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FACTORS ASSOCIATED WITH BUDGET EXPENDITURE FORECASTING ERRORS IN BRAZILIAN MUNICIPALITIES

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ABSTRACT

The study analyzes some of the determinants of budget expenditure forecast error in Brazilian municipalities. The preparation of the tax budget is based on macroeconomic forecasts for the following year. Thus, the quality of the forecasts becomes fundamental to the budgetary health of the public entity. To achieve the objective, descriptive analysis and inference by quantile regression were used to interpret heterogeneities and possible effects on the distribution of conditional error quantiles in relation to a set of financial, budgetary and management variables. The results allow us not to fully reject the formulated hypotheses. The forecast errors that presented the greatest dispersion were those related to the nature of Investments and Interest and Debt Charges. We notice that the budget error bias repeats itself over time and is associated with the degree of incrementalism present in the budgets, as well as with variations in revenue forecasts, especially intergovernmental transfers.

Keywords: Public Budgeting; Forecasting Error; Incrementalism; Quantile Regression.

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SUMMARY

1. INTRODUCTION

The budget is one of the main tools of organization and planning of the state and can be understood as a financial plan for a given period in which revenues are forecasted and expenditures are fixed. This instrument becomes essential for the financial administration of public resources and coordination of state activities, through which public policies are implemented, as well as the way in which the state can intervene in the economy (Abrucio & Loureiro, 2004; Giambiagi & Além, 2011).

Several studies have analyzed the budget allocation process, especially about public spending allocated as important factors in promoting growth and economic development (Afonso, Schuknecht, & Tanzi 2010; Degenhart, Vogt, & Zonatto 2016; Neduziak & Correia 2017). In this sense, factors such as political polarization, government structure, and the electoral system are determinant aspects of budget outcomes.

Tax policy management relies heavily on budget forecasts made by the government and private entities. However, evidence suggests that budget and economic growth forecasts are optimistic, which makes the budget a non-transparent and opaque instrument, as well as incurs a deficit bias[1]. In this sense, forecast errors, understood as the relationship between the forecast (or planning) of the tax budget and its actual execution, correspond to political or administrative maneuvers of governments in making conservative estimates, to build up a reserve in more difficult times. These maneuvers are intensified in periods close to elections and may be a possible source of budget deficit (Vasconcelos de Deus & de Mendonça, 2017).

Wildavsky (1984) already explained that, due to uncertainty, economic development and instability in countries, it is not possible to make a realistic budget. Thus, currently, managers still opt for the strategy of conservative estimates for revenues and expenditures, especially in low-income countries, as a strategy for survival in an environment of uncertainty and poverty, providing greater flexibility for government action. In economic theory, the existence of slack resources represents a product of government inefficiency and of the self-interest of managers, while, for organizational theory, slack resources play the role of "buffers" necessary to adapt to the environment of uncertainty, and are even a good management practice.

[1] An example of this type of manipulation by projection error was the preparation of the Union's PLOA for 2020, which overestimated by R$ 5.8 billion the expenses with personnel. The open tax space could be used to increase investments and parliamentary amendments (Oliveira, R. Projection error can alleviate the 2020 cap. Valor Econômico. Available at: https://valor.globo.com/brasil/noticia/2019/09/25/erro-de-projecao-pode-aliviar-teto-de-2020.ghtml. Accessed September 25, 2019).

There is a lack of new advances on the determinants of budget forecast errors in relation to the political-electoral cycle at the local level. In this sense, considering the importance of the topic, the monograph seeks to contribute to the literature on an aspect still little empirically explored at the level of local governments in Brazil, advancing from the studies of Azevedo (2013)and Fajardo (2016), who analyzed budget deviations in São Paulo municipalities and in the revenue forecast of state governments, respectively. Thus, the objective of this study is to analyze the influence of political and electoral aspects on expenditure forecast errors in municipal budgets. The study also innovates by approaching the deviation in the execution of expenditures in a segregated manner by nature of expenditure.

2. BUDGET FORECASTING ERROR

The budget cycle corresponds to an articulated process that repeats itself in pre-established periods, according to which budgets are planned, voted, executed, evaluated, and accounts approved. From the standpoint of the political process, the budget cycle constitutes the link between financial resources and the realization of public policies, and consists of the negotiation over the prioritization of these policies, guided by legal limits and political elements, in which expectations are registered as budgetary information (Aquino & Azevedo, 2015). This cycle occurs in an environment of informational asymmetry between political power and bureaucrats. Due to the greater knowledge of the real costs of public services by bureaucrats, it incurs greater delegation costs and lower quality of democracy, since it can imply an increase in corruption, clientelism and administrative inefficiency.

The preparation of the tax budget stems from forecasts of macroeconomic variables for the future period of execution. Forecasts of inflation, balance of payments and economic growth create support for the projection of resources that the government will have for the following year. Thus, the quality of such forecasts and their transparency becomes fundamental to the country's budgetary health (Vasconcelos de Deus & de Mendonça, 2017).

The budget is composed of a forecast of the revenues to be collected and the fixing of the expenditures to be executed, following the balanced budget principle. The estimates of revenues and expenditures are private information of the Executive Branch, in which there is no punishment or reward for accuracy. For Schneider(2005), mechanisms of supervision and accountability in the budget process reinforce promises made by the heads of the executive

branch. Azevedo (2013) cites that the absence of incentives leads to lack of interest in the planning sector and consequent perpetuation of errors.

In Brazil, the practice of making revenue forecasts and establishing expenditures for the next tax year has become difficult because of the highly inflationary environment of the past (Vignoli, 2004), in which the budget has lost the sense of being an instrument of planning and control and has become a piece of fiction that masks the result of public administration (Abrucio & Loureiro, 2004; Alves, 2015; Vecchia & Montoya, 2002). Therefore, it is understood that there persists a fictional problem of the budget that, this time in its execution, has not fulfilled its main function of serving as an instrument of control of spending and discussion of public priorities (Aquino & Azevedo, 2015, 2017; Piscitelli, 2007).

On the other hand, minimizing forecast errors can be an important indicator of the public entity's tax management. The Federal Accounting Council issued the Conceptual Framework for the preparation and disclosure of accounting information of public sector entities (CFC, 2016), which provides that the use of comparative information between forecast and budget execution is a performance measure that supports the decision-making process and provides tools for *accountability*.

The revenue forecast based on macroeconomic estimates is usually overestimated to be able to raise budgeted expenditure credits during the tax year. According to the principle of balanced budgets, there is an implicit incentive for these to be inflated so that projected expenditures are also higher, including some margin to meet constituency interests (Rubin, 2014; Alves, 2015; Procópio, 2016). Managers have favored underestimates of public revenues conservatively against the risk of falling revenues. In Brazil, the Tax Responsibility Law (LRF) allows new revenue estimates by the Executive Branch as long as they are admitted due to a technical or legal error or omission. Scarpin & Slomski (2005)observed that, after the adoption of this law, there was an improvement in the forecasting of budget revenues. Fiirst *et al*. (2017) concluded that inefficient forecasts tend to create uncertainty about the investment capacity of the public entity.

