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The Budget as an Instrument of Distributive Justice: Empirical Evidence and Constitutional Foundations of PIX Amendments in Brazil

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ABSTRACT

This study examines the effects of special parliamentary appropriations—referred to as *emendas PIX*—on the allocation of public resources and the constitutional principle of distributive justice in Brazil. Grounded in the Law and Economics tradition and the hypothesis of dissipative inclusion, the analysis considers that transfer policies may yield immediate distributive gains despite their limited long-term efficiency. A balanced panel covering the 27 federative entities from 2015 to 2022 was constructed using socioeconomic indicators and budgetary and political data sourced from the National Treasury Secretariat (STN) and the Superior Electoral Court (TSE). The empirical strategy employs multiple specifications of difference-in-differences models, complemented by robustness checks. The findings indicate that, in the short term (2020–2022), these amendments produced no statistically significant effects on the Human Development Index, suggesting that potential distributive impacts may emerge only over longer horizons. The study concludes that *emendas PIX* operate as transitional instruments of fiscal inclusion whose distributive effectiveness depends on alignment with structurally oriented public policies.

Keywords: parliamentary amendments; public budgeting; distributive justice; Law and Economics; difference-in-differences method.

JEL Classification: C21, D63, D72, K00

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1. INTRODUCTION

The public budget is the primary instrument for achieving the constitutional objectives of the Brazilian state, especially those related to reducing regional and social inequalities. However, growing budgetary fragmentation and the expansion of mandatory parliamentary amendments—especially following the creation of special PIX-type transfers—have raised questions about the distributive efficiency and institutional rationality of this resource allocation mechanism. The debate over the role of parliamentary amendments extends beyond the political sphere, reaching into the field of Economic Analysis of Law (EAL), by allowing us to examine how incentives, institutional structures, and transaction costs shape budgetary decisions and their effects on social welfare (Zylbersztajn; Sztajn, 2005; Posner, 2007).

Recent literature on the Executive-Legislative relationship and the territorial distribution of amendments highlights the hybrid nature of budgetary transfers, which can function both as an instrument of federal cooperation and as a means of clientelistic resource allocation (Bertholini; Pereira; Rennó, 2018; Almeida, 2025). Empirical studies generally indicate that, in the Brazilian case, PIX amendments have expanded the autonomy of legislators and local governments, but without clear evidence of structural gains in social indicators (Barbosa, 2025). Other studies have found evidence supporting the hypothesis of strategic party transfers, according to which voluntary transfers from the federal government are directed, to a greater extent, toward municipalities whose mayors belong to the President's party, while the state governor belongs to a different party (Bugarin; Marciniuk, 2017; Marciniuk; Bugarin, 2019; Marciniuk; Bugarin; Ferreira, 2020; Dantas; Gadelha, 2022). At the same time, the theory of dissipative inclusion (Alston *et al.*, 2016) suggests that expanding transfers does not necessarily translate into sustainable development, as it may produce short-term distributive results without altering the long-term institutional trajectory.

However, the focus of this research lies in the following question: what is the impact of parliamentary amendments for special transfers on the socioeconomic situation of the beneficiary regions? To answer this question, we will test the hypothesis that the decentralized allocation of these resources does not generate measurable social gains in the short term, but may manifest only in the medium and long term, as the funds are incorporated into structural public policies.

Thus, the general objective of this article is to assess the impact of PIX-type parliamentary amendments on the Human Development Index (IDHM) of Brazilian states from 2015 to

2022. We seek to verify whether the funds transferred through these amendments contributed to improving the HDI and, consequently, to the realization of the constitutional principle of distributive justice. In terms of specific objectives, a difference-in-differences (*diff-in-diff*) model will be estimated using a balanced panel database by state and year. Three versions of the model are estimated: (i) a binary model, which compares treatment and control states; (ii) a model with socioeconomic control variables; and (iii) a continuous intensity model, which considers the volume of funds received.

The relevance of this study lies in its attempt to integrate the legal-constitutional debate on the budget with the empirical analysis of public policies, offering evidence regarding the effectiveness of special transfers as a mechanism of distributive justice. The aim is to contribute to the improvement of fiscal governance and to the strengthening of democratic control over the budget cycle.

2. THEORETICAL FRAMEWORK AND EMPIRICAL EVIDENCE

2.1 Parliamentary Amendments at the Intersection of Political-Budgetary Control and Distributive Rationality

The study of parliamentary amendments in the context of the Brazilian public budget requires a multifaceted approach that spans the boundaries of Constitutional Law, Financial Law, Public Administration, and Public Finance Economics. Although these instruments constitute manifestations of the legislative prerogative, they represent a complex dialectic between democratic political representation and the imperatives of rationality, efficiency, and distributive justice in the management of public funds.

In this context, Constitutional Law positions the budget not merely as a plan of revenues and expenditures, but as a government program that must conform to a vision of society. Human dignity (Art. 1, item III) and social rights (Art. 6) impose on the State a *optimization requirements*, requiring that the allocation of public resources function as a vector for its maximum effectiveness. This concept, derived from Alexy's theory of principles (2008), means that fundamental rights must be realized to the greatest extent possible, given factual and legal possibilities, transforming budget management into a field of contention over the fulfillment of constitutional promises.

Parliamentary amendments, provided for in Article 166-A of the Federal Constitution,⁵

serve as a tangible expression of the legislature’s participation in the budgetary process. Their historical evolution reflects the tension between the presidential prerogative to initiate the process and Parliament’s power to shape it. Since redemocratization, there has been a growing institutionalization of amendments, culminating in the mandatory nature of their implementation: for individual amendments, starting with Constitutional Amendment No. 86/2015 (Brazil, 2015), and for caucus amendments, with Constitutional Amendment No. 100/2019 (Brazil, 2019a). More recently, special and earmarked transfers (PIX amendments) have emerged, introduced by Constitutional Amendment No. 105/2019 (Brazil, 2019b).

These regulatory innovations alter budgetary dynamics by granting the legislature greater control over the allocation of resources, especially with PIX amendments, which allow for direct transfers to states and municipalities without requiring agreements or projects, thereby expanding the discretion of the beneficiary entities. From a constitutional perspective, the legitimacy of these amendments rests on democratic and representative principles. The legislator, as a link between the State and society, channels specific demands from their constituents into the budget, seeking to balance local interests and general welfare. However, this prerogative has limits.

