted by theory, empirical evidence shows positive, negative, or null outcomes of these transfers. Adding to the skeptical view of these transfers, there is evidence that increased FPM transfers can deteriorate local political processes by raising corruption levels and decreasing the quality of candidates running for office (BROLLO et al., 2013). Furthermore, increased resources received by municipal governments may not translate into greater public goods provision but, instead, lead to reduced local tax collection efforts (REGATIERI, 2013) and can increase the number of politically appointed employees (ALVES; ARAÚJO, 2021). However, another set of evidence suggests that FPM transfers can improve education, reduce poverty and illiteracy (LITSCHIG; MORRISON, 2013), and stimulate formal employment generation (BRAGA et al., 2017; CORBI et al., 2019). In the realm of health, there are indications that these transfers can also reduce morbidity and hospitalization rates (RIBEIRO, 2015), although a similar effect on maternal and child health indicators has not been found (CAVALCANTI, 2018).

While various studies examine the effects of these resources, there is a gap in the research when it comes to transfers during exceptional circumstances. In times of crisis or disaster, public sentiment tends to be stronger, and a body of evidence shows that more informed individuals scrutinize the actions of policymakers, increasing incentives for accountability (FERRAZ and FINAN, 2010; PANDE, 2011, DIAS; FERRAZ, 2019). In this context, the use of resources in extreme situations may come under greater scrutiny, urging their better use. This is the main argument of this work.

In this paper, we use the critical period of the COVID-19 pandemic in the Brazilian context, i.e., a state of public calamity, to analyze the effect of these intergovernmental

transfers, specifically from the FPM, to local governments. Given that the values of these transfers increase abruptly for municipalities whose population surpasses certain predefined cutoffs, this discontinuity allows for the application of a fuzzy Regression Discontinuity Design, following Corbi et al. (2019). By identifying statistically similar municipalities that received different amounts from the federal government, it is possible to isolate the effects of variations in the received transfers on the provision of health services.

In Brazil, throughout the pandemic, there were disagreements about virus containment actions between the Union, states, and municipalities (ABRUCIO et al.; 2020; FERIGATO et al., 2020). In April 2020, a decision by the Supreme Federal Court (STF) determined that subnational entities had the autonomy to define their strategies for tackling the new coronavirus. However, while this decision declared *de jure* autonomy for states and municipalities, the enforcement capacity for various actions depended on the financial capabilities of these entities, considering that they lack automatic mechanisms for economic shock absorption (BARBOSA et al., 2022).

Specifically for municipalities, financial capacity is strongly related to the availability of intergovernmental transfers, as the traditional channels for increasing taxation are limited due to constitutional deadlines and a restricted capacity for exploiting tax bases - especially in the context of falling income and economic activity. In this scenario, resources from the FPM can represent a significant exogenous variation in the financial capacity of municipalities.

This paper contributes to the literature in three main aspects. First, it adds to the research on government responses to the new coronavirus pandemic (HAUSMANN; SCHETTER, 2020), specifically focusing on the performance of developing countries (ALON et al., 2020). Second, it also contributes to the literature investigating how institutions can guide government actions, testing the potential channels raised by theoretical literature (PERSSON; TABELLINI, 2002; BESLEY, 2006). Several studies identify that these institutions can influence fiscal (GIESENOW et al., 2020) or health policies (KUDAMATSU, 2012), for example. Regarding the media as an institution, evidence suggests that governments are more responsive when citizens are better informed (FERRAZ; FINAN, 2011), and governments also respond better to shocks that attract more media attention, such as natural disasters (EISENSEE; STRÖMBERG, 2007) and the COVID-19 pandemic (BESLEY; DRAY, 2023). By combining both literatures, this article identifies that greater media coverage during exceptional circumstances can encourage the better use of public resources in the context of a developing country. Finally, it also contributes to research investigating the impact of intergovernmental transfers, particularly regarding health indicators (RIBEIRO, 2015; CAVALCANTI, 2018).

In addition to this introductory section, this text is divided into three more parts. The next section presents the institutional context of the FPM, details the data used, and proposes the methodology. Section three presents the results of the estimations, and section four concludes.

2. Institutional Framework: The Municipal Participation Fund (FPM).³

Brazil operates under a federative structure, characterized by three tiers of government: the Union (federal government), states (intermediate level), and municipalities (local governments). This system of shared responsibilities is designed to facilitate decentralization in the implementation of public policies. The federal constitution delineates the allocation of powers among these government levels concerning public policies. The federal government wields extensive authority, encompassing matters of national security, foreign relations, and macroeconomic policies, in addition to substantial regulatory powers across various public policy domains. States and municipalities similarly enjoy significant autonomy in legislating and executing public policies, notably in areas like healthcare and education. However, it's noteworthy that municipalities do not possess broad tax-raising powers. Consequently, decentralization in Brazil heavily relies on financial transfers to local governments, with a prominent role played by the Municipal Participation Fund (FPM).

The FPM assumes a central role as the main fiscal transfer mechanism for Brazilian municipalities, enjoying constitutional status. The fund's financial resources derive from 25.5% of the total collections of the Tax on Industrialized Products (IPI) and the Income Tax on Earnings of Any Nature (IR), taxes falling under federal government jurisdiction. The origin of the FPM can be traced back to 1965 when a tax system reform concentrated IR and IPI taxes within the central government. This shift necessitated the creation of a mechanism to compensate for the loss of revenue at the local government level. It's worth noting that, with the progression of fiscal decentralization, the proportion of IPI and IR collections allocated to local governments gradually increased⁴.

To determine the allocation of funds to each jurisdiction, the process relies on demographic criteria and per capita income levels within each state. Municipalities are categorized into three groups: Capital, Interior, and Reserve. The Capital category encompasses

³ This section essentially follows the instructional material on the FPM prepared by the National Treasury Secretariat (2023).

⁴ The regulation of the fund is Decree-Law No. 1,881/1981 (SECRETARIA DO TESOURO NACIONAL, 2023).

state capitals, while the Interior category includes all other municipalities. The Reserve category comprises municipalities from the Interior category, but only those with a population exceeding 156,216 inhabitants. The percentage breakdown of the total fund values among these three categories is 10%, 86.4%, and 3.6%, respectively. It's important to note that 3.6% of resources in the Reserve category are cumulative. This means that municipalities in the Interior category with populations exceeding 156,216 inhabitants gain access to an additional 3.6% of FPM resources. According to Mendes, Miranda, and Cosio (2008), the resource distribution mechanism for the Interior category follows the formula provided below:

$$V_{ie} = \frac{0,864 * FPM * FP_{ie} * \theta_e}{\sum FP_{ie}} \quad (1)$$

Where V_{ie} is the value to be received by municipality i located in state e , FPM is the total value to be distributed by the fund, FP_{ie} is the coefficient relative to the population of municipality i located in state e (Table 1), θ_e is the participation of state e in FPM-Interior (Table 2). The sum of all coefficients of municipalities i in the state e is given by $\sum FP_{ie}$.