If it is impossible to have a realistic budget, adjustments are made, especially in public spending. Among the reasons that cause the difference between fixing and realization are market price changes, errors in programming government actions, and even unforeseeable or urgent events. For such situations, the legislation foresees correction mechanisms, such as the additional credits[2], foreseen in the Federal Constitution of 1988 and in Law number 4.320/1964.

[2] Law No. 4.320/1964 (Art. 40) defines additional credits as "authorizations for expenditures not included or insufficiently provided for in the Budget Law. The additional credits are mechanisms to rectify the annual budget and aim to cover deficiencies or to

Additional Credits should represent exceptional situations, to preserve the legitimacy of the Budget Law. However, in Brazil, such adjustments have occurred more and more frequently, which causes a real disassociation between expenditures foreseen in the budget and those actually paid, as well as the excessive use of Outstanding Commitments [3](Alves, 2015).

Another strategy used by politicians is the deferral of expenditures. Managers may choose to postpone the payment of expenditures to the next tax year, even though the services have already been contracted, to reduce the budget deficit. Managers can also implement restrictive policies in non-election years, to create financial room for maneuver in future periods without breaking tax rules (creative accounting). With regard to budget expenditures, the recording of Outstanding Commitments not only makes the annuity of the budget more flexible, but also increases the degree of budget unpredictability (Benito, Bastida, & Vicente, 2013).

Outstanding Commitments (RP) have taken on the role of concealing the real budget execution of the year and can be used to inflate performance or give the impression that the government is complying with the established work plan, especially for the implementation of investments in public works that transcend the financial year (Alves, 2015). The use of this mechanism has been pointed out as an instrument of "creative accounting" by public entities to meet the tax target. Such adjustment delays the payment of expenditures and can affect the execution of the budget in force (Augustinho, Oliveira, & Lima, 2013). In addition, the recording in PR can generate, in the short term, a higher primary result by postponing the payment of expenditures, inflating the performance of the current management while undermining the financial execution of future years[4] .

According to Scarpin and Slomski (2005), the forecasting error can mischaracterize the budget approved by the Legislative Branch, which implies the loss of the primary function of planning public spending. For Fiirst *et al.* (2017), adjustments in the proposed budget can compromise the activities of planning, evaluation, control, and *accountability*[5] . Thus, the

contemplate actions not initially foreseen. They are classified as special, supplementary, and extraordinary. The first aims to meet the expenditure not included in the LOA, supplementary credits are intended to strengthen the budgeted appropriation, while extraordinary credits aim to meet unforeseeable and urgent expenses, such as in case of war or public calamity. To open special and supplementary credits, the source of the resources must be indicated: (i) the financial surplus ascertained in the previous year's balance sheet; (ii) credit operations; (iii) partial or total annulment of budget appropriations or of other additional credits; and (iv) the excess of collection ascertained. In the latter case, it is the result of the positive balance between the expected and realized collection, considering the trend of the period and deducting the extraordinary credits opened in the tax year (Slomski, 2013).

[3] Outstanding Payables represent financial commitments made up of budget expenses that were committed but not paid by the end of the tax year. A distinction is made between the Processed Outstanding Commitments, which are expenses settled but not paid, and the Unprocessed Outstanding Commitments, which are expenses committed but not settled by the end of the year (Alves, 2015).

[4] An attempt to correct the indiscriminate use of the Outstanding Commitments was proposed in the drafting of the LRF, in which § 2 of Article 41 limited its registration to the cash balance of the branch or agency. The device, however, was vetoed, under the argument that the way it was proposed would go against the principle of tax balance and public interest.

[5] Abrucio and Loureiro (2004, p.75) define democratic *accountability* as the "construction of institutional mechanisms through which rulers are constrained to be answerable to the governed for their acts or omissions without interruption.

consequence of the disconnection between planning and budget is the reduction in transparency about public spending, in the sense that public choices become disconnected from the needs of society and incur greater transaction costs.

Anessi-Pessina, Sicilia, and Steccolini (2012)found that budget changes (*re-budgeting*) are directly associated with the incrementalism of[6] the initial budget in Italian municipalities, that is, the anchoring of the current budget in old programs, the result of previous analyses and decisions, which receive most of the resources, while new programs have to compete for the few resources available (Giacomoni, 2010).

Martins & Correia (2015)investigated the socioeconomic, political and institutional determinants of budget deviations in Portuguese municipalities. For the authors, the financial imbalance experienced is a result of budget deviations, which, in turn, are related to optimistic revenue forecasts and inertia in the execution of expenditures.

At the national level, Vecchia and Montoya (2002) analyzed the efficiency of budget planning in the municipalities of the middle plateau of the state of Rio Grande do Sul. They conclude that there is no link between planning and budgeting, since budgets showed underestimation in inflationary periods and overestimation in the following period of price stabilization.

According to Azevedo and Aquino (2016)'s research, municipalities continue to face difficulties in planning and budgeting, such as the lack of administrative structure in the Executive, the level of performance of internal controls, and an inefficient Legislative. The budget preparation, most of the time, is done through incremental estimates anchored in previous years for expenditures with personnel and charges and for other current expenditures, while revenues are generally undersized, causing over-collection and allowing maneuvering spaces for managers to allocate supplementary credits in future periods. This offsets uncertainties during the planning period and reduces the Legislative Branch's control over the initial budget.

Piza (2016) investigated the planning and execution of the federal government's tax policy in the period from 2002 to 2015. According to the author, deviations in budget execution arise from external, or exogenous, factors, which include unexpected shocks in the economy and unexpected revenues or expenditures, and from internal factors, such as uncertainty in the forecasting process, error in GDP estimates, overestimation or underestimation of revenues and expenditures, technical insufficiency, or even electoral opportunism. As a result, it points out

[6] Incrementalism corresponds to the budgeting method that takes the previous budget as a reference, having small incremental changes that happen slowly over years from the pre-existing budget base (Rocha, 2001).

that the execution deviations can be attributed, in part, to forecasting errors of macroeconomic variables.

Vasconcelos de Deus and de Mendonça (2017) also analyzed the economic, political, and institutional determinants of the central government's tax error in the period from 2003 to 2013 and concluded that the government's opportunistic behavior will be more intense according to political and institutional characteristics of the society.

In general, the cited research indicates that political and management factors are associated with the degree of realism of budget forecasts. However, few studies so far have focused on the relationship between expenditure forecast errors and their determining factors in the context of local public management.

3. FORMULATED HYPOTHESES

Error or deviation are common denominations to represent the difference between forecast (or planning) and the execution of the tax budget of a given period. Fajardo (2016) segregates budget error into budget inaccuracy (divided into random error, analytical error, and systemic error), and discretionary error (or budget manipulation).

Vasconcelos de Deus and de Mendonça (2017), in turn, surveyed research on tax forecast errors, segregated into three categories: (i) research on more accurate methods and forecasting tools; (ii) studies on accuracy and efficiency (weak rationality hypothesis); and (iii) studies on determinants of forecast errors (strong rationality hypothesis), the focus of this study. On budget forecast errors, we highlight the studies of (Bretschneider *et al*. 1989; Anessi-Pessina, Sicilia, & Steccolini, 2012; Martins & Correia, 2015; Benito, Guillamón, & Bastida, 2015; Boukari & Veiga, 2018; Ríos et al., 2018). In the Brazilian environment, such research was conducted by Vecchia and Montoya (2002), Azevedo (2013), Fajardo (2016), Piza (2016), and Procópio (2016).