Parliamentary budgetary activity must observe the principles of Public Administration (Art. 37 of the 1988 Constitution)—legality, impartiality, morality, transparency, and efficiency—and the provisions of Art. 165, which govern the budget cycle (Brazil, 1988). Flexibility through amendments must not undermine the Multi-Year Plan (PPA), the targets of the Budget Guidelines Law (LDO), or compromise the implementation of the Annual Budget Law (LOA), lest it render public policies of national or strategic regional scope unfeasible (Pacelli, 2025). The constitutionality of amendments is not restricted to formal compliance but includes their functionality in promoting distributive constitutionality, ensuring that public spending reduces inequalities and realizes fundamental rights, while preventing their use as a mere instrument of political bargaining or the maintenance of privileges.

2.2 Perspective of Financial Law and the Public Budget: Rigidity, Flexibility, and Controls

Financial law defines parliamentary amendments as proposals aimed at modifying the budget bill, either to include new appropriations or to alter the amount or allocation of existing appropriations. Law No. 4,320/1964, incorporated into the Constitution, and the Fiscal Respon-

sibility Law (Complementary Law No. 101/2000) establish the regulatory framework for fiscal and budgetary management, imposing limits and conditions on the actions of administrators and legislators.

The expansion of tax-based amendments and *earmarked amendments* alters the pattern of budgetary rigidity. The Brazilian budget *already* features a high degree of linkage between revenues and expenditures (such as in the areas of health, education, and social security), which reduces the Executive Branch's room for maneuver. By directing resources to specific purposes, these amendments can exacerbate this rigidity and hinder the adaptation of public spending to emergency priorities. Furthermore, fragmentation into small projects can compromise economies of scale and the integration of public services, weakening the coherence of public policies.

The introduction of special transfers (Art. 166-A, § 1, CF/1988) represents a critical point for financial law. By allowing funds transferred to states and municipalities to remain unearmarked for specific purposes—except for constitutional prohibitions, such as personnel expenses and debt—and by integrating them into the local budget without the need for agreements, these amendments alter the traditional logic of decentralization and the oversight of public spending. This weakens control and *accountability* mechanisms, as transparency, traceability, and the evaluation of spending effectiveness become more complex, diluting responsibility for resource allocation and increasing the risk of misappropriation and mismanagement (Medauar, 2021).

Cappelli, Leite, and Araújo (2010) argue that transparency goes beyond the mere publication of administrative acts and should encompass accessibility, usability, clarity of information, comprehensibility, and auditability. The latter presupposes validity, controllability, verifiability, traceability, and the ability to explain the data and processes involved in public management.

In this sense, the absence of a predefined plan at the time of budget *allocation* hinders *ex ante* control and requires a greater effort in *ex post* auditing. Transparency and the auditing of such expenditures require improvements to regulatory frameworks and internal and external control systems, including the role of courts of auditors, which need to adapt their methodologies to keep pace with the new dynamics of transfers.

From the perspective of public administration, parliamentary amendments pose a challenge to strategic planning and the efficient implementation of public policies. The logic of micro-allocation of resources, driven by localized or sectoral interests, can fragment public spending and divert attention from macro-organizational priorities—such as infrastructure, health, basic education, and innovation—toward projects with lesser collective impact, often dictated

by local or electoral pressures (Oliveira, 2019). This fragmentation undermines results-based management and intersectoral and intergovernmental coordination—between the federal government, states, the Federal District, and municipalities—which are essential for the delivery of quality public services. The construction of small, isolated projects without an integrated master plan can result in underutilized or redundant infrastructure.

The public administration’s ability to plan, execute, and evaluate policies is undermined when significant portions of the budget are predetermined by amendments. The principle of efficiency, fundamental to public management, can be compromised when project selection is not based on technical criteria—such as cost-benefit analysis, regional needs, or sectoral priorities defined by experts—but rather on political expediency. This can result in the allocation of resources to low-impact projects, duplication of efforts, underutilization of installed capacity, and waste of resources—including the proliferation of so-called “white elephants” or unfinished projects due to the misappropriation of public funds.

The budgetary decentralization promoted by parliamentary amendments—primarily through direct transfers—represents a step forward in the autonomy of subnational entities but raises doubts regarding its practical effectiveness. Financial autonomy does not automatically translate into administrative capacity. Many municipalities lack the technical infrastructure, qualified professional staff, and governance systems to plan, implement, and monitor more complex projects. This institutional weakness can lead to delays, inefficiencies, and the misuse of transferred funds for purposes other than their intended public use.

From a legal standpoint, budgetary decentralization does not exempt entities from the constitutional duty to observe the principles of legality, efficiency, and fiscal responsibility (Constitution, Articles 37 and 163). From an economic perspective, the lack of expertise in areas such as engineering, procurement, project management, and control mechanisms undermines the structural transformation expected from decentralization. Instead of promoting development and reducing inequalities, these transfers may result in low-impact, sporadic, or clientelist spending.

According to Alves (2016), while decentralization strengthens the federal pact and expands democratic space, it does not in itself guarantee the effectiveness of public policies; it is essential that decentralized entities possess technical capacity and robust social control mechanisms. Given this context, the effectiveness of decentralization requires the implementation of consistent mechanisms for institutional capacity-building, inter-federal cooperation, and *accountability*. Only by strengthening local government capacities, combined with transparent moni-

toring and evaluation systems, will it be possible to convert the financial autonomy provided by the amendments into concrete results for the community, preventing such resources from being limited to reproducing formal transfers without distributive or transformative impact.

2.3 Economic-Financial Perspective: Resource Allocation, Public Choice Theory, and Dissipative Inclusion

Public finance economics offers a crucial analytical lens for understanding the incentives and consequences of parliamentary amendments on resource allocation. Public choice theory (Buchanan; Tullock, 1962), for example, suggests that politicians and bureaucrats, like private agents, act in pursuit of their own interests, which may not coincide with the public interest.

In the context of amendments, this manifests itself in lawmakers' pursuit of vote maximization (*electoral rationality*), which may incentivize the allocation of resources to visible, short-term projects in their electoral districts, to the detriment of long-term investments or those with greater social impact but less visible to the electorate.