Table 1 – FPM Population Coefficients

Number of inhabitants	FP _{ie} Coefficient	Number of inhabitants	FP _{ie} Coefficient
Until 10,188	0,6	From 61,129 to 71,316	2,4
From 10,189 to 13,584	0,8	From 71,317 to 81,504	2,6
From 13,585 to 16,980	1	From 81,505 to 91,692	2,8
From 16,981 to 23,772	1,2	From 91,693 to 101,880	3
From 23,773 to 30,564	1,4	From 101,881 to 115,464	3,2
From 30,565 to 37,356	1,6	From 114,650 to 129,048	3,4
From 37,357 to 44,148	1,8	From 129,049 to 142,632	3,6
From 44,149 to 50,940	2	From 142,633 to 156,216	3,8
From 50,941 to 61,128	2,2	More than 156,216	4

Notes: Elaborated by the authors based on the Decree Law 1881 of 1991.

It's important to note that the coefficients and allocations presented in Tables 1 and 2 pertain to the calculation for municipalities classified under the Interior category. This category encompasses the vast majority of Brazilian municipalities, approximately 90%. Therefore, the FPM assessment holds significant relevance. This is because the process of fiscal decentralization and the municipalization of public services, as established by the 1988 Constitution, was strongly underpinned by intergovernmental transfers, with the FPM emerging as the transfer mechanism experiencing the most substantial growth (MENDES, 2005;

GIAMBIAGI; ALÉM, 2011). Moreover, in the latter half of 2020, there was a 503% increase in COVID-19 cases in municipalities with populations of up to 20 thousand inhabitants, and these municipalities were the largest recipients of FPM resources in net terms⁵.

Table 2 – *Share of States in the FPM Revenue*

State	θ_e - Share %	State	θ_e - Share %
Acre	0,263	Paraíba	3,1942
Alagoas	2,0883	Paraná	7,2857
Amapá	0,1392	Pernambuco	4,7952
Amazonas	1,2452	Piauí	2,4015
Bahia	9,2695	Rio de Janeiro	2,7379
Distrito Federal	0,000	Rio Grande do Norte	2,4324
Ceará	4,5864	Rio Grande do Sul	7,3011
Espírito Santo	1,7595	Rondônia	0,7464
Goiás	3,7318	Roraima	0,0851
Maranhão	3,9715	Santa Catarina	4,1997
Mato Grosso	1,8949	São Paulo	14,262
Mato Grosso do Sul	1,5004	Sergipe	1,3342
Minas Gerais	14,1846	Tocantins	1,2955
Pará	3,2948	TOTAL	100

Notes: Elaborated by the authors based on the Decree Law 1881 of 1991.

3. Identification Strategy and Data

3.1. Methodology

This paper aims to evaluate the impact of FPM transfers in tackling the COVID-19 pandemic, and as the cutoff points are well defined by Decree-Law nº 1,881/1981, we follow the literature that implements the Regression Discontinuity Design (RDD) to evaluate the impact of the FPM⁶.

The RDD is used when the probability of receiving treatment depends on an attribution variable, usually called the running variable, and there is a cutoff point, c , that separates the treatment and control groups. In the present paper, the running variable used is the population and the cutoffs are the population ranges established by the FPM, since, municipalities that change the range start to receive more/fewer resources. Figures 1 and 2 present the FPM values

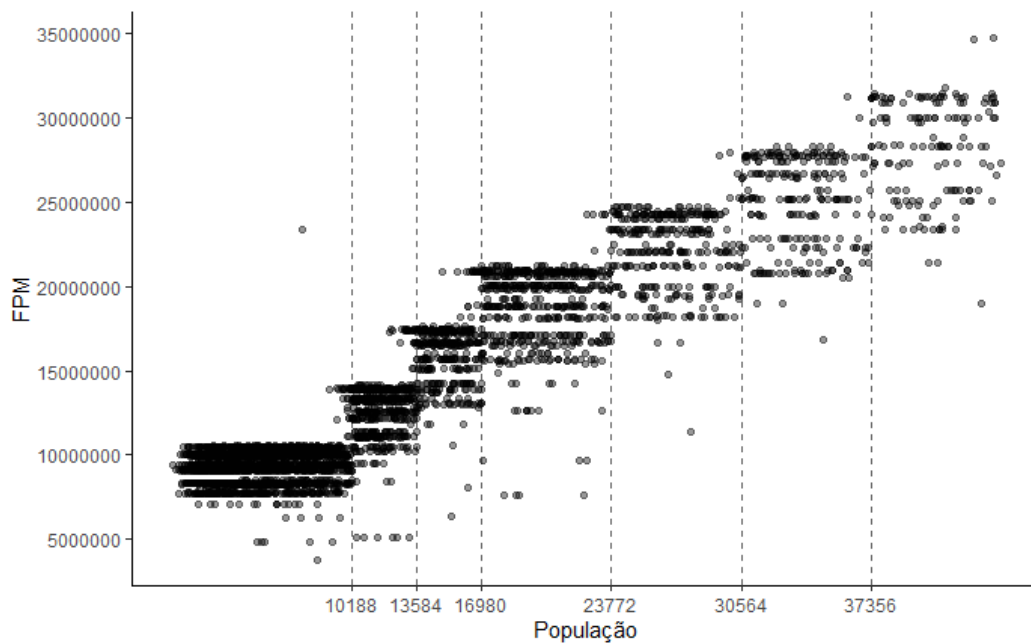
⁵ Folha de São Paulo (2021).

⁶ This approach is used, for example, in Litschig and Morrison (2013), Brollo et al. (2013), Braga et al. (2017); Corbi et al. (2019), and Araújo and Alves (2022).

in 2021 in absolute and per capita terms for the first 7 population groups, respectively. More than 90% of Brazilian municipalities are located in these bands, and in addition, the discontinuities observed are greater. Therefore, those municipalities will be the target of our analysis. The identification of the causal effect involves the idea that municipalities with populations close to the cutoff points are similar, except for the fact that, when they are above (below) a cutoff point, the legislation allows the transfer of more (fewer) resources.

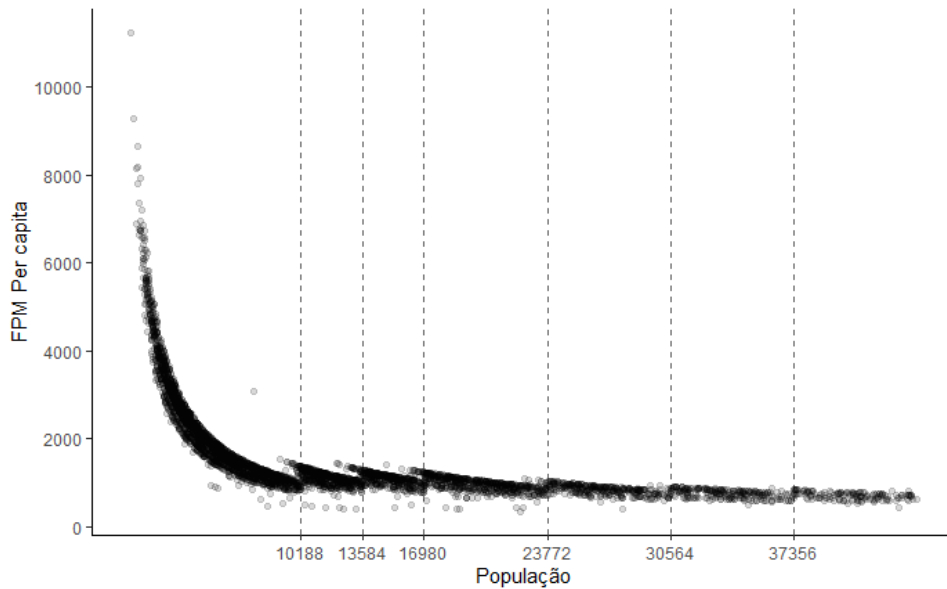
It is assumed that the probability of a municipality receiving more resources increases based on the cutoffs, and that the number of deaths and hospitalizations due to COVID, per 100 thousand inhabitants, does not directly depend on the population for municipalities close to the respective cutoffs. Therefore, it is investigated whether the increase in resources in per capita terms affects the variables of interest related to the management of the pandemic.

