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TESOURONACIONAL

ACCURACY IN FORECASTING PUBLIC REVENUE AND EFFICIENCY IN IMPLEMENTING THE MUNICIPAL PUBLIC INVESTMENT BUDGET

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ABSTRACT

This study proposes an analysis of the budgetary outcome obtained between the estimate and realization of municipal budgetary revenue and its relationship with the improvement in the volume of public investments made by Brazilian municipalities. Building on previous research that explored the quality and effects of municipal budget planning on revenue and expenditure realization, this article sought to deepen the understanding of how discrepancies between estimated revenues and those effectively collected impact the municipalities' ability to carry out investments in infrastructure, public goods and services, and local development. Employing a quantitative methodology, as well as inferential statistics methods to examine the relationship between the accuracy in budget revenue planning and the effectiveness of public investment spending across the 5,565 Brazilian municipalities surveyed during the period from 2018 to 2022, the research focused on understanding whether greater accuracy in budget forecasting leads to an improvement in the allocation of resources in public investments. The results indicate that municipalities demonstrating greater accuracy in revenue budget planning achieve greater effectiveness in the execution of investment spending. This positive relationship underscores the importance of precise budget estimates for the effective management of municipal resources in public investments.

Keywords: Budgetary Accuracy, budgetary outcome, budgetary revenue, public investments.

SUMMARY

1. INTRODUCTION

Brazil's Federal Constitution establishes the general rules on the country's budget process. Article 165 instructs and establishes the authors responsible for preparing, executing and controlling the public budget and reinforces the principles that should govern the budgetary process, such as universality, annuality, unity, exclusivity and control (CF of Brazil, 1988) .

In this context of the public budget, the Constitution also determines that the preparation of the Multi-Year Plan (PPA), the Budget Guidelines Law (LDO) and the Annual Budget Law (LOA) is the initiative of the Executive Branch. Therefore, this triad of PPA, LDO and LOA are the basic instruments of government planning and should guide the organization and execution of the municipal government's initiatives in terms of its intentions in formulating and executing public policies.

When it comes to fundamental legislation for the financial management of the public sector in Brazil, we have Law No. 4.320/64 (Federal Law 4.320, 1964) , known as the "Public Budget" law, which provides for general rules of financial law, as well as public budget guidelines, budget principles, classification of revenue and expenditure, budget execution, internal and external control, additional credits and public debt. This law establishes general rules of financial law for the preparation and control of the budgets and balance sheets of the Union, the States, the Municipalities and the Federal District.

Complementary Law 101/2000, known as the Fiscal Responsibility Law (LRF) (LRF, 2000) , has emerged as an important milestone in terms of the country's public finances. It determines ways of preventing and correcting situations that jeopardize the balance of public accounts (STN, 2023) .

Based on all the legislation mentioned above, the budget process must be designed with forecasting and estimation procedures, where budget technicians seek to identify, predict and introduce into the budget instrument the fiscal movement that is expected to take place in the following fiscal year. After the estimates and forecasts, during the execution phase of the Annual Budget Law (LOA), municipal public planning will be implemented or not, and it will be possible to gauge the quality and success of the planning, making it possible to fulfill the government's promises (Krol, 2013) .

Budget forecasting errors, according to (Krol, 2013) are costly in the budgeting process, which is why the importance of precision in forecasting budget revenues is evident. Thus, a balanced, realistic and feasible public budget is essential for public management to perform well,

ensuring the full functioning of the public entity (Almeida & Ferreira, 2018) .

Considering an ideal context, at the end of each budget year, the planned municipal public budgets should portray the expected budget revenues and expenditures as accurately as possible, which would contribute to the execution of the fixed expenditures as a way of achieving budgetary and fiscal planning. From this perspective, (Boukari & Veiga, 2018) argue that recurring errors in government budget revenue forecasts can result in successive budget deficits, leading to the accumulation government debt, which compromises budgetary and fiscal efficiency, requiring investments to be readjusted to the level of revenue, discontinuing investment projects due to lack of resources, with negative results for the population, in a scenario diminishing resources available for the provision of public goods and services (Zonatto et al...), 2014) .