Parliamentary amendments introduce, within the budgetary framework, dynamics typical of the free-rider problem and the prisoner's dilemma. Each parliamentarian is incentivized to maximize the individual appropriation of resources for their electoral base, without internalizing the systemic costs that this behavior generates for the budget as a whole, nor the diffuse benefits that could be obtained if there were collective coordination. This logic of misaligned incentives favors the fragmentation of *budget allocation*, in which parochial and narrow-scope projects prevail, to the detriment of structural investments in essential public goods—such as health, education, and infrastructure—which produce broad and lasting gains in social efficiency.

The result is allocative inefficiency, in which public resources are no longer directed toward uses with the highest economic and social returns. Instead of addressing strategic national or regional priorities, the budget comes to reflect the sum of fragmented and particularistic interests, often redundant or overlapping, compromising distributive rationality and the constitutional function of the budget as an instrument for promoting fiscal justice and the effectiveness of fundamental rights.

The concept of opportunity cost is central to the economic analysis of amendments. Every real allocated by an amendment to a specific project represents a real that cannot be used for another public policy. When the choice of allocation is suboptimal, society bears the opportuni-

ty cost of obtaining a social return lower than the maximum potential. For example, allocating resources to paving a street at the expense of an investment in basic sanitation or education can generate a high social opportunity cost, especially in highly vulnerable regions.

In this scenario, the concept of dissipative inclusion emerges, an analytical category that this study proposes to develop. Dissipative inclusion occurs when the allocation of resources via amendments, although it promotes the inclusion of groups or regions in access to public goods and services, does so in a fragmented, discontinuous manner and without the capacity to generate structural changes in living conditions or in the reduction of inequalities. Instead of universal and structural public policies, the result is ad hoc interventions with low transformative impact, which dissipate the budget's redistributive potential.

Examples include the construction of small squares or outdoor gyms at the expense of investments in health or education networks, which could have a systemic and lasting impact (Alston *et al.*, 2016).

2.4 Review of Empirical Studies and Recent Analyses on Parliamentary Amendments

National and international literature has highlighted the role of budgetary institutions as mechanisms for political coordination and for promoting—or limiting—distributive justice. From the perspective of Economic Analysis of Law (EAL), Zylbersztajn and Sztajn (2005) argue that the budget is an instrument of institutional governance whose design affects allocative efficiency and the behavior of political actors. The economic approach to law allows us to understand the budget not merely as an accounting document, but as a set of incentives that determines how the state distributes resources and internalizes the costs of public policies.

In this regard, Alston *et al.* (2016) develop the concept of “dissipative inclusion,” according to which institutional reforms and redistributive policies can expand access to resources and rights, but in an unsustainable manner, without altering the power structures that underpin inequality. This perspective is useful for understanding the Brazilian case, where the expansion of fiscal transfer mechanisms, such as parliamentary amendments, yields immediate gains in political legitimacy but limited results in terms of socioeconomic transformation.

Empirically, recent literature on parliamentary amendments highlights tensions between efficiency and representativeness. Bertholini, Pereira, and Rennó (2018) demonstrate that the implementation of amendments is one of the main instruments of bargaining between the Executive and Legislative branches, constituting a form of political coordination based on bud-

getary incentives. Similarly, Almeida (2025) emphasizes that budget transfers reinforce the mutual dependence between the branches of government but can weaken the rationality of public spending when not linked to performance targets and indicators.

Barbosa (2025) shows that PIX amendments are concentrated in states and municipalities with greater political coordination, with no proportional relationship to social vulnerability indicators, which reinforces the need for empirical analysis of their distributive effects

Finally, technical studies conducted by Fonseca and Vazquez (2005), Pinheiro and Mesquita (2025), as well as Vieira (2025), on public spending through budget amendments and sectoral reports on the SUS, the Ministry of Education (MEC), and Social Assistance, corroborate the heterogeneity of the amendments' impact, suggesting that the results depend more on administrative capacity and the local political context than on the volume of transferred resources. Taken together, this literature indicates that, although parliamentary amendments expand decentralization and local access to resources, their effects on human development remain ambiguous.

3. DATABASE AND MODEL DEFINITION

This section presents the database used in the study, indicating the sources, data processing, constructions, and analyses performed. The database was compiled by integrating different sources, covering socioeconomic, fiscal, and political-institutional information regarding Brazilian states from 2015 to 2022. The objective of constructing this database was to enable the estimation of *diff-in-diff* models, which have the capacity to identify the average effects of PIX amendments on the aggregate IDHM by state.

The socioeconomic variables were obtained from the State Indicators Panel of the Brazilian Institute of Geography and Statistics (IBGE, 2022) and the Atlas of Human Development in Brazil (UNDP; IPEA; FJP, 2021). The variables collected were *per capita* income, extreme poverty rate, infant mortality, HDI, and population.

Data regarding PIX amendments (special transfers) were collected from the Federal Government's Open Transfer Panel (EPIB). Consolidation at the state level was performed by summing the municipal values belonging to each federal unit.

Information on political alignment between state and federal governments was constructed based on the party affiliation of governors and the President of the Republic in each year, extracted from the Superior Electoral Court (TSE), according to the ideological classification

proposed by Bolognesi, Ribeiro, and Codato (2023)¹.

The construction of the state-year panel involved various stages of data standardization and harmonization. Initially, information on PIX amendments at the municipal level was aggregated by sum to the state level, with the aim of obtaining the total amount received by each state.

To reduce population heterogeneity across states, the value of transfers was converted to *per capita* terms (*value_pix_pc*) by dividing it by the total population of the respective state and year. Next, the cumulative value of *per capita* transfers for the period from 2020 to 2022 was calculated, allowing us to identify the intensity of treatment.

The states were then classified into intensity quartiles. Those in the top quartile (Q4) were defined as the treatment group (high receipt of amendments), while those in the bottom quartile (Q1) were defined as the control group. Intermediate observations were discarded to ensure a clearer comparison between groups with high and low exposure to the policy.

Additionally, a binary variable of ideological symmetry between the federal and state governments was included, constructed based on party acronyms and the ideological classification by Bolognesi, Ribeiro, and Codato (2023), which categorizes parties into left, center, and right. This variable takes value 1 when there is ideological alignment between the spheres and 0 otherwise.