Figure 1 – FPM Values and population cutoffs– First 7 cutoffs



Notes: Prepared by the authors. Data from STN and IBGE.

Figure 2 – FPM *per capita* values and population Cutoffs– First 7 cutoffs



Notes: prepared by the authors. Data from STN and IBGE.

There are two approaches to implementing RDD: the sharp and the fuzzy case. The choice between the two cases depends on the discontinuity in the probability of receiving treatment. In the first case, sharp, the treatment is given using a deterministic function that goes from 0 to 1: 0 if the observation unit is below the policy cutoff point and 1 if it meets the cutoff point criteria. In the fuzzy case, the jump in probability is not exactly from 0 to 1, but rather partially determined by the discontinuity around the cutoff point.

One important issue with the FPM is the fact that it has imperfect compliance. As Regatieri (2013) points out, in theory, municipalities belonging to the same range and located in a given state should receive the same per capita values of FPM transfers. However, not all municipalities that can be treated receive treatment. Note that from the visualization of Figure 1, it can be seen that there are municipalities located to the left of the respective cutoff points receiving similar per capita resources as municipalities immediately to the right of the cutoff. In light of these observations, the hypotheses of the sharp case are violated, and the use of fuzzy RDD estimates is recommended. This occurs because, in practice, the fund does not only depend on the population values of the municipalities, but also on the political influence of these municipalities with the Union, or on judicial decisions that contest the population estimates done by the Brazilian Institute of Geography and Statistics (IBGE) used for FPM transfers (MATTOS; ROCHA; ARVATE, 2011; MONASTERIO, 2013).

Therefore we followed the approach proposed by by Corbi et al. (2019), which implements a Two-Stage Least Squares (2SLS) approach and uses the theoretical values of the

FPM as an instrumental variable of the observed values of the fund transfers. This strategy mitigates the imperfect compliance that exists when applying the rule. The estimated model follows the specification:

$$1^\circ \text{ Stage: } FPM_{pc_i} = \pi FPMteo_{pc_i} + f(pop_{i,1-t}^c) + \delta_s + v_i \quad (2)$$

$$2^\circ \text{ Stage: } Y_{it} = f(pop_{i,1-t}^c) + \tau \widehat{FPM}_{pc_i} + \delta_s + u_i \quad (3)$$

In the first stage, equation (2), the observed values, FPM_{pc_i} , are regressed against the theoretical values established by the law, $FPMteo_i$; δ_s represents the fixed effect for States and v_i is the error term. The term, $f(pop_{i,1-t}^c)$ is a polynomial of the centralized population of the previous year, which captures how close (or far) a municipality i is from its respective cutoff point, c_i ⁷. In the second stage, equation (3), Y_{it} represents several health indicators, such as deaths and hospitalizations due to COVID-19, deaths from Severe Acute Respiratory Syndrome (SARS) (both per 1000 thousand inhabitants), and several measures of health expenditure per capita. The treatment variable is \widehat{FPM}_{pc} (the predicted FPM_{pc}) and the τ coefficient captures the causal effect of an increase in FPM on pandemic variables.

The RDD analysis undertaken in this work focuses on the neighborhood of 10%, 5%, and 3% of the first seven population cutoffs. This procedure was adopted by several articles that implement the RDD in the analysis of the FPM (BROLLO et al. 2013; LITSCHIG; MORRISON, 2013, CORBI et al. 2019; ARAUJO and ALVES, 2021) and aims to increase the number of observations around the cutoff points. Additionally, estimations were carried out using the optimal band proposed by Cattaneo, Idrobo, and Titiunik (2023).

As Angrist and Pischke (2008) point out, RDD estimates should not be sensitive to the inclusion of control variables, therefore the inclusion of covariates should be seen as a test of the robustness of the results found. The following variables were included as pre-treatment covariates: municipal GDP per capita, transferred ICMS per capita (a consumption tax, which is transferred from states to their respective municipalities), the percentage of people over 65 years old as a proportion of the municipal population (2010 demographic census), a dummy that indicates whether the municipality is part of a metropolitan region and, finally, a dummy,

⁷ Following Araújo and Alves (2021), the polynomial was defined as follows $f(pop_{i,1-t}^c) = Dist_i = \frac{pop_{i,1-t}^c - c_i}{c_i}$.

indicating whether a given municipality registered a higher proportion of votes in favor of Jair Bolsonaro in the 2018 presidential election⁸.

3.2. *The Data*

We used several data sources and most of them come from the year 2021. However, it's worth noting that the population was based on 2020 figures due to the legal FPM transfer mechanism, which uses the previous year as the baseline. Similarly, municipal GDP values were from the year 2020.

One of the main sources of COVID-19 pandemic data in Brazil is the Painel Coronavírus (Coronavirus Panel), provided by the Ministry of Health (MS). However, due to the bureaucratic notification process, it suffers from significant delays (VALENTE; LAURINI, 2021). In contrast, the SARS surveillance database, organized by SIVEP-GRIPE⁹ and also under government administration (MS), stands out. This database is seen as the most robust data source for cases leading to deaths and hospitalizations (OLIVEIRA et al., 2020), even though most cases of the new coronavirus are not severe (GAO, 2020). This is attributed to its inclusion of crucial information such as the date of hospitalization, the onset of symptoms, and the occurrence of deaths for each case. It's noteworthy that the new coronavirus belongs to the SARS category. Therefore, from the SIVEP-GRIPE database, we use data on COVID-19 deaths and hospitalizations, as well as deaths from SARS, for the year 2021 and categorized according to the individuals' municipalities of residence.

Finbra¹⁰ serves as a comprehensive database that compiles information regarding the annual budgetary and financial performance of federal entities. In this system, municipalities themselves submit their fiscal and accounting data to the National Treasury. This database encompasses various revenue types received by municipalities, including their share of state ICMS revenues (consumption tax). Firstly, we collected the data on municipal health expenditures for 2021 at the most aggregated level available, reflecting the total amount of health expenses. For a more in-depth analysis, these health expenditures were further categorized into 'expenditures on basic care,' 'expenditures on hospital care,' and 'expenditures on epidemiological surveillance' (all on a per capita basis). This categorization based on

⁸ The use of this dummy is justified, since in the fight against the pandemic there was divergence regarding the measures to be taken between the federal government and subnational entities (BRUCE, et al., 2022).