As identified by the literature, the determinants of the budget forecast error are mainly of a tax, political, and electoral nature. The predictability of public revenues plays a fundamental role in the budgeting process, which corresponds to an indicator of tax responsibility of public management and enables the necessary resources to carry out public works and investments. In this sense, the Brazilian tax federalism is identified as a central government that concentrates resources, while the municipalities must bear a greater burden of

providing public services to the population, even though they have lower tax collection competence. Municipal entities have two main sources of resources, called own revenues and those resulting from transfers. Thus, it is expected that the level of autonomy and financial dependence provides an indicator of the governing capacity of the public entity and is a relevant factor for the implementation of public policies.

As mentioned, at the end of the tax year, entries in Outstanding Commitments are used as instruments of "creative accounting" to cover up the actual budget execution. Based on the research of Anessi-Pessina, Sicilia, & Steccolini (2012)and Boukari and Veiga (2018), in which political aspects and the socioeconomic conditions of the municipality play a significant role in the practice of initial budget appropriation and the adjustment of the appropriation, the following hypotheses were formulated:

> *Hypothesis 1: The revenue forecasting error and the entry in Outstanding Commitments exert a positive influence on the expenditure forecasting error.*
>
> *Hypothesis 2: Resource dependence negatively affects expenditure forecast error.*

Research on budget institutions investigates whether budget decisions and tax outcomes are attributed to rules that make up the budget process (Alesina et al, 1999; Dietrichson & Ellegård, 2015; Gollwitzer, 2011). Budget institutions consist of the set of rules and organizations under which budgets are set, approved and executed, and have an influence on the tax discipline of the public entity.

The political factors are represented by the electoral calendar, the incentive for the manager's reelection, the fragmentation of the Legislature, and political competition. The existence of a previously established calendar for holding elections allows the political class to adjust policies in order to enjoy better results and associate the candidate's popularity (Sakurai & Gremaud, 2007). Thus, pre-election and election years correspond to periods of adjustments to channel resources to the election year, when public deficits increase (Sakurai , 2009). Brender & Drazen (2013), who evaluated the influence of elections on the composition of public spending, indicate that election years exert an influence on the change in the composition of

public spending. Sakurai & Menezes-Filho (2008) found evidence that municipal deficits increase in election years as total and current expenditures increase and tax collection decreases.

In relation to budget forecast deviations, Martins and Correia (2015) comment that, in pre-electoral periods, budget forecasts tend to be more optimistic, since the government intends to signal competence when implementing expansionary policies. Thus, it is expected that, during election periods, larger additions to the initial budget will occur.

Ríos *et al*. (2018) analyzed the influence of municipal transparency on levels of budget accuracy and showed that the phase of the electoral cycle is relevant for an overestimation effect of expenditures in the period before elections.

In Brazil, Baldissera *et al*. (2019) conducted a study on political and electoral characteristics that influence the opening of additional credits, concluding that there is a positive relationship between average budget supplementation and the election year and the change of political party. Thus, the following hypothesis is formulated:

> *Hypothesis 3: The effects of the election year, the first year in office, and the change of public manager have a positive influence on the expenditure forecast error.*

Another factor that relates political interactions and the composition of public spending is party fragmentation and electoral competition. The fragmentation of the legislature identifies the power of parliamentary control exercised over the executive, through budgetary control, participation in the appointment of members of the middle and upper bureaucracy and in the establishment and conduct of parliamentary committees of inquiry (Abrucio & Loureiro, 2004). Party fragmentation, a rate that measures the parliamentary dispersion of the benches as a *proxy* for greater competition for resources (Batista & Simpson, 2010) , suggests greater difficulty in forming majorities in the legislature and is positively related to higher spending, deficit and difficulty in making tax adjustments (Sakurai, 2009). More fragmented governments tend to present a more balanced budget and make optimistic projections to accommodate line-item changes (Piza, 2016). Budget updates are related to the possible reforms that the government tries to implement and the majority of the government's caucus in the legislative house (Anessi-Pessina *et al*., 2012).

The electoral competition or fractionalization of the Executive, a *proxy of* political reputation that measures the dispersion or concentration of votes for the office of Executive, is

associated with greater heterogeneity of the municipalities and hinders the implementation of tax adjustments (Sakurai, 2014) . According to Rodrigues(2017) , competition forces politicians to perform well in order not to be punished by the electorate in the next election, which increases accountability, transparency, concern with the needs and participation of the community. On the other hand, tax indiscipline can influence the government, becoming poorly evaluated by voters and subject to greater popular pressure (Vasconcelos de Deus & de Mendonça, 2017). Similarly, in a situation of low competition, the elected ruler's accountability to voters decreases. A side effect of competition is the dissemination of information by publicity, which would contribute to the reduction of information asymmetry. Participation and transparency also provide better control of political opportunism. Evidence from Sakurai (2009) and De Melo, De Souza, & Bonfim (2015) indicates that social participation in the democratic process influences the tax discipline of rulers. Thus, the following hypothesis is formulated:

> *Hypothesis 4: The effects of legislative fragmentation, electoral competition, and political participation have a negative influence on budget forecast error.*

Finally, the relationship of ideological influence on government tax variables has presented contradictory results. The influence of political orientation on budget estimates suggests that parties linked to left-wing movements tend to increase revenue estimates and allocate more resources to social functions, while right-wing parties prefer to make adjustments that decrease expenditures (Tavares, 2004) . Several studies indicate that ideology and party alignment among governors affect the performance of municipal public accounts and the decision to transfer resources (Arvate, Avelino, & Lucinda, 2008; Cavalcante, 2016; Sakurai, 2013) . Sakurai and Menezes-Filho (2008) point out that distinct ideologies can affect the composition of the budget for the case of Brazilian municipalities. On the other hand, studies by Nakaguma & Bender (2006) , Sakurai and Gremaud (2007) and Sakurai (2014) verify a low ideological consistency by political parties in the Brazilian case, which may not influence the political cycle. For Arretche & Rodden (2004) , the Brazilian party system is highly fragmented, since electoral coalitions often differ from government coalitions. According to Arvate and Biderman (2004), the reasons for the lack of a definitive conclusion on this issue correspond to the difference in the construction of representative variables of ideology and to the contextual and temporal influence, taking into account the situation and problems of the country at a given

moment. Complements Guerra, Paixão, & Leite Filho (2018) in that national studies have generally investigated partisan differences only at two ideological extremes - left and right - which may induce inconsistent results and interpretations.

4. RESEARCH PROCEDURES

Considering the objective of the explanatory research, the necessary procedures were developed to test the research hypotheses. The study adopts the hypothetical-deductive method, which consists of stating hypotheses to be confirmed or not. As for the data collected and treated, the study's approach is quantitative.

The dependent variable adopted for analysis is defined as budget forecast error (EP). To evaluate the degree of inaccuracy between estimate and execution, the Expenditure Execution Quotient of the Budget Balance was used, adapted from Kohama (2016) or Vecchia and Montoya's (2002) Accuracy in Expenditure Fixing Index, as the ratio between Expenditure Commitment and Initial Allocation (Fixed Expenditure).