All data were processed using the Python environment (version 3.13). Continuous variables were standardized (mean zero and standard deviation of one) to minimize scale distortions among indicators and reduce multicollinearity.

4. METHODOLOGY

This section presents the methodology adopted in the study and is divided into four subsections: the first outlines the rationale and structure of the difference-in-differences model; the second describes the estimated models; the third addresses statistical tests and robustness diagnostics; and the fourth, finally, explains the structure of the applied model.

¹ Bolognesi, Ribeiro, and Codato (2023) conducted an ideological classification of Brazilian political parties. Right-wing parties include: PSDB, PL, União Brasil, PP, Republicanos, Novo, Patriota, and PRTB. Centrist parties are: MDB, PSD, Cidadania, and Avante. The left-wing parties, meanwhile, include: PT, PSOL, PCdoB, PSTU, PCO, UP, PDT, PSB, PV, and Solidariedade. Calculating the percentages yields the following results:
Left (PT, PSB) = 12.12% + 6.06% = 18.18%;
Center (MDB, PSD, Cidadania) = 18.18% + 6.06% + 3.03% = 27.27%;
Right (PL, União, Republicanos, PSDB, PP, PTB) = 21.21% + 18.18% + 6.06% + 3.03% + 3.03% + 3.03% = 54.54%.

4.1 Rationale And Structure Of The Difference-In-Difference Model

This subsection describes the difference-in-differences (*diff-in-diff*) methodology, the estimated models, the statistical and diagnostic robustness tests, as well as how the model is structured based on panel data.

The difference-in-differences (*diff-in-diff*) methodology is used to estimate the causal effects of public policies in observational contexts where randomized experiments are not feasible. The method seeks to compare the average change in a given indicator between two groups (treatment and control) over time, before and after an event, intervention, or policy (Angrist; Pischke, 2009; Wooldridge, 2010).

The basic structure of the *diff-in-diff* model can be presented as follows:

$$Y_{it} = \alpha + \beta_1 D_i + \beta_2 D_{post} + \delta(D_i \times Post_t) + \varepsilon_{it} \quad (1)$$

where: Y_{it} corresponds to the response variable or outcome of interest (in this study, the IDHM of state i in period t); D_i is a binary variable that takes the value 1 for units belonging to the treatment group (states that received a higher volume of PIX amendments) and 0 for the control group; $Post_t$ is a binary variable that takes the value 1 in the periods following the policy's implementation (2020–2022) and 0 in the preceding periods (2015–2019); $D_i \times Post_t$ represents the interaction term, whose coefficient δ expresses the *average treatment effect* on the outcome (ATT); ε_{it} is the random error term.

The parameter δ is the central measure of interest, as it shows whether the indicator Y_{it} exhibited a distinct variation in the treated states following the introduction of the PIX amendments. The central hypothesis of the method is that of parallel trends, according to which, in the absence of treatment, the average trajectories of Y_{it} for the treated and control groups would evolve similarly over time (Imbens; Wooldridge, 2009).

4.2 Estimated Models

Three specifications of the DID model were estimated to verify the robustness and stability of the results: the main model (binary DID); the model with controls; and the continuous model (DID with intensity).

The main model (binary DID) was estimated according to the equation presented above, 13

using a binary treatment variable (D_i) that distinguishes states with high and low volumes of cumulative *per capita* transfers between 2020 and 2022.

The model with controls includes socioeconomic and demographic variables as additional controls to capture structural heterogeneities among states. The model is structured as follows:

$$Y_{it} = \alpha + \beta_1 D_i + \beta_2 D_{post} + \delta(D_i \times Post_t) + \gamma X_{it} + \varepsilon_{it} \quad (2)$$

where X_{it} represents the vector of controls (*per capita* income, extreme poverty rate, infant mortality, and political alignment between state and federal governments).

The continuous model (with intensity) replaces the binary treatment variable (D_i) with a continuous measure of treatment intensity ($Dose_i$), obtained from the logarithm of the *per capita* value of accumulated PIX amendments between 2020 and 2022:

$$Y_{it} = \alpha + \beta_1 D_i + \beta_2 D_{post} + \delta(Dose_i \times Post_t) + \gamma X_{it} + \varepsilon_{it} \quad (3)$$

In this case, the coefficient δ indicates the marginal effect of a change in the intensity of transfers on the IDHM, holding all other covariates constant.

4.3 Statistical and Robustness Diagnostic Tests

The model's validity was verified through a set of complementary statistical tests: parallelism test, placebo test, sensitivity analysis, and event study plot.

In the parallelism test (Wald test), we assessed whether the trends in the IDHM between the treatment and control groups were parallel during the pre-treatment period. The null hypothesis states that there is no significant divergence between the trends, which confirms the fundamental assumption of DID.

The placebo test applies a “dummy” treatment to a period prior to the actual event, with the aim of identifying possible spurious effects prior to the policy. The null hypothesis, in this case, is the absence of spurious effects.

The sensitivity analysis re-estimates the model using all observations to verify whether the presence of outliers alters the results. The null hypothesis indicates the robustness of the obtained estimates.

The event study estimates the annual effects of the treatment for the period from 2015 to 14

2022, using a base year as a reference. The results allow us to observe whether the series were stable prior to policy implementation and to identify the average immediate impact in the post-treatment period.

4.4 Structure of the Applied Model

The model was estimated using state-year panel data (state \times year), covering the period from 2015 to 2022, with 80 observations. The panel data model allows for the simultaneous exploration of both the temporal variation and the cross-sectional variation of socioeconomic indicators. The adoption of this method makes it possible to control for fixed effects specific to each state—such as historical, geographical, and institutional characteristics—as well as shocks common to all states during certain periods, ensuring greater statistical consistency in the estimates (Wooldridge, 2010). This structure is suitable for studies on public policy, in which unobservable differences between units can introduce bias into the results if not properly controlled.

The model was estimated using the balanced panel difference-in-differences method (complete observations for all years), with *cluster-robust standard errors*, as suggested by Cameron and Miller (2015). This strategy allows us to identify the average treatment effect on the treated states (ATT), isolating the impact of the PIX amendments on the IDHM after controlling for fixed variations across states and common time-series fluctuations.