By initially estimating budget income and expenditure with greater precision, public managers ensure responsible and effective fiscal management, optimizing the use of public funds, providing transparency and credibility to municipal public administration, avoiding budget deficit scenarios and contributing to fiscal sustainability and socio-economic development.

With this in mind, this study poses the following research problem: Do municipalities that demonstrate greater accuracy in preparing their revenue budgets achieve greater effectiveness in executing investment spending?

The aim of this research is to verify the extent to which planned investments are discontinued due to errors in revenue forecasting, producing negative effects on society, since local government investments have a significant impact on the quality of social life (Haraldsvik et al., 2023).

The aim of the research is to verify the possible relationship between the discrepancy between the estimate and realization of budget revenues and the discrepancy in the estimate and realization of investment expenses set by municipalities, seeking to understand the extent to which negative or positive discrepancies between estimates and realization of budget revenues affect the ability of municipalities to comply with their investment plans, and how these variations can influence resource allocation decisions.

By reviewing the existing literature and using a research methodology with a quantitative approach, using inferential statistical methods to examine the relationship between the accuracy of revenue budgeting and the effectiveness of spending on public investments in Brazilian municipalities, the analysis focuses on understanding whether greater accuracy in budget forecasting leads to an improvement in the application of resources in public investments.

2. THEORETICAL FRAMEWORK

2.1 Budget Planning

Under Brazilian budget legislation, anchored in the 1988 Federal Constitution (CF of Brazil, 1988) , Law 4.320/1964 (Federal Law 4.320, 1964) , and the Fiscal Responsibility Law (LRF) (LRF, 2000) , clear guidelines are established for budget planning and execution in Brazil

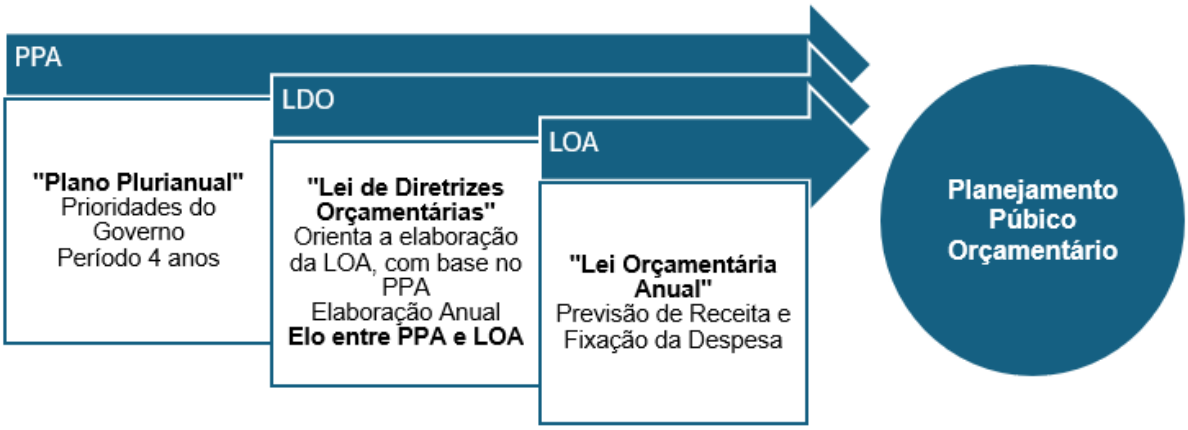

Figure 1: Public Budget Planning
Note: Prepared by the authors

As mentioned above, the triad of PPA, LDO and LOA are the basic and fundamental instruments of public budgeting.

The public budget offers a series of benefits for the general population, providing transparency, civic participation, accountability and improvements in public services. Public investment is essential for stimulating growth and providing welfare services for society (Haraldsvik et al., 2023) .

In this perspective, (Boukari & Veiga, 2018) emphasize that revenue forecasts are extremely important in the preparation of the public budget and that the analysis of these forecasts is motivated in view of the role they play in economic policy. According to (Buettner & Kauder, 2009) , who point out that in this forecasting process there may be some uncertainties, as well as macroeconomic risks, tax legislation and its application, changes in legislation, changes in the economy and the repercussions of revenue developments on public spending.