⁹ With annual versions, this database undergoes constant updates: every Wednesday the information is updated. Therefore, the information used in this study may not be the same as that in future analyses. The last update of the data used was carried out on October 17, 2022. Available at: <https://opendatasus.saude.gov.br/dataset/srag-2021-a-2023>.

¹⁰ Available at: https://siconfi.tesouro.gov.br/siconfi/pages/public/consulta_finbra/finbra_list.jsf.

functional expenses enables a better understanding of how FPM impacted the municipality allocation of the healthcare budget.

The data regarding FPM (Municipal Participation Fund) came from the National Treasury Secretariat (STN)¹¹, representing consolidated values for the entire year of 2021. Population estimates for municipalities were acquired from the IBGE; as mandated by law, they are submitted to the TCU (Federal Court of Accounts) and used for calculating FPM transfers. Additionally, GDP estimates, information regarding municipalities in metropolitan regions, and the proportion of residents aged 65 and older were directly obtained from IBGE¹². Lastly, details on municipalities where the majority of votes in the 2018 election favored Jair Bolsonaro were obtained through the Superior Electoral Court¹³. Finally, Table 3 has been compiled to present descriptive statistics, providing an illustrative overview of the variables discussed in this section.

Table 3 – Descriptive Statistics – Main Variables

Variáveis	Média	Desvio-Padrão	Mínimo	1º Quart.	Mediana	3º Quart.	Máximo
População	20257.8	8962.1	9187	13023.5	17106.5	27569.8	41081
FPM per capita	960.9	194.9	342.6	821.5	954.6	1105.1	1482.9
FPM teórico per capita	937.3	186.2	263.8	803.8	937.7	1073.6	1375.4
PIB per capita	24971	28786.7	4924	10347.3	17214.2	30114.1	591101.1
ICMS per capita	767.9	891.3	81.1	290.7	541.7	988.7	16319.3
% Vitória Bolsonaro 2018	0.4	0.2	0	0.2	0.3	0.5	0.8
Óbitos COVID/100 mil hab.	139.3	96.5	3.2	61.7	118.3	202.1	534.1
Óbitos SRAG/100 mil hab.	155.7	103.1	3.2	74	133.9	219.3	584.4
Internações COVID/100 mil hab.	417.1	337.7	8.1	155.3	314.2	597.3	2099.3
Gastos em Saúde per capita	931.3	361.2	132.4	730.8	868.4	1042.5	4341.1

Fonte: elaboração própria. Dados da STN, IBGE e MS. Essas estatísticas consideram 1802 municípios de nossa amostra.

4. Estimation and Results

4.1. Validation of Regression Discontinuity

This subsection will examine the suitability of data and policies for the RDD methodology. We have opted to employ the methodology proposed by CORBI et al. (2019),

¹¹ Available at: <https://sisweb.tesouro.gov.br/apex/f?p=2600:1:::NO:::>

¹² Available at: <https://www.ibge.gov.br/estatisticas/todos-os-produtos-estatisticas.html>

¹³ Available at:

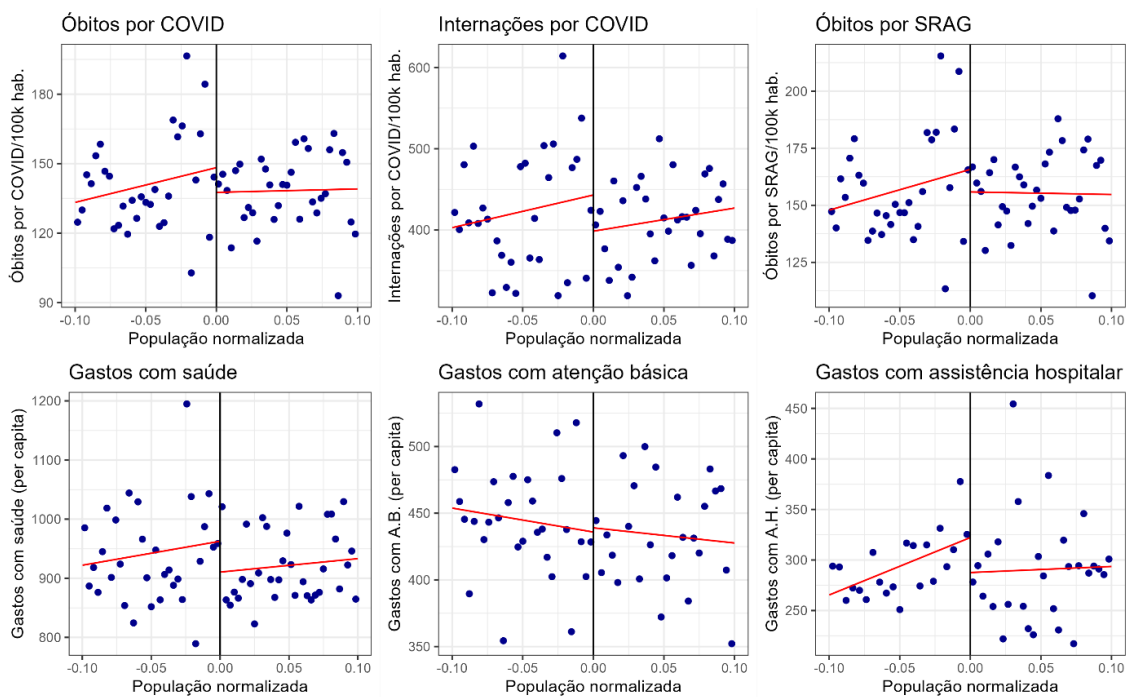
https://sig.tse.jus.br/ords/dwapr/r/seai/sigeleicaoresultados/partidos?p0_turno=2&session=101372185045676

which utilizes a fuzzy RDD approach, following equations (2) and (3) as detailed earlier, and employing 2SLS as our estimation method¹⁴.

To assess the applicability of the RDD methodology, we follow the protocol outlined by Skovron and Titunik (2015). The first robustness test involves a descriptive examination of graphs that relate the outcome variable to the running variable, specifically to verify if discontinuities occur only around the analyzed cutoff point. The graphs utilized in this test are presented in Figure 3, which comprises six distinct charts, each representing a health-related variable plotted against population estimates. Consequently, it can be noticed that the discontinuity is only observed in the outcome variables around the cutoff point. This observation indicates that the proposed methodology aligns descriptively with the framework intended by RDD, following the approach of Skovron and Titunik (2015).

Important to note in Figure 3 that healthcare spending decreases to the right of the cutoff. However, as demonstrated in the results section, there is indeed an increase in these expenses in the treated municipalities. When we break down healthcare expenditure into its basic healthcare and hospital care components, it becomes apparent that there is a significant decline in hospital care expenditure in the treated municipalities, which contributes to the overall decrease in healthcare expenditure for this group.

Figure 3 - Health Variables and Population Estimate



¹⁴ For the first stage stage, we computed the values prescribed by the law (theoretical FPM) using data sourced from the STN, following equation (1).