The treatment group was defined based on the top quartile of cumulative *per capita* transfers (Q4), while the control group corresponds to the bottom quartile (Q1). Standard errors were estimated using *cluster* robustness, grouped by state, in order to control for serial autocorrelation and intra-state heteroscedasticity (Cameron & Miller, 2015). Estimations were performed in the Python 3.13 environment.

This structure allows us to estimate the average effect of PIX amendments on the trajectory of the state IDHM, controlling both common temporal variations and fixed heterogeneities across states.

5. RESULTS

This section presents the empirical results obtained from the difference-in-differences (*diff-in-diff*) model, estimated to measure the effect of PIX amendments on the IDHM level of Brazilian states from 2015 to 2022. We also report the robustness tests applied—parallelism₁₅

test, placebo test, and sensitivity analysis—to ensure the statistical validity and consistency of the results.

Table 1 below presents the results of the *diff-in-diff* model, which estimated the average effect of PIX amendments on the IDHM level of Brazilian states between 2015 and 2022, taking 2020 as the policy’s starting year.

Table 1 – Results of the DID Model for State IDHM Levels

| variable | coefficient | standard error | p-value |
|--------------------------------|--------------------|-----------------------|----------------|
| constant | 0,5373 | 0,056 | 0,000 |
| treatment | 0,1120 | 0,037 | 0,002 |
| post (2020-2022) | -0,1428 | 0,067 | 0,033 |
| interaction (treatment x post) | -0,0281 | 0,117 | 0,810 |
| R ² : 0,434 | | | |
| No of observations: 80 | | | |

Source: Author’s own calculations, using Python.

According to Table 1, the coefficient associated with the *treatment* variable (0.112; $p < 0.10$) indicates that, prior to the introduction of the amendments, the states that subsequently received higher amounts from special transfers had, on average, higher IDHM levels than those in the control group. These results may point to the existence of prior structural differences between the groups, which are corrected by the *diff-in-diff* model itself.

The coefficient for the *post-amendment* variable (2020–2022) (-0.1428; $p < 0.033$) indicates a statistically significant decline in the IDHM in the period following the adoption of the amendments, an effect associated with macroeconomic and social shocks—particularly the COVID-19 pandemic.

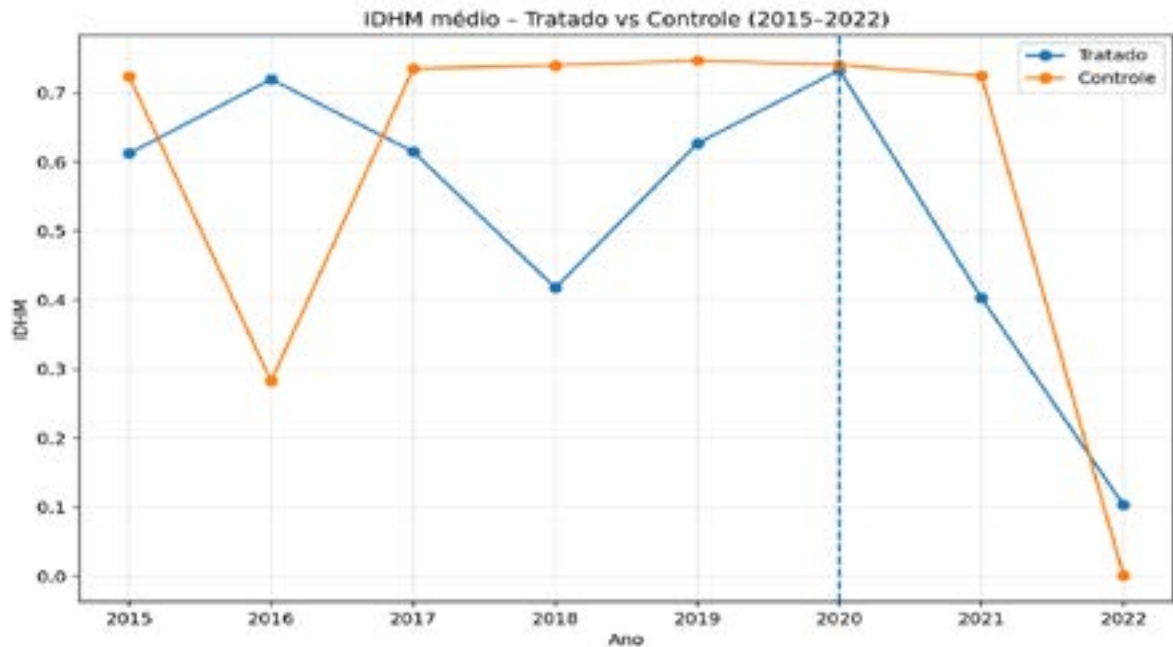
The coefficient associated with the *interaction* variable (*treatment x post*), which represents the average causal effect of the PIX amendments on the IDHM of the states, is negative (-0.0281) and statistically insignificant ($p\text{-value} > 0.10$). This result indicates that there is no evidence that the transfers resulting from the PIX amendments impacted on the immediate average gains in the IDHM in the states that received larger volumes of funds.

R² shows that the model’s explanatory variables account for approximately 43% of the variation in the IDHM, indicating a good fit for the type of model adopted. The total number of observations (N = 80) corresponds to the balanced panel between 2015 and 2022.

Figure 1 presents the behavior of the average IDHM between states classified as treatment states—those that received the largest volume of PIX amendments—and control states, with a

lower relative volume, from 2015 to 2022. The dashed line indicates the year the policy was adopted (2020).

Figure 1 – Average outcome for state IDHM levels over time



Source: Author’s own analysis, using Python.