Given these uncertainties pointed out by (Buettner & Kauder, 2009) , in his research, (Pardaev, 2016) indicates that forecasts will not always be accurate, as they involve predicting the future with incomplete information. However, he highlights significant implications of the

errors that occur in the forecasting process, such as excessive deficits, debts that accumulate, cuts in public spending that are crucial, such as investments.

Based on these uncertainties that affect the public budget so much, this research found that inaccurate revenue estimates generate both a positive discrepancy, which occurs when the municipality underestimates its revenue collection and collects more than estimated, and a negative discrepancy, when it overestimates its revenue and collects less than estimated (Pardaev, 2016) . In both cases, according to (Krol, 2013) and (Pardaev, 2016) , the execution of expenditure is compromised, especially investment expenditure, as it is not classified as compulsory expenditure.

For (Krol, 2013) , sound budget planning is directly linked to accurate revenue forecasts, corroborating the view of (Krol, 2013) and (Mikesell & Ross, 2014) , which indicate that accurate revenue forecasting will restrict the budget of resources for allocation to public services, without transferring the cost of ongoing programs to the future, that is, with a more accurate forecast, the allocation of expenses will be restricted to this forecast, not incurring costs for the future, in view of the realization of the planned expenditure.

When errors in revenue forecasts are reduced, according to (Voorhees, 2004) the result is a significant improvement in performance, as well as indicating transparency and government efficiency.

2.2 Tax Collection in Brazilian Municipalities

The public budget is a sequence of stages in which decisions are made about resources and their use. Within the collection process of Brazilian municipalities, revenue forecasting is the first stage of this sequence, as its results will influence these decisions and the allocation of resources (Sedmihradská & Čabla, 2013).

According to (Buettner & Kauder, 2009) , a question that needs to be analyzed is whether the performance of these forecasts is affected by the methodologies or practices used. They also emphasize that some countries are dedicated to ensuring independence from political manipulation, and whether this has an impact on the quality of the forecasts.

(Chatagny & Soguel, 2012) in their research carried out in Switzerland, point out that when tax revenues are underestimated, there is a significant reduction in fiscal deficits, and they also report that this effect is clearly channeled through a reduction in expenditure. Finally, they found that underestimated and overestimated revenues affect deficits symmetrically.

According to (Krol, 2013) , the accuracy of the revenue forecast is important, as forecasting errors can be politically and administratively costly, since an exaggerated forecast can lead to spending cuts or tax increases, and an insufficient forecast can jeopardize essential programs and tax collection too much.

According to the findings of (Nascimento & Boente, 2022) , in the results of their research, they identified that when a municipality makes a mistake in its forecast, it tends to continue making mistakes in the future. One of the problems this can cause is the overestimation of revenue, which is directly linked to the execution of expenditure, i.e. it can jeopardize the realization of planned expenditure. This results in an increase in the public deficit and also in an increase in the amount of expenditure entered in accounts payable.

(Krol, 2013) indicates that unanticipated revenues, which are the result of inefficient forecasting, end up increasing the purchasing power of the political manager.

Below, in Figure 2, the graph shows the comparison between expected revenue and realized revenue in Brazilian municipalities, by region, from 2018 to 2022.