A valid running variable should undergo minimal or no manipulation by municipalities to the extent that we do not reject the hypothesis of treatment exogeneity. We conducted the McCrary density test (McCRARY, 2008), which has the null hypothesis of density continuity of the running variable at the cutoff point. Rejecting the null hypothesis indicates a potential manipulation around the cutoff. The p-value obtained from the test was (0.7254), and we didn't reject the null hypothesis, therefore, there is no evidence of data manipulation concerning the FPM.

The subsequent step involves assessing whether the covariates intended for RDD estimation are influenced by the running variable at the cutoff point, as recommended by Skrovn and Titiunik (2015). So, we run the RDD estimations considering the municipalities' GDP *pc* for 2020 and ICMS *pc* transfers for 2021. None of the estimated coefficients were statistically significant¹⁵, showing that these covariates had no discontinuity around the cutoff.

As the final stage of validation, the protocol includes placebo tests, designed to determine whether potential artificial cutoffs have any local impact. If these artificial cutoffs produced a local effect, it could undermine the ability of the proposed methodology to accurately identify the FPM impact. When conducting these tests for the outcome variables, it became evident that all sharp estimates, within their confidence intervals, exhibited coefficients around zero for the simulated cutoffs¹⁶.

4.2 Results and Discussion

This subsection presents the findings from our RDD estimations. To capture the elasticities, we have adopted the *Log-Log* functional form, which can be interpreted as follows: a one-percent change in FPM per capita corresponds to a direct one-percent impact on the outcome variables, namely, deaths, hospitalizations, and health expenditures. We applied fixed bandwidths of 10%, 5%, and 3%, and the selection of the bandwidth using the Minimum Mean Square Error (MSE) methodology (CATTANEO, IDROBO, and TITIUNIK, 2023). The main results are displayed in Table 4.

¹⁵ The results of sharp estimations, using the triangular kernel, showed results in the expected direction, with the LATE effect for the GDP per capita covariate having a p-value of (0.4975). The same was done for the covariate of ICMS transfers: (0.1412).

¹⁶ The test used used quantiles 0.25 and 0.75 around the cutoff. The p-values of the test estimates were, for the outcome variables of deaths and hospitalizations due to COVID-19, deaths due to SARS, and health expenses, respectively, (0.1236, 0.0877, 0.1391, 0.0775).

Firstly, when examining those local estimates, the dependent variables related to deaths, hospitalizations, and health expenses, were all statistically significant across all model specifications. The estimated impact of the FPM consistently aligns with the initial hypothesis. Starting with the model with a 10% bandwidth and covariates control (2), a 1% increase in FPM per capita decreases the deaths from COVID-19 by 0.45% and hospitalizations by 0.41%, both measured per 100 thousand inhabitants. Additionally, the FPM impacted positively health expenditure per capita by 0.22%. When analyzing the coefficients for deaths in our estimates, it becomes apparent that the magnitude was higher for COVID-19 cases compared to SARS: given that COVID-19 is a subset of SARS, it suggests that transfers such as the FPM may be more effectively targeted during high-severity crises. These findings deviate from previous literature, which found no impact of the FPM on health indicators and expenditures during "normal times" (ARAÚJO; ALVES, 2021), that is, outside the context of a large-scale crisis like the COVID-19 pandemic.

The impact remains statistically significant and with similar magnitude even when we reduce the Bandwidth to 5% or 3% or use the MSE methodology (mserd). Furthermore, it's important to highlight that, in general, these impacts remained robust even when covariates were included in the model. The only exception was observed in the analysis of health expenditures when the statistical significance diminished upon the inclusion of covariates for the model with MSE methodology.

In light of these results, a hypothesis emerges: increased resource transfers, coupled with greater autonomy and responsibility granted to municipalities in pandemic management, led to more effective governance. This was reflected in reductions in both deaths and hospitalizations, contrary to certain aspects of the existing literature. For instance, Ribeiro (2015) suggests that although there is a negative impact on morbidity indicators and general hospitalizations in municipalities receiving more resources per capita, there were no effects on spending on preventive measures. In a similar vein, Cavalcanti (2018) indicates a lack of impact on maternal and child health indicators.

Table 4 – Baseline Results – Log-Log Model

Bandwidth	Local IV estimations						Additional Bandwidth's		
	10%	10%	5%	5%	3%	3%	mserd	mserd	Observações
Outcome	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variável de Tratamento: FPM per capita - Modelo Log-Log									
COVID Deaths / 100K.	-0.44 *** (0.09)	-0.45 *** (0.09)	-0.45 *** (0.14)	-0.56 *** (0.15)	-0.53 *** (0.18)	-0.61 *** (0.19)	-0.47 ** (0.20)	-0.54 *** (0.21)	443 -

SRAG Deaths / 100K.	-0.36 *** (0.08)	-0.38 *** (0.09)	-0.36 *** (0.13)	-0.48 *** (0.14)	-0.43 ** (0.18)	-0.48 *** (0.18)	-0.38 ** (0.19)	-0.41 ** (0.19)	446 -
Hospitaizations / 100K.	-0.41 *** (0.09)	-0.41 *** (0.10)	-0.45 *** (0.14)	-0.48 *** (0.15)	-0.60 *** (0.19)	-0.55 *** (0.19)	-0.71 *** (0.18)	-0.73 *** (0.19)	537 -
Health Expenditures pc	0.22 *** (0.04)	0.17 *** (0.04)	0.23 *** (0.06)	0.18 ** (0.07)	0.20 ** (0.09)	0.20 ** (0.09)	0.22 *** (0.07)	0.14 (0.09)	630 -
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	
State Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observações	1802	1802	841	841	501	501	-	-	

Notes: Author's elaboration. Data from STN, IBGE, TSE, and MS. Robust standard errors are in parentheses, and *, **, and *** indicate that the coefficients are significant at the 10%, 1%, and 0.1% levels, respectively. Due to the selection of bandwidths using "mserd," the number of treated observations also varied (column 9) depending on the outcome variable used. The covariates used were: municipal per capita GDP, per capita ICMS transfers, proportion of residents over 65 years old (for the year 2010), indicator if it belongs to a metropolitan region, and finally, indicator if the municipality had more votes in favor of Jair Bolsonaro in the second round of the 2018 presidential election.

When considering the impacts of FPM on municipal budgets, the results presented in Table 4 show that an increase in transferred funds leads to positive effects on healthcare spending. This finding diverges from part of the literature that examines the relationship between direct transfers and local municipal management (BARDHAN; MOOKHERJEE, 2006; VIGNEAULT, 2007). Araújo and Alves (2021), who analyzed a panel of municipalities from 2012 to 2016, found no impact of FPM on healthcare expenses. According to the authors, the existence of legislation mandating minimum percentage allocation for healthcare expenses suggests that any additional contributions from the fund tend to be channeled into other public expenditures.