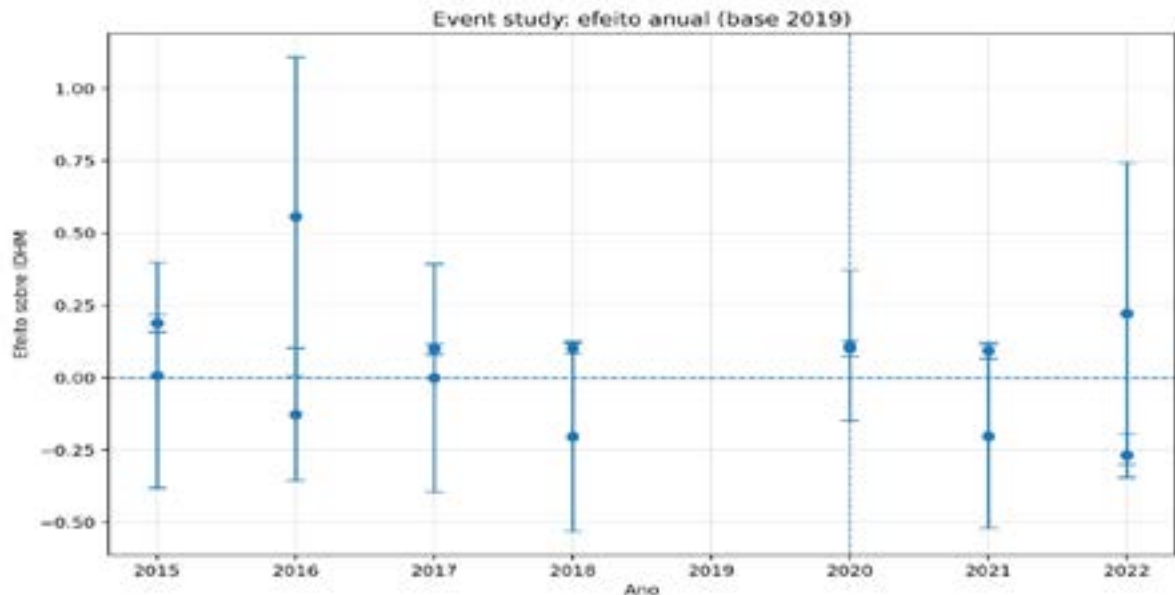
From 2015 to 2019—the pre-treatment period—the IDHM trends for both groups follow roughly parallel patterns, with variations of similar magnitude. This finding confirms the assumption of parallel trends, subsequently verified statistically by the Wald test (or parallelism test), which yielded a *p-value* of 0.142 (see Table 2).

After 2020, a general reduction in the IDHM is observed in both groups, a result consistent with the estimates of the econometric model, according to which the coefficient of the *post* variable (-0.1428; $p < 0.10$) indicates a negative effect common to all states. This decline can be attributed to exogenous shocks, particularly the economic and social crisis resulting from the COVID-19 pandemic.

The trajectory of the treated states reveals a more pronounced decline between 2021 and 2022, while the control group shows a larger decline over the same period. This pattern suggests that the potential effects of the PIX amendments on the IDHM have not yet materialized significantly, possibly requiring time lags for their impacts to become measurable.

Figure 2 illustrates the annual estimates of the effect of the PIX amendments on the IDHM (event study), using 2019 as the base year.

Figure 2 – Annual Estimates of the Policy’s Effect on Employment Levels (*event study* – 2019 base)



Source: Author’s own work, using Python.

The results suggest that, prior to the policy’s implementation, there was no statistically significant difference in the IDHM trend between the treatment and control groups, confirming the previously observed parallelism hypothesis. After 2020, the estimated coefficients remain close to zero and statistically insignificant, indicating the absence of an immediate average effect of the PIX amendments on the states’ IDHM.

The slight increase observed in 2021 and 2022 may reflect lagged effects of the policy, consistent with the maturation period of budget transfers—which confirms the evidence presented in Table 1 and Figure 1.

Table 2 presents a comparative analysis of the main model with the alternative models.

Table 2 – Comparative Analysis of Alternative Models

| Model | Variable of Interest | Coefficient | p-value |
|--------------------|----------------------------|-------------|---------|
| Binary DID (main) | <i>treatment:pos</i> | -0,028 | 0,810 |
| DID with controls | <i>treatment:pos</i> | -0,072 | 0,592 |
| DID with intensity | <i>dose_log_pix_pc:pos</i> | -0,0067 | 0,729 |

Source: Author’s own calculations, using Python.

According to Table 2, in all estimated specifications—whether in the basic *diff-in-diff*

model, or in versions with control variables or continuous intensity—no statistically significant evidence was found of effects of the PIX amendments on the IDHM of Brazilian states during the period from 2015 to 2022.

The results indicate that, although the transfers increased the availability of resources in subnational entities, their impacts on the IDHM did not manifest immediately, which may be related to a time lag between budget execution and measurable socioeconomic effects.

Table 3 presents the results of the parallelism test, the placebo test, and the sensitivity analysis, which aim to verify the validity of the assumptions and the stability of the estimated coefficients.

Table 3 – Results of the Parallelism Test, Placebo Test, and Sensitivity Analysis

| Tests | Results |
|----------------------|---|
| Parallelism Test | “C(Year):treatment” p-value: 0.142 |
| Placebo Test | “placebo_did” p-value: 0.148 |
| Sensitivity Analysis | “treatment:pos” coefficient: -0.0294 p-value: 0.801 |

Source: Author’s own work, based on Python.

The parallelism test ($p = 0.142$) assesses whether the IDHM trajectories between the treatment and control groups show similar behavior prior to the implementation of the PIX amendments. The result does not reject the null hypothesis of parallelism, indicating that the fundamental validity assumption of the *diff-in-diff* method has been met.

The placebo test, which artificially introduces a treatment in 2018, yielded a non-significant coefficient ($p = 0.148$), indicating that the model does not capture spurious effects prior to the policy, reinforcing the reliability of the main result.

The sensitivity analysis yielded a coefficient close to zero (-0.0294) and statistically insignificant ($p = 0.801$). This demonstrates that the inclusion of possible outliers does not alter the central conclusions, attesting to the robustness and stability of the results obtained.

Taken together, the tests corroborate the model’s reliability, indicating that the results are statistically consistent and methodologically valid.

Overall, the results indicate that the PIX amendments did not produce statistically significant average effects on the IDHM of Brazilian states in the short term (2020–2022). Although

the treated states exhibited, on average, higher IDHM levels than the control group, this difference predates the implementation of the policy and cannot be attributed to the special transfers. The analysis of time trends, the event study, and the robustness tests (parallelism, placebo, and sensitivity tests) reinforce the stability of the estimates and the validity of the adopted model.