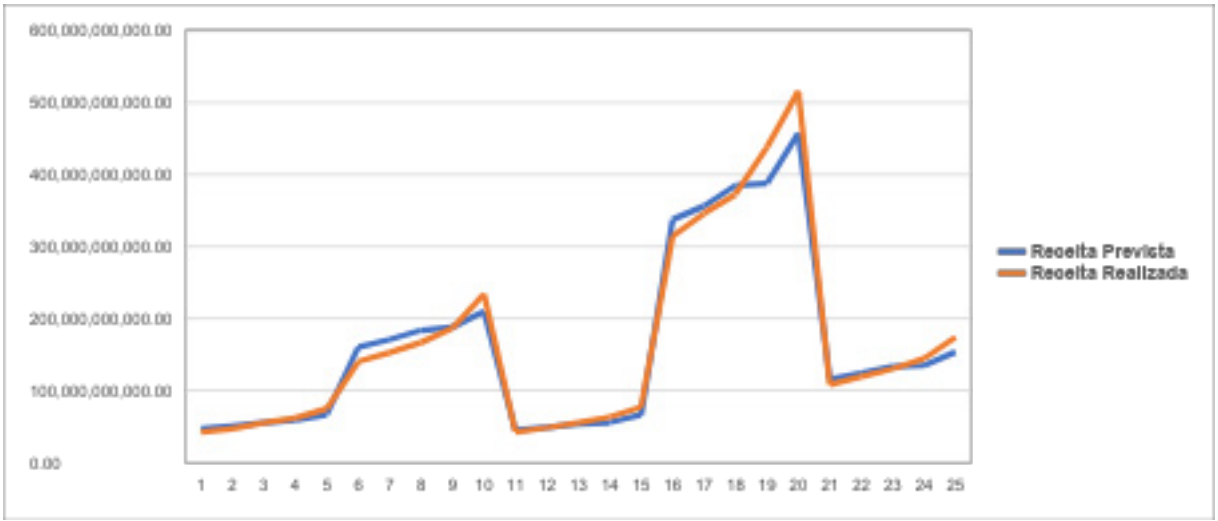

Figure 2: Projected Revenue x Realized Revenue, Brazilian municipalities by region, from 2018 to 2022.
Note: Prepared by the authors

In some years, revenue was both overestimated and underestimated. The analysis of the survey data will indicate the impact of revenue coming in above or below the forecast, in relation to the investments planned and made in the same period.

2.3 Investment Problems in Brazilian Municipalities

According to the results of their research, (Buettner & Kauder, 2009) analyzed the difference in performance between OECD (Organization for Economic Cooperation and Development) countries, verifying that it can be driven by the characteristics of each country, its fiscal structure and that revenue forecasting increases when there is independence, i.e. without government manipulation and if the forecast is inserted in the context of a macroeconomic model.

According to evidence and research results, (Chatagny & Soguel, 2012) point out on the basis of their studies that politicians in office may have the incentive to manipulate public budgets in order to achieve their own objectives.

Municipal investments are extremely important for economic development and especially for society, but they are the subject of investigation from various perspectives (Goeminne & Smolders, 2014) .

Municipalities that make mistakes in their forecasts tend to continue making mistakes in their future forecasts, overestimating revenue and jeopardizing the execution of expenses, which leads to a public deficit (Nascimento & Boente, 2022) .

According to (Menke & Gartner, 2023) , fiscal policy is related to the municipality's economic growth and that this growth has a proportional impact on tax collection. In addition, they emphasize that fiscal policy should be used to control government deficits, which includes planning revenue and expenditure.

Below, in Figure 3, the graph shows the comparison between forecast investment expenditure and actual investment expenditure in Brazilian municipalities, by region, between 2018 and 2022. For much of the period analyzed, public investment is below the forecast.