For a better understanding of the positive result of FPM on budgetary management in healthcare, we conducted a more detailed analysis of healthcare expenditure. The results are presented in Table 5. Starting with the local estimates, concerning primary healthcare (PHC), all results displayed a consistently positive and statistically significant pattern across all bandwidths, remaining robust even after the inclusion of covariates. In contrast to these results, expenditure on hospital care (HC) exhibited a negative and statistically significant trend regardless of covariate inclusion; however, these estimates lost statistical significance at the 3% bandwidth when covariates were introduced. Furthermore, estimates related to expenditure on epidemiological surveillance (ES) showed negativity and statistical significance only at the 10% bandwidth, without proving to be robust in the presence of covariates. Similar patterns emerged when utilizing bandwidths proposed by the MSE methodology. In general, the estimates preserved these characteristics and maintained their robustness in the presence of covariates, except for expenditure on HC, which once again ceased to be statistically significant when covariates were controlled for.

We observed that increases in FPM per capita led to corresponding increases in spending on basic care, along with reductions in spending on hospital care. This suggests that treated municipalities strategically allocated and reallocated their budgets to enhance initial contact with individuals infected by COVID-19, primarily focusing on primary care. This strategic shift may explain the decrease in hospitalizations for severe cases and the associated reduction in hospital expenses. However, it's worth noting that there is no strong evidence indicating a significant impact on spending related to epidemiological surveillance.

Table 5 – Additional Results I – Log-Log Model

Bandwidth	Local IV estimations						Additional Bandwidth's		
	10%	10%	5%	5%	3%	3%	mserd	mserd	Observations
Outcome	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variável de Tratamento: FPM per capita - Modelo Log-Log									
PHC Expenditures pc	0.67 *** (0.09)	0.63 *** (0.10)	0.65 *** (0.16)	0.57 *** (0.20)	0.67 *** (0.23)	0.73 *** (0.25)	0.56 *** (0.19)	0.48 ** (0.23)	519 -
HC Expenditures pc	-1.27*** (0.20)	-1.19 *** (0.24)	-0.98*** (0.30)	-0.76 * (0.42)	-0.66* (0.38)	-0.34 (0.57)	-0.93 *** (0.33)	-0.76 (0.51)	473 -
ES Expenditures. pc	-0.42 * (0.24)	-0.48 * (0.27)	-0.43 (0.35)	-0.41 (0.40)	0.04 (0.50)	0.005 (0.57)	0.14 (0.46)	-0.13 (0.54)	371 -
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	
State Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	1338	1338	616	616	367	367	-	-	

Notes: Author's elaboration. Data from STN, IBGE, TSE, and MS. Robust standard errors are in parentheses, and *, **, and *** indicate that the coefficients are significant at the 10%, 1%, and 0.1% levels, respectively. Due to the selection of bandwidths using "mserd," the number of treated observations also varied (column 9) depending on the outcome variable used. The covariates used were: municipal per capita GDP, per capita ICMS transfers, the proportion of residents over 65 years old (for the year 2010), indicator if it belongs to a metropolitan region, and finally, indicator if the municipality had more votes in favor of Jair Bolsonaro in the second round of the 2018 presidential election.

To quantify the budget reallocation, we examined disaggregated health expenditures as a proportion of the total. To facilitate interpretation in terms of percentage points (p.p), a *Level-Level*¹⁷ model was employed, as illustrated in Table 6. These results are consistently aligned with our previous findings. The proportion of spending on basic care exhibited a positive effect while spending on hospital care showed a negative effect, with similar magnitudes. These effects remained robust even when covariates were included and Bandwidths selected via the MSE methodology were employed. As a result, an increase of R\$100 in FPM per capita corresponds to a 2.43 p.p. increase in spending on basic care relative to the total, accompanied by an almost symmetrical 2.69 p.p. reduction in the proportion of spending on hospital care.

¹⁷ In this analysis, the FPM per capita values are measured at R\$100.

Tabela 6 – Additional Results II – Nível-Nível Model

<i>Bandwidth</i> Outcome	Local IV estimations						Additional Bandwidth's		
	10%	10%	5%	5%	3%	3%	mserd	mserd	Observações
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variável de Tratamento: FPM per capita - Modelo Nível-Nível									
Share PHC Expenditures	0.0243 *** (0.003)	0.0223 *** (0.004)	0.0218 *** (0.005)	0.0188 *** (0.006)	0.0236 *** (0.006)	0.0239 *** (0.009)	0.0202 *** (0.005)	0.0181 ** (0.007)	503 -
Share HC Expenditures	-0.0269 *** (0.003)	-0.0235 *** (0.003)	-0.0204 *** (0.004)	-0.0172 *** (0.005)	-0.0189 *** (0.005)	-0.0185 ** (0.007)	-0.0203 *** (0.005)	-0.018 *** (0.006)	509 -
Share ES Expenditures	-0.00115 * (0.000)	-0.0009 (0.000)	-0.0014 (0.000)	-0.0013 (0.000)	0.0001 (0.00)	0.0001 (0.001)	-0.0002 (0.001)	0.0002 (0.001)	376 -
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	
State Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	1338	1338	616	616	367	367	-	-	

Notes: Author's elaboration. Data from STN, IBGE, TSE, and MS. Robust standard errors are in parentheses, and *, **, and *** indicate that the coefficients are significant at the 10%, 1%, and 0.1% levels, respectively. Due to the selection of bandwidths using "mserd," the number of treated observations also varied (column 9) depending on the outcome variable used. The covariates used were: municipal per capita GDP, per capita ICMS transfers, the proportion of residents over 65 years old (for the year 2010), an indicator of belonging to a metropolitan region, and finally, an indicator of the municipality had more votes in favor of Jair Bolsonaro in the second round of the 2018 presidential election.

Our findings suggest that the supplementary funds from the FPM were effectively directed toward bolstering health expenditures and concurrently reducing mortality rates and hospitalizations. A deeper analysis of these expenditures revealed that primary healthcare received the highest share of these additional contributions. Consequently, the increased investment in primary care emerges as the primary factor contributing to the decline in both hospitalizations and fatalities within these municipalities.

5. Conclusion

In the Brazilian context, the Municipal Participation Fund (Fundo de Participação Municipal), which is the primary federal government transfer to local governments, has yielded mixed or modest outcomes in terms of efficient resource management (MENDES; MIRANDA; COSIO, 2008; REGATIERI, 2013; ARAÚJO; ALVES, 2021; CAVALCANTI, 2018). The existing literature highlights that some of these challenges are associated with accountability issues, fiscal irresponsibility, and potential capture by local elites, often leading to the misallocation of resources. These are common hurdles faced by developing nations (PRUD'HOMME, 1995; BARDHAN; MOOKHERJEE, 2000 and 2006; VIGNEAULT, 2007).

Despite those numerous challenges, it is well-established that increased access to information empowers citizens and encourages political accountability (FERRAZ; FINAN, 2010; PANDE, 2011; DIAS; FERRAZ, 2019), potentially leading to more efficient utilization of public resources. Considering that during significant events media coverage tends to be more extensive, this study examines the impact of FPM transfers on the number of COVID-19-related deaths and hospitalizations in the context of the pandemic. It also evaluates their influence on the allocation of local government health budgets. In doing so, we aim to contribute to the literature by assessing whether the effects of FPM, often considered modest, become more pronounced in times of public emergency.