The result of the quotient should be interpreted as the deviation of the efficiency measure equal to 1. According to Vecchia and Montoya (2002), the index translates the efficiency of government action planning. The greater the discrepancy with the maximum efficiency reference value (EP = 1) the greater the inefficiency in public budget performance. On the other hand, values greater than 1 indicate the undervaluation of the budget, representative of the use of additional credits; while values less than 1 indicate a reduction in expenditures compared to what was planned, representative of the overvaluation of the initial budget.

For the analysis of the budget execution gap, the classification by nature of expenditure was adopted, which is divided into six types: (a) personnel and social charges; (b) interest and debt charges; (c) other current expenditures; (d) investments; (e) financial investments; and (f) debt amortization. It is expected, however, that the contractual or mandatory classifications, such as personnel and payroll charges and interest and debt charges, have low forecast error, considering the greater predictive power, while discretionary classifications, such as other current expenditures and investments, show a tendency for greater error in election periods, signaling possible manipulation by the manager.

The explanatory variables of the models were divided into two groups. The first group of variables sought to test endogenous aspects of the municipal budget itself, such as the occurrence of revenue frustration, the incrementalism in the expenditure budget and the entries in Outstanding Commitments at the end of the tax year. The use of budget incrementality (Incrementalism) was based on the study by Anessi-Pessina, Sicilia, & Steccolini (2012) and aims to analyze the measure of anchorage of the current budget with the previous budget. Besides these, a one-period lagged forecast error measure was inserted, aiming to eliminate inconsistency problems in the parameters. According to Martins and Correia (2015), the lagged measure of the explanatory variable aims to translate a systematic nature of budget deviations arising from the maintenance of forecast and execution practices.

The second group tested political and management variables, as well as control measures. The FIRJAN Municipal Development Index (IFDM) was used for the level of economic development, and the FIRJAN Tax Management Index (IFGF), which seeks to measure the discipline and quality of municipal budget and financial management, both in a disaggregated manner. The IFGF uses four dimensions for evaluation: financial autonomy, personnel expenditures, investments, and liquidity. Each indicator ranges from 0 to 1, and the closer to 1, the better the municipality's tax management.

The variation in Gross Domestic Product was used in order to capture the economic slowdown and instabilities that tend to increase tax stress, increasing the pressure for public spending (Dantas Junior, Diniz, & Lima, 2019) . It is expected that the higher the GDP growth, the higher the actual collection will be in relation to the forecasted collection, also incurring in higher expenditure forecast errors. Another control variable used was population size, according to the IBGE classification. It is understood that large municipalities - in terms of population size and budget - tend to constitute a more complex and difficult to manage structure, and are more likely to make budget adjustments over the period. On the other hand, larger municipalities are better able to make close estimates.

Table 1- Independent variables, operational definitions, and expected relationships

Variable	Description	Expected ratio
EP-Rtrib	EP of Tax Revenue	(+)
EP-Transf	EP of Transfers (Current or Capital)	(+)
RPNP	Unfinished Accounts Payable registered in the year (by category)	(+)
Increment	Degree of Incrementalism in relation to the annual budget of the previous year	(+)
POP	Population Size	(+)
VarGDP	GDP variation in relation to the previous period	(+)
AdmDiret	Direct Management Staff Size	(+)
IFGF-Autonom	FIRJAN Tax Management Index - Autonomy	(-)
IFGF-Pess	FIRJAN Tax Management Index - Personnel Expenditure	(-)
IFGF-Invs	FIRJAN Tax Management Index - Liquidity	(-)
IFGF-Liqu	FIRJAN Tax Management Index - Investments	(-)
Comparec	Voter turnout in the first round of the 2016 Elections	(-)
Compet	Measure of electoral competition represented by the first-place winning percentage in municipal elections (2016)	(-)
Fragment	Fragmentation of the legislature represented by the total number of parties elected in relation to the number of seats	(-)
MudGestor	Change of Manager (Elections 2016)	(-)

Source: Prepared by the author (2020).

Thus, the model was specified according to Equations 1, 2 and 3 below.

$$EP(pessoal)_i = \alpha + \beta_1 EPrectrib_i + \beta_2 EPtransf_i + \beta_3 RPNP_i + \beta_4 Increment_i + \beta_5 VarPIB_i + \beta_6 AdmDiret_i + \beta_7 IFGF_i + \beta_8 Comparec_i + \beta_9 Compet_i + \beta_{10} MudaPartid_i + \varepsilon \quad \text{Equation 1}$$

$$EP(outrdesp)_i = \alpha + \beta_1 EPrectrib_i + \beta_2 EPtransf_i + \beta_3 RPNP_i + \beta_4 Increment_i + \beta_5 VarPIB_i + \beta_6 IFGF_i + \beta_7 Comparec_i + \beta_8 Compet_i + \beta_9 MudaPartid_i + \varepsilon \quad \text{Equation 2}$$

$$EP(investim)_i = \alpha + \beta_1 EPrectrib_i + \beta_2 EPtransf_i + \beta_3 RPNP_i + \beta_4 Increment_i + \beta_5 VarPIB_i + \beta_6 IFGF_i + \beta_7 Comparec_i + \beta_8 Compet_i + \beta_9 MudaPartid_i + \varepsilon \quad \text{Equation 3}$$

The data used were obtained from secondary sources from the National Treasury Secretariat (Secretaria do Tesouro Nacional - STN), which presents the self-declared budget and accounting data of the municipalities and from the bases Brazilian Finances (FINBRA) and Public Sector Accounting & Tax Information System (SICONFI). Other variables were collected from the Brazilian Institute of Geography and Statistics (IBGE), the Institute for Applied Economic Research (IPEA), the Federation of Industries of the State of Rio de Janeiro (FIRJAN), and the Superior Electoral Court (TSE).

For the study, the Budgetary Balance and the Resume Report of Budget Execution (RREO) of the municipalities were analyzed. The information refers to the Budgetary Balance, prepared from Class 5 (Approved Budget), Group 2 (Forecasting Revenue and Setting

Expenditure), and Class 6 (Budget Execution), Group 2 (Realization of Revenue and Execution of Expenditure). The period comprises the tax years 2015 to 2018, according to the availability of data from SICONFI, covering one political cycle.

The unit of analysis comprises the municipal entities. The population comprises 5,570 Brazilian municipalities. At the end of the collection and treatment, the sample defined by availability was made up of 3,693 municipalities, about 66% of the population. In terms of population estimate, the sample represents 82% of the national resident population. We adopted a criterion for the size of the municipalities according to the IBGE, being: very small, small, medium 1, medium 2, large, very large, and metropolis.

Table 2- Number of municipalities in the population and sample

	Population (A)		Sample (B)		(A / B) %
Very Small	1,235	22.2%	806	21.8%	65.3%
Small	1,215	21.8%	743	20.1%	61.2%
Medium 1	1,352	24.3%	886	24.0%	65.5%
Medium 2	1,103	19.8%	722	19.6%	65.5%
Large	355	6.4%	265	7.2%	74.6%
Very Large	268	4.8%	231	6.3%	86.2%
Metropolis	42	0.8%	40	1.1%	95.2%
TOTAL	5.570	100.0%	3.693	100.0%	66.3%

Source: Prepared by the author from IBGE and SICONFI (2019) data.