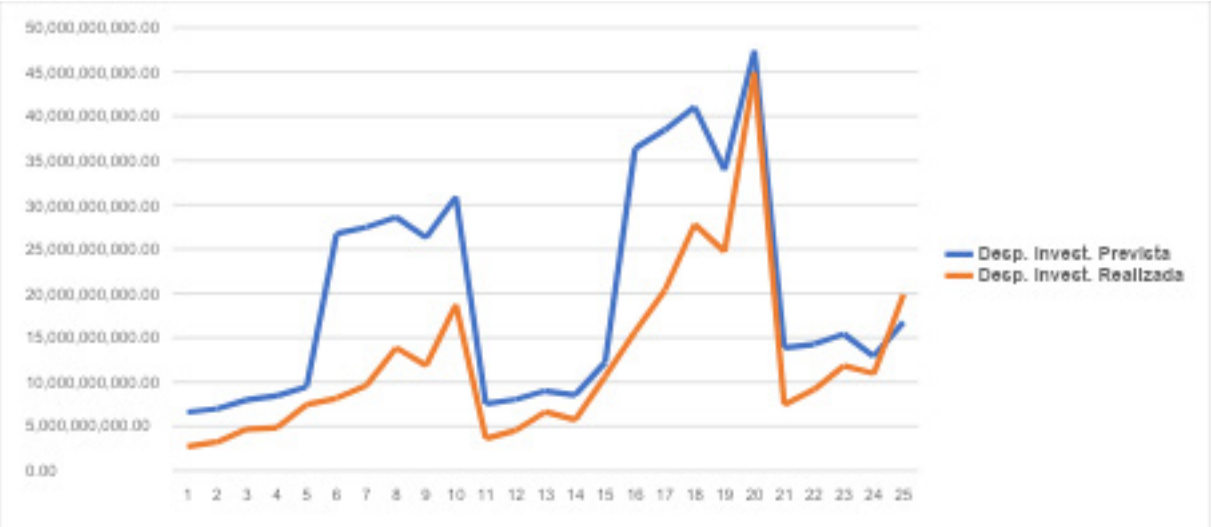

Figure 3: Projected Investment Expenditure x Realized Investment Expenditure, Brazilian municipalities by region, from 2018 to 2022.

Note: Prepared by the authors

The budget can serve as a planning and control tool, directing the government towards achieving its objectives (Kuntadi & Puspasari, 2023), i.e. a well-executed budget will result in the achievement of the proposed goals. These goals involve investments in municipalities.

In view of the above, in an attempt to ascertain whether greater accuracy in budget forecasting leads to an improvement in the use of resources in public investments, the research tests the following hypothesis:

H1: Municipalities with a higher degree of precision and accuracy in the realization of budget revenue make investment expenditures with greater precision.

(Sedmihradská & Čabla, 2013) evaluated the accuracy of municipal budgets and their components their research, as well as checking which factors influence revenue forecasting errors. They concluded that many municipalities did not include some types of revenue in the budget and that there was a practice of systematically underestimating revenue.

(Kuntadi & Puspasari, 2023) point out that effective financial management will result in the completion of all planning, with the fulfillment of the objectives that have been set, that is, the more accurate the forecast, the more accurate the execution will be. Corroborating (Kuntadi & Puspasari, 2023) in relation to the accuracy of the forecast, (Williams & Calabrese, 2016), point out in their research that the literature analyzed indicates that forecasting errors in their large part, do not result only from technical problems, but there is the influence of political decisions that have an impact.

Public management, as in private management, could establish management indicators or performance measures to evaluate its actions over time, with a view to achieving better precision in the budgeting of revenues. (Aibar Guzmán, 2003), analyzes three indicators: efficiency, effectiveness and economy, highlighting that in addition to these, others can be used, which would lead to an improvement in the performance results of a public entity.

(Siregar & Susanti, 2018), test two hypotheses in their research, one focused on revenue growth and the other on expenditure growth in the budgeting process, checking whether both tend to have a positive impact on forecasting errors. They conclude that the higher the budgeted revenue and expenditure figures, i.e. in relation to their growth, the greater the chances of forecast errors.

In addition to analyzing the proposed hypothesis, the research also proposes suggestions for future research, exploring the effects of more variables, in addition to those presented in the methodology, and also proposes examining the interaction between budget accuracy and other municipal development indicators.

3. METHODOLOGY

This study adopts a quantitative approach, using inferential statistical methods to verify a possible relationship between the forecast and realization proxy for budget revenue and the forecast and realization proxy for public investment spending in the 5565 Brazilian municipalities. The data covers the period from 2018 to 2022, a period in which one municipal and one federal election took place. The analysis focuses on understanding whether greater accuracy in budget revenue forecasting leads to better accuracy in the relationship between forecasting and spending on public investments.