Considering that the allocation rule of FPM resources is based on population ranges, municipalities that transition between these ranges begin to receive more or fewer resources. Making use of this framework, we employed a Discontinuous Regression (RDD) methodology and estimated the causal impact of these transfers. Our results showed that an increase in FPM had a significant impact in reducing COVID-19-related fatalities and severe hospitalizations. Delving deeper into the mechanism underpinning these impacts, one of the main channels was the increase in health budget expenditures.

The findings demonstrate that municipalities that received higher FPM resources exhibited elevated per capita health expenditure. Notably, a breakdown of health expenditures reveals a directed allocation of resources toward primary care spending. This category encompasses initiatives aimed at enhancing primary healthcare services and programs such as the *Programa Saúde da Família*. Consequently, the results illuminate that the treated municipalities strategically allocated their budgets towards mechanisms that enhanced initial contact with individuals afflicted by COVID-19. This reallocation accounts for the observed decrease in hospitalizations for severe cases and a reduction in mortality rates.

Our results contributed to the literature by examining the impact of intergovernmental transfers in extraordinary situations, particularly during crises and public emergencies. In alignment with the accountability literature, our findings underscore the importance of increased budgetary resources in responding to healthcare crises, especially within the context of the COVID-19 pandemic. It is worth noting that previous research, conducted outside the pandemic context, failed to identify substantial effects of the FPM on healthcare expenditures (ARAÚJO; ALVES, 2021) or indicators related to maternal and child health (CAVALCANTI, 2018). These disparities further emphasize the distinct impact of such transfers during periods of crisis, when politicians were under great scrutiny.

During the pandemic, conflicts between the federal government and subnational entities resulted in uncoordinated policies in response to the crisis (ABRUCIO et al., 2020). However, the constitutional nature of FPM transfers underscores the autonomy of this allocation mechanism, which operates independently of political factors: FPM transfers functioned as a system of checks and balances between local governments and the federal administration, providing increased autonomy and financial flexibility to municipal public budgets. As highlighted by our findings, this allowed for a more efficient allocation to areas of greater need within the constraints of the Constitution. Thus, our results align with a body of literature that emphasizes the advantages of decentralization in the provision of public goods and services, as exemplified by the models proposed by Persson and Tabellini (2002) and Besley (2006).

Given that the pandemic crisis had profound impacts on various sectors, this study paves the way for future research to examine whether the increased resources allocated through the PM contributed to mitigating the pandemic's effects on areas such as education and the labor market. Furthermore, forthcoming studies could explore whether similar transfers could be effective in mitigating the effects of other public emergencies, such as floods, earthquakes, droughts, etc., not only for developing countries but also for developed ones.

6. Referências Bibliográficas

ABRUCIO, Fernando Luiz et al. Combate à COVID-19 sob o federalismo bolsonarista: um caso de descoordenação intergovernamental. **Revista de Administração Pública**, v. 54, p. 663-677, 2020.

ALON, Titan; MINKI Kim; DAVID Lagakos; MITCHELL VanVuren. 2020. How should policy responses to the COVID-19 pandemic differ in the developing world? Working Paper 27273. **National Bureau of Economic Research**.

ALVES, P.J; ARAÚJO, J. M. Os impactos das transferências intergovernamentais nos incentivos orçamentários dos municípios brasileiros. IPEA. Brasília-DF.(Texto para Discussão, n.2623)

ANGRIST, Joshua D.; PISCHKE, Jörn-Steffen. **Mostly harmless econometrics: An empiricist's companion**. Princeton University Press, 2009.

BARBOSA, Rafael Barros et al. Situação Fiscal Local e a Resposta à Pandemia da COVID-19: Evidências para os municípios brasileiros. **CADERNOS DE FINANÇAS PÚBLICAS**, v. 22, n. 01, 2022.

BARDHAN, Pranab; MOOKHERJEE, Dilip. Capture and governance at local and national levels. **American Economic Review**, v. 90, n. 2, p. 135-139, 2000.

BARDHAN, P; MOOKHERJEE, Dilip. Decentralisation and accountability in infrastructure delivery in developing countries. **The Economic Journal**, v. 116, n. 508, p. 101-127, 2006.

BESLEY, Timothy. **Principled agents?: The political economy of good government**. Oxford University Press on Demand, 2006.

BESLEY, Timothy; DRAY, Sacha. The political economy of lockdown: Does free media matter? **European Journal of Political Economy**, p. 102361, 2023.

BOADWAY, R. Grants in a Federal Economy: A Conceptual Perspective. In: R. Boadway e A. Shah (Eds.). *Intergovernmental Fiscal Transfers: Principles and Practice*. Washington: Banco Mundial, 2007.p. 55- 74

BRAGA, Breno; GUILLÉN, Diogo; THOMPSON, Benjamin. Local Government Spending and Employment: Regression Discontinuity Evidence from Brazil. **Available at SSRN 2966187**, 2017.

BRASIL. Decreto-Lei n. 1881 de 1981. Altera a Lei nº 5.172, de 25 de outubro de 1966, cria a Reserva do Fundo de Participação dos Municípios - FPM a dá outras providências. Disponível em: http://www.planalto.gov.br/ccivil_03/decreto-lei/1965-1988/De11881.htm#:~:text=DCRETO%2DLEI%20N%C2%BA%201.881%2C%20DE%2027%20DE%20AGOSTO%20DE%201981.&text=Atera%20a%20Lei%20n%C2%BA%205.172,FPM%20a%20d%C3%A1%20outras%20provid%C3%Aancias. Acesso em 20/01/2023

BRUCE, Raphael, et al. Under pressure: Women's leadership during the COVID-19 crisis. **Journal of Development Economics**, v. 154, p. 102761, 2022.

BROLLO, F. *et al.* The political resource curse. **American Economic Review**, v. 103, n. 5, p. 1759-1796, 2013

CATTANEO, Matias D.; IDROBO, Nicolás; TITIUNIK, Rocío. A Practical Introduction to Regression Discontinuity Designs: Extensions. 2023.

CAVALCANTI, André Luiz de Almeida. **Análise do impacto da receita municipal sobre a saúde da população: municípios mais ricos têm uma população mais saudável?**. 2018. Dissertação de Mestrado. Universidade Federal de Pernambuco.

CORBI, Raphael; PAPAIOANNOU, Elias; SURICO, Paolo. *Regional transfer multipliers*. **The Review of Economic Studies**, v. 86, n. 5, p. 1901-1934, 2019.

DIAS, Marina; FERRAZ, Claudio. **Voting for quality? The impact of school performance information on electoral outcomes**. Texto para discussão, 2019.

EISENSEE, Thomas; STRÖMBERG, David. News droughts, news floods, and US disaster relief. **The Quarterly Journal of Economics**, v. 122, n. 2, p. 693-728, 2007.

FERIGATO, S., FERNANDEZ, M., AMORIM, M., AMBROGI, I., FERNANDES, L.M.M., Pacheco, R., 2020. The Brazilian government's mistakes in responding to the COVID-19 pandemic. *Lancet* 396 (10263), 1636.

FERRAZ, Claudio; FINAN, Frederico. Exposing corrupt politicians: the effects of Brazil's publicly released audits on electoral outcomes. **The Quarterly Journal of Economics**, v. 123, n. 2, p. 703-745, 2008.