These conclusions contrast with the hypotheses formulated by Bertholini, Pereira, and Rennó (2018), which engage with the theory of dissipative inclusion in fiscal policy. According to the authors, in the short term, budget amendments produce positive impacts on social indicators but lose effectiveness in the long term. In the present study, which analyzes the effects on IDHM, the opposite is observed: in the short term, the effects are null or diffuse, though they may manifest more noticeably in the long term.

These results, however, align with the empirical evidence of Gadelha, Andrade, and Figueredo (2024), according to whom parliamentary amendments function as instruments of political bargaining, rather than as distributive mechanisms.

Therefore, the findings suggest that the potential impact of PIX amendments on human development is, so far, negligible or delayed, and may only manifest itself in the medium and long term, as the resources are incorporated into structural public policies. Thus, the hypothesis of the dissipative inclusion theory has not been confirmed, and the lack of improvement in the IDHM resulting from PIX amendments appears to contradict the constitutional principle of distributive justice.

6. FINAL CONSIDERATIONS

This study sought to analyze the role of the Brazilian public budget as an instrument of distributive justice, using as a reference the theoretical framework of the Economic Analysis of Law (Zylbersztajn; Sztajn, 2005) and the dissipative inclusion proposed by Alston *et al.* (2016). The study began with the hypothesis that PIX-type parliamentary amendments, by expanding the autonomy of legislators and subnational governments, could generate positive effects on human development indicators, albeit in an unequal and institutionally fragile manner.

To this end, a methodological strategy based on the difference-in-differences (*diff-in-diff*) model was adopted, using panel data for the 26 states and the Federal District from 2015 to 2022. The main model, estimated with controls by state and by year, was complemented by robustness analyses—including parallelism, placebo, and sensitivity tests—and by variations that incorporated control variables and measures of the intensity of PIX amendments. This approach

sought to ensure statistical consistency and mitigate potential identification biases.

The results revealed no statistically significant average effect of the PIX amendments on the Municipal Human Development Index (IDHM) of the states in the period immediately following their implementation (2020–2022). Although the treated states exhibit higher average MHDI levels than the control group, this difference predates the period during which the special transfers were in effect, suggesting the influence of preexisting structural factors. Additionally, the models with controls and intensity reinforce this conclusion, indicating that the volume of transferred funds was not robustly associated with positive changes in state human development.

These findings are consistent with the empirical results obtained by Dantas and Gadelha (2022), who point out that parliamentary amendments, considered instruments to enable the allocation of specific discretionary transfer funds from the federal government to subnational entities, operate more as instruments of political bargaining. The study's evidence appears to contradict the theory of dissipative inclusion and the constitutional principle of distributive justice, given that the impacts of PIX amendments are null or diffuse on the welfare proxy (IDHM) in the short term, although they may manifest in the medium and long term.

Among the study's limitations are the short time interval following the implementation of the PIX amendments and the absence of more granular municipal indicators, which could more accurately capture the local effects of the transfers. Nevertheless, the article contributes by bringing the debate on the budget and parliamentary amendments into the agenda of empirical and constitutional analysis of distributive justice, offering a solid methodological foundation for future evaluations.

Looking ahead, we suggest extending the period of analysis and incorporating variables related to the institutional capacity of federal entities, the degree of political alignment among governments, and the efficiency of budget execution. Future studies may examine whether, over longer time horizons, PIX amendments consolidate as instruments of regional development or remain expressions of a logic of political bargaining and low institutional sustainability.

BIBLIOGRAPHICAL REFERENCES

ALEXY, Robert. *Teoria dos Direitos Fundamentais*. Tradução de Virgílio Afonso da Silva. 2. Ed. São Paulo: Malheiros, 2008.

ALMEIDA, Acir. *A relação Executivo-Legislativo e o impacto em políticas públicas de saúde, educação, assistência social e trabalho*. Brasília, DF: Instituto de Pesquisa Econômica Aplicada (Ipea), Coordenação-Geral de Imprensa e Comunicação Social (CGCOM), set. 2025. (Policy Brief, n. 34). Disponível em: <https://repositorio.ipea.gov.br/entities/publication/1db9a307-b73d-4d3d-83d6-2e9da5ec5086>. Acesso em: 11 out. 2025.

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

ALVES, Márcia Oliveira. Descentralização e gestão das políticas públicas. *Revista Científica de Ciências Aplicadas da FAIP*, Marília, v. 3, n. 6, p. 65-79, nov. 2016.

ANGRIST, Joshua D.; PISCHKE, Jörn-Steffen. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton: Princeton University Press, 2009.

BARBOSA, Glauber de Castro. Transferências especiais: “PIX” para quem? *Cadernos de Finanças Públicas*, Brasília, DF, Edição Especial, p. 1-43, 2025.

BERTHOLINI, Frederico; PEREIRA, Carlos; RENNO, Lucio. Pork is policy: dissipative inclusion at the local level. *Governance – An International Journal of Policy, Administration, and Institutions*, Hoboken, NJ, v. 31, n. 4, p. 695-712, 2018. Disponível em: <https://doi.org/10.1111/gove.12331>. Acesso em: 29 ago. 2025.

BOLOGNESI, Bruno; RIBEIRO, Ednaldo; CODATO, Adriano. Uma nova classificação ideológica dos partidos políticos brasileiros. *Dados: Revista de Ciências Sociais*, Rio de Janeiro, v. 66, n. 2, p. 1-29, 2023. DOI: <https://doi.org/10.1590/dados.2023.66.2.303>. Acesso em: 11 out. 2025.

BRASIL. Constituição (1988). *Emenda Constitucional nº 86, de 17 de março de 2015*. Altera os arts. 165, 166 e 198 da Constituição Federal, para tornar obrigatória a execução da programação orçamentária decorrente de emendas parlamentares individuais e dá outras providências. *Diário Oficial da União: seção 1, Brasília, DF, 18 mar. 2015*.

BRASIL. Constituição (1988). *Emenda Constitucional nº 100, de 26 de junho de 2019*. Torna obrigatória a execução da programação orçamentária decorrente de emendas de bancada de parlamentares de Estado ou do Distrito Federal. *Diário Oficial da União: seção 1, Brasília, DF, 27 jun. 2019^a*.