To carry out this research, multiple linear regression models were used, in line with studies by (Boukari & Veiga, 2018) , using the Ordinary Linear Regression (OLS) technique and its variants with Fixed Effects (OLS FE) and Random Effects (OLS RE). These models are essential for assessing how revenue budget accuracy, expressed by specific indicators developed for this study, influences the effectiveness of planned municipal investment spending. These methods have been successfully applied in previous studies in the field of budgeting and public finance, as highlighted by Wooldridge (2010) and Greene (2012), who discuss the practical applications and implications of these models in longitudinal and panel data used here. In order to analyze the aspects associated with the accuracy of investment expenditure as a function of the accuracy of revenue, the multiple linear regression model was applied, with a panel structure:

$$\text{Prec\_Desp}=\beta 0+\beta 1(\text{Prec\_Rec})+\beta 2(\text{Desp\_Neg})+\beta 3(\text{Elei\_mun}) +\beta 4(\text{Elei\_fed})+\beta 5(\text{G\_Pref})+\epsilon$$

The accounting and population data collected for this research was tabulated in Excel, with statistical analysis carried out using the Statistics Data Analysis - STATA software. The data was obtained from the consolidated public database on the SICONFI website, belonging to the National Treasury Secretariat (STN). Electoral data was extracted from the website of the Superior Electoral Court (TSE):

Accounting and population data:

- Updated Estimated Revenues (***Rec_Prev***);
- Realized Revenues (***Rec_Real***);
- Planned Investment Expenses (***Desp_Inv_Prev***);

- Investment Expenditure Realized (***Desp_Inv_Real***);
- Population (***Population***);
- Fiscal year (***year***);
- Municipality (***Municipality***);

Electoral data:

- Mayor's gender (***G_Pref***);
- Federal Election (***Elei_mun***);
- Municipal Election (***Elei_fed***);

With regard to the data available for the variables under analysis, 19 observations were discarded if they did not present complete data.

In order to treat the effect of outliers, winsorization was applied to the two tails of the distribution of the variables Revenue Accuracy (***Presc_Rec***) and Expense Accuracy (***Presc_Desp***), at a percentage of 2.5% and to improve the robustness of the regression estimates, without, however, discarding a significant amount of data.

The basic OLS model sought to identify the direct impact of budget accuracy variables on investments, without considering the specific heterogeneities of the municipalities. However, to capture effects that vary between municipalities but remain constant over time, the OLS FE model was used. This model adjusts a single intercept for each municipality, allowing intrinsic characteristics that do not vary over time to be controlled for, an approach reinforced by the studies of (Arellano, 2003) .

Alternatively, the OLS RE model was used to consider random variations between municipalities. This model is particularly useful when the differences between the units of analysis are assumed to be derived from a common distribution, which is relevant when the number of units is large and heterogeneity between them is not the main focus of the analysis, as described by (Baltagi, 2021) .

Each model was subjected to rigorous diagnostic tests to check for the presence of multicollinearity, heteroscedasticity and autocorrelation, ensuring the robustness of the results. The Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) were used to determine the most appropriate model, based on the fit and complexity of the models.

In the end, this methodology not only provides a detailed and rigorous analysis of the effects of budget accuracy on the effectiveness of municipal public investments, but also guides

public policy and fiscal management decisions, contributing to a more efficient use of public resources in varied municipal contexts. This study contributes to the literature by applying advanced statistical methods, following in the footsteps of renowned scholars who have shaped public policy and budget analysis.

4. ANALYSIS OF RESULTS

Understanding the characteristics of the universe surveyed is fundamental to guaranteeing the adequacy and accuracy of the analysis. Table 1 provides us with a descriptive overview of the variables analyzed, with a robust number of observations totaling 27,675, which represents the comprehensive inclusion of Brazilian municipalities. This extensive database is crucial to ensure the generalizability of the results.

TABELA 1 - ESTATÍSTICA DESCRITIVA

				------		Quantiles		-------
Variable	n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
Prec_Desp	27675	1.24	1.58	0.07	0.32	0.65	1.4	7.49
Prec_Rec	27675	1.02	0.21	0.6	0.88	1.01	1.15	1.49
Pop_M50	27675	0.12	0.33	0	0	0	0	1
Desp_Neg	27675	0.65	0.48	0	0	1	1	1
Elei_mun	27675	0.2	0.4	0	0	0	0	1
Elei_fed	27675	0.4	0.49	0	0	0	1	1
G_Pref	27675	0.88	0.32	0	1	1	1	1