After the initial tabulation and descriptive analysis of the data, observations with extreme values (*outliers*) were removed using the interquartile distance criterion. Considering that budget forecasts admit a certain degree of inaccuracy, arising from price variation and uncertainty about the future (Anessi-Pessina & Sicilia, 2015; Rubin, 2014) , it becomes necessary to evaluate different levels of accuracy. To identify the model specification, one should take into account the quality of the data fit. We used a semiparametric model of quantile regression (RQ), obtained by the *least absolute deviations* estimator, with lagged variables (Fávero & Belfiore, 2017).

The QR, introduced by Koenker and Basset (1978), represents a robust method of estimation and allows assessing the impact of explanatory variables at different points of the dependent variable distribution (Mendes & Sousa, 2006). The use of the RQ technique is appropriate for cases in which there is no normal distribution of errors or when the dependent variable presents extreme values. According to a study by Duarte, Girão, & Paulo (2017) about *value relevance*[7] models, the estimation by RQ becomes more efficient and less likely to present

[7] It refers to research that seeks to analyze whether accounting data can be relevant in explaining the prices of firms in the capital market, as well as to see whether financial information can predict profits in subsequent periods.

estimation errors than the traditional method of ordinary least squares (MQO). In the field of public finance, RQ was mainly employed in the studies of Meneguin, Bugarin and Carvalho (2005), Mendes and Sousa (2006), Costa, Ferreira, Braga and Abrantes (2015), Queiroz, Araújo, Morais and Martins (2015), Gouveia, Horsth and Faroni (2017) and Santos and Rover (2019).

5. RESULTS AND DISCUSSION

This section is intended to present the main findings and expose discussions of the study, whose objective is to evaluate the relationship between expenditures foreseen in the Budget Law and the expenditures committed for a sample of Brazilian municipalities. As seen previously, as a function of dividing the amounts committed by the initial appropriation amounts, it is noted that the closer to 1, the greater the accuracy in predicting expenditures, and the more distant, the lower the accuracy.

On average, the total current expenditure forecast of the municipalities initially evaluated was underestimated by 8.43% in relation to its execution (PE = 0.9157). However, the forecast errors presented different behavior in each group of expenditure nature, considering: Personnel and Social Charges, Other Current Expenditures and Investments. First, expenditures with Interest and Debt Charges, showed the highest mean (14.317) and dispersion of errors (55.505). However, unlike the other categories analyzed, an increasing trend can be observed for the years observed. Due to the strong asymmetry in the distribution, the low number of observations (about 34% of the municipalities in the sample presented the item) and due to the peculiar characteristic of local finances, this expenditure was not considered for analysis. Thus, except for expenditure on Interest and Debt Charges, there was no substantial variation in the EP variable between the four periods of analysis.

In the percentile segmentation, the distribution of the prediction errors is upward, so that the lower and upper quantiles (P25 and P75) represent lower planning accuracy with overestimation and underestimation biases, respectively.

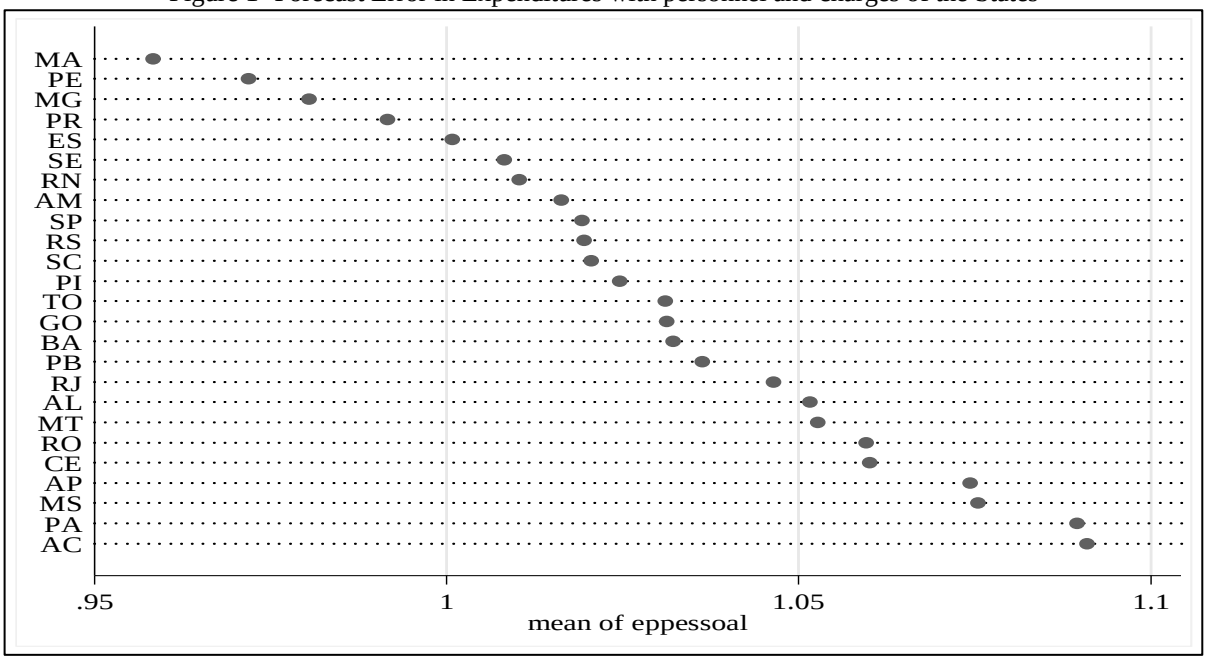
Table 3- EP descriptive statistics

Variable	YEAR	N	Average	Standard Deviation	Minimum	P25	P50	P75	Maximum
Personnel and Charges	2015	3532	1.015	0.1024	0.7369	0.9506	1.007	1.08	1.29
	2016	3491	1.018	0.1038	0.7369	0.9491	1.015	1.084	1.293
	2017	3525	1.015	0.1054	0.7374	0.947	1.01	1.081	1.293
	2018	3545	1.002	0.1024	0.7374	0.9352	0.9998	1.066	1.293
Other Current Expenditures	2015	3582	0.9331	0.1542	0.5132	0.8314	0.934	1.034	1.377
	2016	3555	0.9309	0.1594	0.5112	0.8255	0.9356	1.035	1.377
	2017	3603	0.9273	0.1588	0.5137	0.8216	0.9332	1.035	1.376
	2018	3582	0.9775	0.1581	0.5122	0.8761	0.9813	1.081	1.376
Investments	2015	3356	0.5557	0.4601	0.0019	0.2203	0.4112	0.7503	2.173
	2016	3268	0.6018	0.4793	0.0001	0.2368	0.4652	0.8281	2.175
	2017	3363	0.5263	0.4634	0.0051	0.1939	0.3705	0.7126	2.175
	2018	3188	0.6290	0.4917	0.0072	0.26	0.4715	0.8699	2.175

Source: Prepared by the author from SICONFI data (2019).