FINBRA. Contas Anuais. Disponível em: <https://siconfi.tesouro.gov.br/siconfi/pages/public/consulta_finbra/finbra_list.jsf>. Acesso em 18 jan. 2023.

FOLHA DE SÃO PAULO. Cidades com até 20 mil habitantes registram crescimento de 500% no número de mortes por COVID-19. Folha de São Paulo, 2021. Disponível em: <https://www1.folha.uol.com.br/eqilibrioesaude/2021/01/cidades-com-ate-20-mil-habitantes-registram-crescimento-de-500-no-numero-de-mortes-por-covid.shtml>. Acesso em 26 jul. 2023.

GAO, Q. et al. The Epidemiological Characteristics of 2019 Novel Coronavirus Diseases (COVID-19) in Jingmen, China. **SSRN Electronic Journal**, v. 2, n. 8, p. 113–122, 2020.

GIAMBIAGI, F; ALÉM, A.C. **Finanças Públicas: Teoria e Prática no Brasil**. 4ed. Rio de Janeiro: Elsevier, 2011.

GIESENOW, Federico M.; DE WIT, Juliette; DE HAAN, Jakob. The political and institutional determinants of fiscal adjustments and expansions: Evidence for a large set of countries. **European Journal of Political Economy**, v. 64, p. 101911, 2020.

HAUSMANN, Ricardo, ULRICH Schetter. 2020. *Horrible trade-offs in a pandemic: Lockdowns, transfers, fiscal space, and compliance*. **Working Paper n° 382**. CID Faculty at Harvard University.

IBGE. Censo Demográfico. Disponível em: <https://www.ibge.gov.br/estatisticas/sociais/trabalho/9662-censo-demografico-2010.html?edicao=9673>. Acesso em 01 de fev. 2023.

IBGE. Produto Interno Bruto dos Municípios. Disponível em: <<https://www.ibge.gov.br/estatisticas/economicas/contas-nacionais/9088-produto-interno-bruto-dos-municipios.html?=&t=o-que-e>>. Acesso em 01 de fev. 2023.

KUDAMATSU, Masayuki. Has democratization reduced infant mortality in sub-Saharan Africa? Evidence from microdata. **Journal of the European Economic Association**, v. 10, n. 6, p. 1294-1317, 2012.

LITSCHIG, S.; MORRISON, K. The impact of intergovernmental transfers on education outcomes and poverty reduction. *American Economic Journal: Applied Economics*, v. 5, n. 4, p. 206-240, 2013.

MATTOS, E.; ROCHA, F.; AVARTE, P. Flypaper effect revisited: evidence for tax collection efficiency in Brazilian municipalities. *Estudos Econômicos*, v. 41, n. 2, p. 239-267, 2011.

MENDES, Marcos. Federalismo Fiscal. In: BIDERMAN, C.; ARVATE, P. (Orgs). *Economia do Setor Público no Brasil*. Rio de Janeiro: Campus, 2005. p. 421 – 461.

MENDES, Marcos; MIRANDA, Rogerio B.; COSIO, Fernando B. **Transferências intergovernamentais no Brasil: diagnóstico e proposta de reforma**. Senado Federal, Consultoria Legislativa, 2008.

MCCRARY, J. Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics*, 142, 698–714, 2008.

MONASTERIO, L. O FPM e a estranha distribuição da população dos pequenos municípios brasileiros. IPEA. 2013 (**Texto para a discussão n. 1818**)

OATES, Wallace E. An Essay on Fiscal Federalism. *Journal of Economic Literature*, v. 37, n. 3, p. 1120–1149, 1999.

OLIVEIRA, Silvano Barbosa De *et al.* Monitoring social distancing and SARS-CoV-2 transmission in Brazil using cell phone mobility data. *medRxiv*, 2020. Disponível em: <<https://www.medrxiv.org/content/early/2020/05/05/2020.04.30.20082172>>.

OPENDATASUS. SRAG 2021 a 2023 – Banco de dados de Síndrome Respiratória Aguda Grave – incluindo dados da COVID-19, 2023. Disponível em: <<https://opendatasus.saude.gov.br/dataset/srag-2021-a-2023>>. Acesso em: 27 de jan. 2023.

PANDE, Rohini. Can informed voters enforce better governance? Experiments in low-income democracies. *Annu. Rev. Econ.*, v. 3, n. 1, p. 215-237, 2011.

PERSSON, Torsten; TABELLINI, Guido. **Political economics: explaining economic policy**. MIT Press, 2002.

RIBEIRO, Fernanda Patriota Salles. **Impacto das transferências incondicionais nos indicadores de saúde dos municípios brasileiros**. 2015. Dissertação de Mestrado.

PRUD'HOMME, Remy. The dangers of decentralization. *The world bank research observer*, v. 10, n. 2, p. 201-220, 1995.

REGATIERI, R. Tributos municipais: um mecanismo de aplicação da política municipal e sua relação com os resultados eleitorais. 2013. Dissertação (Mestrado em Economia) – Escola de Economia de São Paulo, São Paulo, 2013

SECRETARIA DO TESOURO NACIONAL. Transferências Constitucionais. Disponível em: <https://sisweb.tesouro.gov.br/apex/f?p=2600:1:::NO::> , acesso em: 23/12/2022.

SECRETARIA DO TESOURO NACIONAL. O QUE VOCÊ PRECISA SABER SOBRE AS TRANSFERÊNCIAS FISCAIS DA UNIÃO: Fundo de Participação dos Municípios FPM. Março, 2023. Disponível em: https://sisweb.tesouro.gov.br/apex/f?p=2501:9:::9:P9_ID_PUBLICACAO_ANEXO:6370 acesso em : 22/01/2023

SHAH, A. A Practitioner's Guide to Intergovernmental Fiscal Transfers. In: BOADWAY, R.; SHAH, A (Eds.). *Intergovernmental Fiscal Transfers: Principles and Practice*. Washington: World Bank, 2007. p.1-54

SKOVRON, C.; TITIUNIK, R. A practical guide to regression discontinuity designs in political science. *American Journal of Political Science*, 1-36, 2015.

TIEBOUT, Charles M. A pure theory of local expenditures. **Journal of political economy**, v. 64, n. 5, p. 416-424, 1956.

TRIBUNAL SUPERIOR ELEITORAL. Resultados eleitorais. Disponível em: https://sig.tse.jus.br/ords/dwapr/r/seai/sigeleicaoresultados/partidos?p0_turno=2&session=101372185045676, acesso em: 12/06/2023

VALENTE, Fernanda; LAURINI, Márcio P. Robust trend estimation for COVID-19 in Brazil. *Spatial and Spatio-temporal Epidemiology*, v. 39, p. 100455, nov. 2021. Disponível em: <https://linkinghub.elsevier.com/retrieve/pii/S187758452100054X>

VIGNEAULT, M. Grants and Soft Budget Constraints. In: BOADWAY, R.; SHAH, A (Eds.). *Intergovernmental Fiscal Transfers: Principles and Practice*. Washington: World Bank, 2007. p.133-169