Fonte: Próprio autores utilizando software stata versão 18

Descriptive statistics show us the mean, standard deviation, and minimum and maximum values for each variable. For example, the standard deviation close to zero for the variable (Prec_Rec) suggests a certain consistency in budget revenue forecasts between municipalities, while the standard deviation and the maximum and minimum values for the variable (Prec_Desp) are already more dispersed, indicating possible discrepancies and pulverization of this data, which reflects the diversity of scenarios in the realization of investment expenditure. Knowledge of these variations is crucial, as it helps to understand how contextual variables can influence subsequent analyses and helps to identify outliers that can distort the results.

Before proceeding with more complex analyses, it is essential to explore the relationships between the variables using the correlation matrix. The purpose of Table 2 is to present the correlation between the variables, helping to mitigate possible biases resulting from multicollinearity that could invalidate the research conclusions.

TABELA 2 - MATRIZ DE CORRELAÇÃO

	Prec_Desp	Prec_Rec	Pop_M50	Desp_Neg	Elei_mun	Elei_fed	G_Pref
Prec_Desp	1						
Prec_Rec	0.5083	1					
	0.0000						
Pop_M50	-0.0977	0.0166	1				
	0.0000	0.0058					
Desp_Neg	-0.6894	-0.5339	0.0843	1			
	0.0000	0.0000	0.0000				
Elei_mun	0.0185	-0.1169	0.0002	-0.0265	1		
	0.0021	0.0000	0.9752	0.0000			
Elei_fed	0.0304	0.1811	0.0011	-0.0382	-0.4083	1	
	0.0000	0.0000	0.8612	0.0000	0.0000		
G_Pref	0.0552	0.0308	0.0138	-0.0572	0.0043	-0.0018	1
	0.0000	0.0000	0.0215	0.0000	0.4724	0.7702	

Fonte: Próprio autores utilizando software stata versão 18

The correlations shown in the table are essential for understanding the interrelationships, degrees and directions of these linear relationships between the variables. For example, the moderate, positive and significant correlation between (***Prec_Rec***) and (***Prec_Desp***), where the relationship is statistically significant as indicated by the p-value (0.0000), rejecting the null hypothesis of no correlation. This conclusion shows that municipalities with higher budget revenue accuracy tend to have higher investment expenditure, a finding that serves as a basis for deeper causal analysis in regression models. This initial understanding is vital for designing models that effectively capture the relationships of interest without being obscured by spurious relationships.

The econometric analysis in Table 3 is the final stage in which we test the statistical significance of our variables of interest. The coefficient and p-value associated with each variable allow us to infer the causal relationship between the accuracy of budget revenue and the effectiveness of public investment spending.

TABELA 3: ANÁLISE ECONOMÉTRICA

	OLS	FE	RE
Prec_Rec	1.605***	1.784***	1.802***
	-0.0393	-0.0403	-0.0378
Pop_M50	-0.257***	0.274	-0.309***
	-0.0206	-0.168	-0.0312
Desp_Neg	-1.898***	-0.996***	-1.392***
	-0.0168	-0.018	-0.0165
Elei_mun	0.0745***	0.133***	0.110***
	-0.0183	-0.0139	-0.0144
Elei_fed	-0.0694***	-0.0306**	-0.0539***
	-0.0151	-0.0115	-0.0119
G_Pref	0.0819***	0.00995	0.0667**
	-0.0209	-0.0276	-0.0232
_cons	0.813***	0.0146	0.288***
	-0.0511	-0.0564	-0.05
N. Obs.	27675	27675	27675

Fonte: Próprio autores utilizando software stata versão 18

The positive and significant coefficients of (Prec_Rec) in all three models tested (OLS, FE, RE) indicate that an increase in revenue accuracy is associated with an increase in the dependent variable (Presc_Desp). This significance supports the hypothesis that accuracy in budget revenue estimates is positively associated with greater effectiveness in making municipal public investments.

These findings echo those of authors such as (Gupta and Simonsen, 2002), who found similar results in fiscal management contexts. The analysis also reveals that election years influence investment spending, a phenomenon already observed in literature discussing political--economic cycles.