As expected, the forecast of Personnel Expenditures showed the highest degree of accuracy in budget planning compared to other expenditures. For the four years analyzed, the errors for Personnel and Expenditures were slightly underestimated (PE > 1), that is, the amounts committed were close to the initial appropriation, with an average error of 1%. The municipalities in the South and Southeast regions were the ones that reached the lowest averages, while the municipalities belonging to the North and Center-West regions reached the highest averages. In relation to population size, Very Small, Small and Metropolis municipalities present greater accuracy in determining the budget, while Medium and Large municipalities present greater forecast errors.

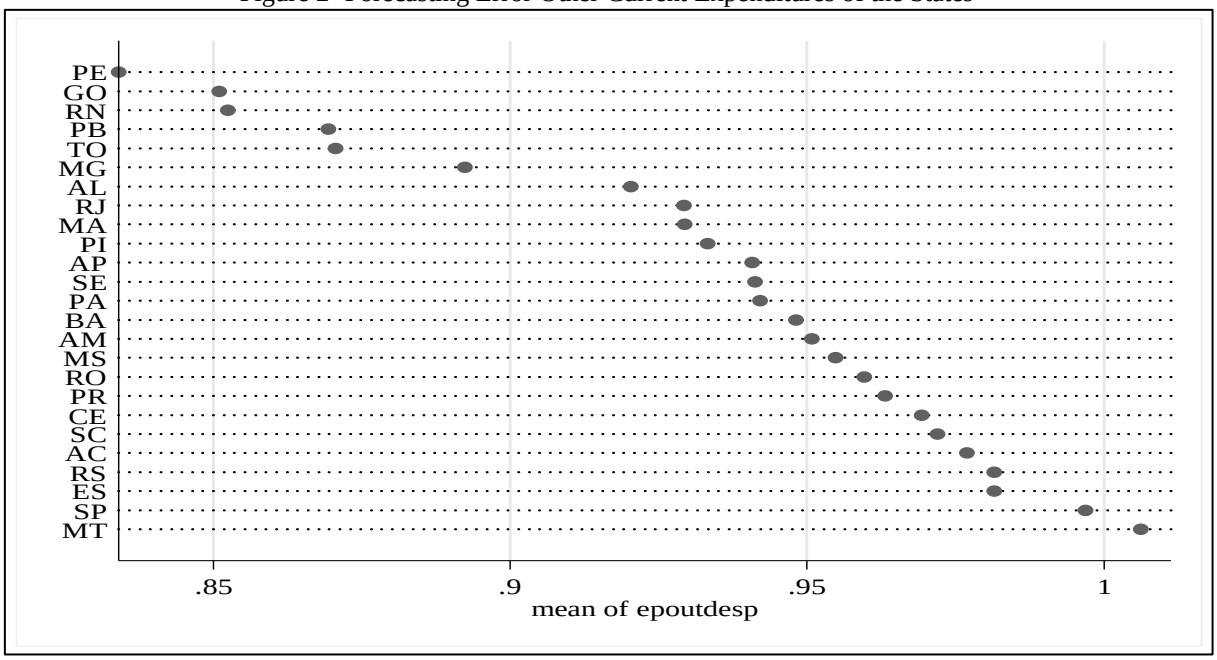
Figure 1- Forecast Error in Expenditures with personnel and charges of the States



Source: Prepared by the author from SICONFI data (2019).

The Other Current Expenditures group, in all geographic regions and population sizes, presented average values lower than 1, that is, the initial budget was overestimated by an average of 8.3% in relation to the committed expenditures. Municipalities located in the South Region and municipalities of large size presented the highest accuracy in the expenditure forecast. On the other hand, municipalities in the Northeast Region and municipalities with a Very Small population size showed higher forecast errors.

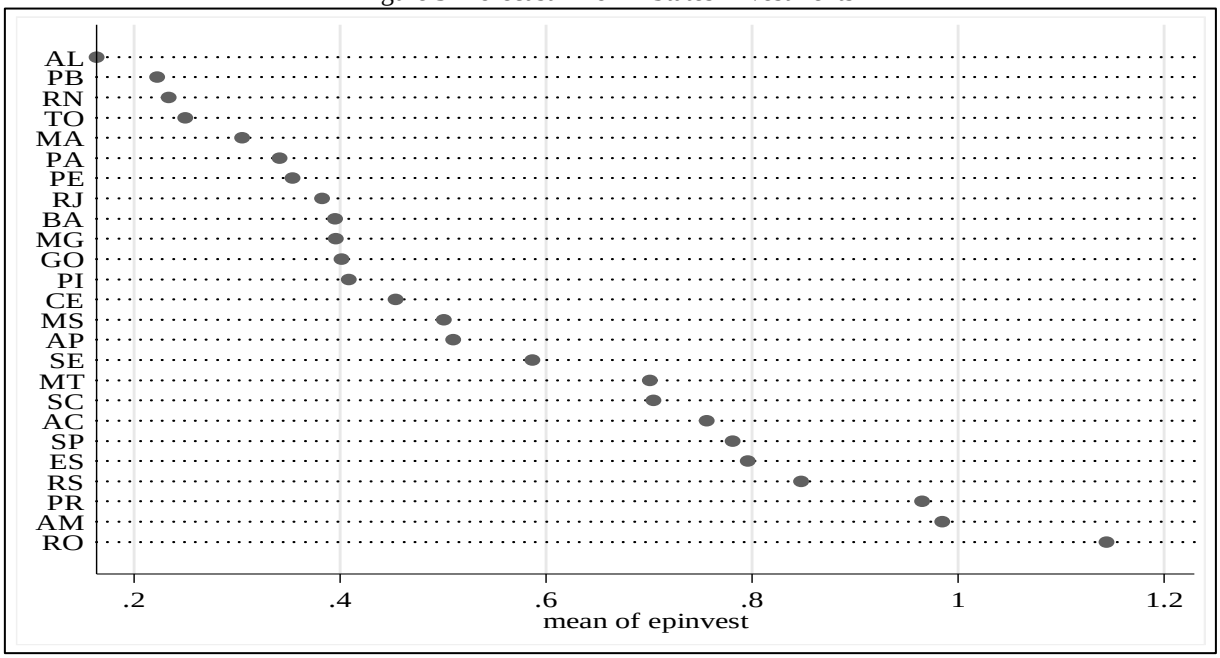
Figure 2- Forecasting Error Other Current Expenditures of the States



Source: Prepared by the author from SICONFI data (2019).

In the Investments group, the average error of the final sample was 52.38% below the value of the initial allocation (underestimated), with a standard deviation of 1.2263. Municipalities located in the South Region showed a higher degree of accuracy in the forecast, with an average of 0.846, while municipalities in the Northeast Region showed a higher disparity, with an average value of 0.364. As for population size, the budget inaccuracy increases with the size of the municipality, just as the sample standard deviation decreases. Unlike the other groups, Investments showed an alternating pattern of underestimation and overestimation. The years 2016 (municipal elections) and 2018 (second year in office) showed an overestimation bias, while the years 2015 and 2017 showed an underestimation of the initial budget.

Figure 3- Forecast Error in States' Investments



Source: Prepared by the author from SICONFI data (2019).