BRASIL. Constituição (1988). *Emenda Constitucional nº 105, de 12 de dezembro de 2019*. Altera os arts. 165 e 166 da Constituição Federal, para tornar obrigatória a execução de emendas parlamentares apresentadas por bancada estadual. *Diário Oficial da União: seção 1, Brasília, DF, 13 dez. 2019b*.

BRASIL. Presidência da República. *Constituição da República Federativa do Brasil de 1988*. *Diário Oficial da União: seção 1, p. 1, 05 out. 1988*. Disponível em: <https://portal.stf.jus.br/constituicao-supremo/constituicao.asp>. Acesso em: 29 ago. 2025.

BUCHANAN, James M.; TULLOCK, Gordon. *The Calculus of Consent: Logical Foundations of Constitutional Democracy*. Ann Arbor: University of Michigan Press, 1962.

BUGARIN, M. S.; MARCINIUK, F. Strategic partisan transfers in a fiscal federation: Evidence from a new Brazilian database. *Journal of Applied Economics*, v. 20, n. 2, p. 211-239, November 2017.

CAMERON, A. Colin; MILLER, Douglas L. A practitioner's guide to cluster-robust inference. *Journal of Human Resources*, v. 50, n. 2, p. 317-372, 2015.

CAPPELLI, Cláudia; LEITE, Julio Cesar Sampaio Prado; ARAÚJO, Renata Mendes. A importância de um modelo de estágios para avaliar a transparência. *Revista do Tribunal de Contas do Município do Rio de Janeiro*, Rio de Janeiro, n. 45, p. 97-103, set. 2010.

DANTAS, Aline de Medeiros; GADELHA, Sérgio Ricardo de Brito. *Transferências Partidárias Estratégicas: Teoria e Evidências para o Brasil, 2007 a 2018*. Brasília-DF: Secretaria de Orçamento Federal, Escola Nacional de Administração Pública, 2022 (Monografia vencedora do XI Prêmio SOF de Monografias, Tema 2: Inovação e Orçamento Público).

FONSECA, Sergio Luiz Doscher da; VAZQUEZ, Daniel Arias. *Emendas parlamentares ao orçamento do Ministério da Educação: 2014–2024*. Brasília, DF: Ipea, 2025. (Relatório de Pesquisa). Disponível em: <https://dx.doi.org/10.38116/RP-236202>. Acesso em: 11 out. 2025.

GADELHA, Sergio Ricardo de Brito; ANDRADE, Bernardo Borba de; FIGUEREDO, Wesley Washington Lourenço. *A importância dos marcos de médio prazo para o planejamento fiscal no Brasil: instrumentos orçamentários para um novo regime fiscal*. Brasília, DF: Secretaria de Orçamento Federal, 2023. (Monografia vencedora do XII Prêmio SOF – Integração entre planejamento e orçamento público).

IBGE. Instituto Brasileiro de Geografia e Estatística. *Cidades e Estados: panorama do Brasil*. Rio de Janeiro, 2022. Disponível em: <https://cidades.ibge.gov.br/brasil/panorama>. Acesso em: 11 out. 2025.

IMBENS, Guido W.; WOOLDRIDGE, Jeffrey M. Recent developments in the econometrics of program evaluation. *Journal of Economic Literature*, Nashville, v. 47, n. 1, p. 5-86, mar. 2009. Disponível em: <http://www.jstor.org/stable/27647134>. Acesso em: 25 jun. 2014.

MARCINIUK, Fernanda L.; BUGARIN, Maurício Soares; FERREIRA, Débora Costa. Motivação partidária nas transferências voluntárias da União: o papel do Legislativo Federal. *Estudos Econômicos*, São Paulo, v. 50, n. 2, p. 261-291, abr./jun. 2020.

MARCINIUK, Fernanda L.; BUGARIN, Maurício Soares. A influência da reeleição nas políticas fiscais subnacionais. *Revista Brasileira de Economia*, v. 73, n. 2, p. 181-212, abr./jun. 2019.

MEDAUAR, Odete. *Direito Administrativo Moderno*. 25. ed. São Paulo: Revista dos Tribunais, 2021.

OLIVEIRA, Pedro. Planejamento governamental e desafios da gestão pública contemporânea. *Revista de Administração Pública*, Rio de Janeiro, v. 53, n. 2, p. 300-320, mar./abr. 2019.

PACELLI, Giovanni. *AFO – Administração Financeira e Orçamentária*. 7. ed. rev. e atual. São Paulo: JusPodivm, 2025.

PINHEIRO, Marina Brito; MESQUITA, Ana Cleusa Serra. *Evolução da participação das emendas parlamentares no orçamento federal da Assistência Social (2005–2024)*. Brasília, DF: Ipea, jun. 2025. (Texto para Discussão, n. 3134). Disponível em: <https://xdo.org/10.38116/td-3134-port>. Acesso em: 11 out. 2025.

POSNER, Richard A. *Economic Analysis of Law*. 7th ed. New York: Aspen Publishers, 2007.

PNUD. Programa das Nações Unidas para o Desenvolvimento; IPEA. Instituto de Pesquisa Econômica Aplicada; FJP. Fundação João Pinheiro. *Atlas do Desenvolvimento Humano no Brasil*, Brasília, DF, 2021. Disponível em: <http://www.atlasbrasil.org.br/>. Acesso em: 11 out. 2025.

ROSA, André. A constitucionalidade distributiva do orçamento na jurisprudência brasileira. *Revista Brasileira de Direito Constitucional*, São Paulo, n. 19, p. 45-68, jan./abr. 2017.

VIEIRA, Fabíola Sulpino. *Emendas parlamentares ao orçamento federal do Sistema Único de Saúde: 2014–2024*. Rio de Janeiro: Ipea, 2025. (Relatório de Pesquisa). Disponível em: <https://dx.doi.org/10.38116/RP-EPOFSUS>. Acesso em: 11 out. 2025.

WOOLDRIDGE, Jeffrey M. *Econometric Analysis of Cross Section and Panel Data*. 2nd ed. Cambridge: MIT Press, 2010.

ZYLBERSZTAJN, Décio; SZTAJN, Rachel. *Direito e Economia: análise econômica do direito e das organizações*. Rio de Janeiro: Elsevier, 2005.