Analysis of the coefficients of the variable (Pop_M50), which distinguishes between municipalities with more and less than 50,000 inhabitants, in relation to the accuracy of investment expenditure reveals that, in the Ordinary Linear Regression (OLS) and Random Effects (RE) models, larger municipalities show significantly lower accuracy in investment expenditure (Prec_Desp), as indicated by the negative and significant coefficients (-0.257*** in the OLS and -0.309*** in the RE). This suggests that, on average, municipalities with populations above 50,000 face greater challenges in accurately predicting investment expenditure compared to smaller municipalities. However, in the Fixed Effects (FE) model, the Pop_M50 variable has no statistically significant impact on the accuracy of investment expenditure, indicating that when

controlling for unchanged characteristics of municipalities over time, population size alone does not significantly affect the accuracy of investment expenditure. These results highlight the complexity of fiscal management in municipalities of different sizes and the importance of considering local specificities when analyzing the accuracy of investment spending. This result is in line with studies such as those by (Holtz-Eakin & Rosen, 1993) , which highlight the role of population scale in municipal fiscal dynamics.

Analysis of the coefficients for the **Elei_mun** and **Elei_fed** variables in the OLS, FE and RE models reveals how municipal and federal electoral cycles have a different impact on the accuracy of investment spending in municipalities.

In municipal election years (**Elei_mun**), there is a significant increase in the accuracy of investment expenditure in all models (OLS: 0.0745**, FE: 0.133**, RE: 0.110**), suggesting that the local electoral context promotes greater attention and responsibility in fiscal management, possibly due to increased scrutiny by voters and the media.

On the other hand, during federal election years (**Elei_fed**), the accuracy of investment spending tends to decrease (OLS: -0.0694**, FE: -0.0306**, RE: -0.0539**), indicating that uncertainties and changes in politics and the economy at a national level can adversely affect the ability of municipalities to plan and execute their investments accurately.

These results underline the significant influence of electoral cycles on municipal fiscal management, with municipal elections improving the accuracy of investment spending, while federal elections seem to have the opposite effect, as discussed in classic studies by Rogoff and Sibert (1988).

5. FINAL CONSIDERATIONS

In view of the proposed research problem, understanding whether municipalities that demonstrate greater precision and accuracy in the preparation of budget revenue estimates, achieve greater precision and effectiveness in the execution of investment expenditure, led this study to a comprehensive quantitative analysis. The investigation was based on the hypothesis that municipalities with a higher degree of precision and accuracy in estimating budget revenue, carry out investment expenditure more accurately; an indicator of revenue and investment expenditure accuracy was calculated.

The results confirmed the hypothesis, revealing a statistically significant correlation between the precision and accuracy of the estimate of budget revenue, represented by the in-

dicator (Prec_Rec) and the precision of the realization of public investment expenditure, as evidenced by the indicator (Prec_Desp). This positive relationship underlines the importance of accurate budget revenue estimates for greater assertiveness in municipal spending on public investments.

The study also recognized the significant influence of contextual variables such as population size and electoral cycles, which added a layer of complexity to the interpretation of the data. These factors suggest that public investment management is subject to the dynamics of revenue estimates, political and demographic aspects that merit detailed investigation.

In view of the findings, we propose that public managers improve budget forecasting techniques, implementing practices that improve the accuracy of estimates in order to maximize investment results. In addition, the importance of using data to formulate and monitor fiscal policies is emphasized to ensure informed and responsible decisions.

Given the importance of the municipal budget as a management and transparency tool, there is a need to focus on studies that point to the determinants that lead to errors in the revenue budget (Chatagny & Soguel, 2012)

For future research, we suggest exploring the effects of variables that investigate the causal effects of frustrations and errors in budget revenue estimates, which can be explored in qualitative research that delves deeper into the causes that better explain the difficulties and obstacles related to more accurate budget revenue forecasts. In addition, it would be useful to examine the interaction between budget accuracy and precision and other indicators of municipal development, such as health and education, for a more holistic understanding of the impact of fiscal management on the social and economic progress of municipalities.

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