Pearson's correlation coefficients for the variables Personnel and Social Charges, Other Current Expenditures and Investments showed weak and moderate linear association between the variables, considering a significance level of 5% (Tables 9, 10 and 11 in Appendix A). Regression analysis method with panel data and Quantile Regression (QR) was applied to analyze the PE of expenditures in municipalities. The results of the verification tests indicated the fixed effects model as the best fit in all equations. Hypothesis tests were conducted to verify the equality of the coefficients of each regressor. From the F-test, it is possible to reject the hypothesis of equality of the estimated coefficients for the three quartiles of each regression. To evaluate the statistical significance of the differences between quantiles, the Wald test was used, which tests the hypothesis that all estimated parameters are equal to zero. The results of the *variance inflation factor* (VIF) analysis for the model's independent variables showed values considered low, ruling out multicollinearity problems for the model (Fávero and Belfiore, 2017).

The results of the fixed effects panel and RQ estimations can be seen in Tables 4, 5 and 6 below, respectively. The Pseudo R^2 represents the coefficient of determination of the RQ model. Additionally, Figures 3, 4 and 5 in Appendix A illustrate the results of the quantile regression coefficients. The gray area corresponds to the confidence interval, while the horizontal lines represent the MQO regression estimates from the mean and the dotted lines identify the variation of the estimates at each quantile.

In the group of Expenditures with personnel and social charges, for being considered a rigid expenditure, which cannot be easily managed in the short term and given the control and limit established by the LRF[8], the inaccuracy of the expenditure with personnel tends to be lower compared to other expenditures. The results of the panel with fixed effects for the forecast error of expenditures with personnel and charges showed R^2 *within* 0.1884 with significant model fit. The Pseudo R^2 coefficients of determination of the quantile regression ranged from 0.2901 to 0.3270 across percentiles. The coefficients obtained for the variable EP of tax revenue showed statistical significance in the model. This becomes relevant in a context in which, as of 2019, Supplementary Law 164, of December 18, 2018, which amended the LRF, "loosened" the restrictions provided for personnel expenditures in case of a drop of more than 10% in municipal revenue. On the other hand, the EP relative to current transfers was significant at 1%, with a positive association in all the quantiles analyzed.

[8] The LRF renders null and void any act that increases personnel expenses issued in the 180 (central and eighty) days prior to the end of the term of office of the officers of the branches or agencies.

Table 4- Estimated coefficients for PE-Personnel and Social Charges

Variable	FE	P10	P25	P50	P75	P90
EP-personal (n-1)	(omitted)	0,486***	0,554***	0,592***	0,650***	0,627***
		(0,055)	(0,031)	(0,024)	(0,040)	(0,070)
EP-rectrib	-0,120	-0,173***	-0,083**	-0,046**	0,116***	0,090**
	(0,167)	(0,029)	(0,035)	(0,022)	(0,040)	(0,035)
EP-transfcorr	0,741***	0,732***	0,708***	0,683***	0,578***	0,595***
	(0,096)	(0,189)	(0,083)	(0,054)	(0,082)	(0,131)
RPNP	0,024**	-0,000	0,004	0,011*	0,014	0,007
	(0,012)	(0,014)	(0,009)	(0,007)	(0,011)	(0,016)
Incrementalism	-0,914***	-3,102***	-3,753***	-4,082***	-4,351***	-3,214***
	(0,286)	(0,670)	(0,362)	(0,243)	(0,403)	(0,720)
Var. GDP	0,009	0,105	0,075*	-0,001	-0,015	0,040
	(0,039)	(0,066)	(0,040)	(0,029)	(0,044)	(0,070)
Direct Adm.	1,045***	0,062	0,008	0,009	0,000	-0,015
	(0,308)	(0,052)	(0,032)	(0,024)	(0,037)	(0,054)
IFGF-Autonomi	0,076	0,054	-0,008	-0,134**	-0,184*	-0,395**
	(0,373)	(0,148)	(0,087)	(0,065)	(0,101)	(0,166)
IFGF-Personnel	-1,200***	-0,632***	-0,601***	-0,625***	-0,693***	-0,667***
	(0,169)	(0,182)	(0,107)	(0,083)	(0,133)	(0,223)
IFGF-Liquid	-0,228*	-0,096	-0,031	-0,094	-0,028	-0,034
	(0,128)	(0,139)	(0,084)	(0,067)	(0,104)	(0,151)
Comparec	-0,110*	0,003	0,001	0,012	0,018	-0,014
	(0,058)	(0,048)	(0,030)	(0,023)	(0,035)	(0,052)
Compet	-0,051	-0,038	-0,022	-0,036	-0,071*	-0,108*
	(0,035)	(0,055)	(0,032)	(0,025)	(0,037)	(0,056)
Fragment	(omitted)	0,024	-0,023	-0,032	-0,025	-0,003
		(0,046)	(0,029)	(0,022)	(0,032)	(0,051)
MudaPartid	-0,042	-0,201**	-0,081	0,063	0,020	0,097
	(0,065)	(0,102)	(0,064)	(0,050)	(0,076)	(0,115)
Constant	-5,751***	2,514***	3,840***	4,526***	5,318***	4,800***
	(2,192)	(0,803)	(0,448)	(0,309)	(0,500)	(0,829)
Obs.	2228	1162	1162	1162	1162	1162
R^2 | Pseudo-R^2	0,1884	0,2901	0,3039	0,3268	0,3270	0,3018

Source: Prepared by the author (2020) based on data from SICONFI, IBGE, FIRJAN, and TSE.
Note: *0.10 significance; **0.05 significance; ***0.01 significance. Standard errors in parentheses.

For the model, the number of personnel employed in the direct administration was used as a control variable. The variable presented significant relation at 1% only for the fixed effects model, indicating that, for the municipalities of the sample the degree of imprecision in the definition of the budget with Personnel and Charges presents little relation with the number of workers in the public administration. This indication contradicts previous studies by Batista (2015), who found that the number of employees, as well as qualification, is negatively associated with the record of errors during the implementation of public policies. Management quality indicators, on the other hand, indicated that commitment to personnel expenditures and financial autonomy are significantly related to PE. The IFGF-Personnel index showed significant coefficients with negative sign of the relationship for all quantiles of the quantile regressions and for the fixed effects panel. The indicator also represents the level of budget rigidity represented by spending on municipal civil servants, consistent with the negative

relationship presented in relation to PE. On the other hand, the IFGF-Autonomy identified only the quantiles representing overestimation of the initial budget.

Table 5Estimated Coefficients for PE-Other Current Expenditures

Variable	FE	P10	P25	P50	P75	P90
EP-outdesp (n-1)	(omitted)	0,620***	0,640***	0,663***	0,687***	0,645***
		(0,020)	(0,012)	(0,010)	(0,014)	(0,018)
EP-rectrib	-0,015**	-0,006***	-0,009***	-0,013***	-0,017***	0,017***
	(0,007)	(0,002)	(0,002)	(0,001)	(0,002)	(0,003)
EP-transfcorr	0,036***	0,208***	0,397***	0,487***	0,563***	0,666***
	(0,008)	(0,030)	(0,012)	(0,006)	(0,005)	(0,005)
RPNP	0,035***	0,020***	0,010**	0,018***	0,028***	0,030***
	(0,006)	(0,007)	(0,005)	(0,004)	(0,007)	(0,009)
Incrementalism	-0,025***	-2,901***	-3,085***	-3,195***	-3,358***	-3,000***
	(0,008)	(0,141)	(0,085)	(0,078)	(0,125)	(0,200)
Var. GDP	-0,015	0,027	-0,001	0,007	-0,008	-0,005
	(0,009)	(0,022)	(0,013)	(0,012)	(0,016)	(0,021)
Popul.	-3,474***	-0,064***	-0,036***	-0,039***	-0,034**	-0,029*
	(0,931)	(0,016)	(0,011)	(0,010)	(0,014)	(0,017)
IFGF-Autonomi	-0,336***	0,339***	0,211***	0,111***	-0,125***	-0,250***
	(0,119)	(0,045)	(0,028)	(0,025)	(0,036)	(0,047)
IFGF-Liquid	-0,350***	-0,024	-0,091***	-0,109***	-0,128***	-0,216***
	(0,046)	(0,049)	(0,032)	(0,029)	(0,040)	(0,051)
Comparec	0,030	-0,019	0,003	0,005	0,015	0,023
	(0,026)	(0,017)	(0,011)	(0,010)	(0,014)	(0,018)
Compet	0,016	-0,033**	-0,010	0,007	0,010	0,035**
	(0,012)	(0,015)	(0,010)	(0,009)	(0,012)	(0,016)
Fragment	(omitted)	-0,077***	-0,054***	-0,039***	-0,009	0,023
		(0,015)	(0,010)	(0,009)	(0,013)	(0,016)
MudaPartid	0,011	-0,232***	-0,151***	-0,117***	-0,092***	-0,049
	(0,025)	(0,033)	(0,022)	(0,020)	(0,028)	(0,035)
Constant	33,457***	2,599***	3,091***	3,567***	4,091***	4,098***
	(8,989)	(0,196)	(0,129)	(0,118)	(0,179)	(0,259)
Obs.	8417	5662	5662	5662	5662	5662
R^2 | Pseudo-R^2	0,0331	0,3162	0,3485	0,3452	0,3183	0,2840

Source: Prepared by the author (2020) based on data from SICONFI, IBGE, FIRJAN, and TSE.
Note: *0.10 significance; **0.05 significance; ***0.01 significance. Standard errors in parentheses.

The model for Other Current Expenditures with fixed effects presented a low determination coefficient. The fit coefficients of RQ, on the other hand, ranged between 0.2840 and 0.3485. In the last model for capital expenditure in the Investments category, the coefficient of determination for the fixed effects panel was 0.03, while the pseudo-R^2 ranged between 0.28 and 0.34.

In the Other Current Expenditure and Investment models, the Population Size variable was used as a *proxy for* demand for public services. In both models, the variable was significant and negatively related to the explanatory variable Forecast Error.

Table 6Estimated Coefficients for EP-Investments

Variable	FE	P10	P25	P50	P75	P90
EP-invest (n-1)	(omitted)	0,238***	0,359***	0,484***	0,669***	0,764***
		(0,010)	(0,009)	(0,010)	(0,015)	(0,037)
EP-rectrib	-0,005	0,003**	0,002*	0,000	-0,004**	-0,010***
	(0,006)	(0,001)	(0,001)	(0,001)	(0,001)	(0,002)
EP-transfcap	-0,005	0,046***	0,037***	0,044**	0,021***	0,006
	(0,029)	(0,001)	(0,002)	(0,006)	(0,006)	(0,011)
RPNP	0,087***	0,034***	0,042***	0,052***	0,066***	0,076***
	(0,006)	(0,003)	(0,003)	(0,004)	(0,008)	(0,022)
Incrementalism	-0,156***	-0,223***	-0,296***	-0,376***	-0,400***	-0,325***
	(0,013)	(0,007)	(0,008)	(0,013)	(0,031)	(0,107)
Var. GDP	-0,012	-0,002	-0,003	0,007	0,020	0,004
	(0,010)	(0,008)	(0,010)	(0,011)	(0,016)	(0,037)
Popul.	6,325***	-0,035***	-0,041***	-0,075***	-0,126***	-0,198***
	(0,946)	(0,007)	(0,007)	(0,008)	(0,013)	(0,035)
IFGF-Autonomi	0,142	0,091***	0,068***	0,113***	0,118***	0,331***
	(0,125)	(0,020)	(0,021)	(0,025)	(0,039)	(0,097)
IFGF-Liquid	0,042	-0,001	-0,018	-0,052**	-0,092**	-0,085
	(0,045)	(0,023)	(0,023)	(0,027)	(0,040)	(0,099)
IFGF-Invest	1,800***	0,770***	0,917***	1,133***	1,340***	1,731***
	(0,048)	(0,030)	(0,029)	(0,033)	(0,050)	(0,124)
Comparec	-0,746*	-0,291**	-0,065	-0,200	-0,245	0,271
	(0,431)	(0,136)	(0,139)	(0,162)	(0,245)	(0,615)
Compet	-0,067	-0,023	-0,005	-0,048	-0,047	-0,118
	(0,056)	(0,032)	(0,033)	(0,039)	(0,061)	(0,151)
Fragment	(omitted)	0,067	0,053	-0,014	0,016	0,055
		(0,047)	(0,047)	(0,055)	(0,086)	(0,210)
MudaPartid	0,026	0,001	-0,005	0,000	0,023	0,054
	(0,025)	(0,016)	(0,016)	(0,019)	(0,030)	(0,074)
Constant	-63,791***	-0,692***	-0,680***	-0,021	0,689**	1,085
	(9,420)	(0,155)	(0,163)	(0,193)	(0,293)	(0,723)
Obs.	5622	3653	3653	3653	3653	3653
R^2 | Pseudo-R^2	0,3737	0,2360	0,2818	0,3147	0,3354	0,3317

Source: Prepared by the author (2020) based on data from SICONFI, IBGE, FIRJAN, and TSE.
Note: *0.10 significance; **0.05 significance; ***0.01 significance. Standard errors in parentheses.

The general results obtained for budget forecast errors indicate a scenario of deficient planning in most Brazilian municipalities. In the three models obtained, it is possible to verify a relationship between the accuracy of expenditure planning and revenue forecasting, this relationship being negative with own revenues, and positive with the forecast of intergovernmental transfers. The largest portion of current transfers is determined by legislation, making the estimate more consistent in relation to own revenue forecast. The results are aligned with previous studies by Martins and Correia (2015), for EP tax revenue, and Queiroz et al. (2015), for EP current transfers, which identified a positive relationship between personnel expenditures and specific transfers from the Fund for Maintenance and Development of Basic Education (FUNDEB) and the Unified Health System (SUS).

Moreover, these results allow us to identify a relationship with the forecast errors of the previous year and the degree of budgetary incrementalism of the public entity. The lagged

measure of errors indicates a situation of "inertia" of the budget deviations, consistent with Benito et al. (2015), Martins and Correia (2015) and Piza (2016). The prior year error explains at least 48% of the error with personnel expenditures, 62% of other current expenditures, and 23% of public investments. The result is consistent with the measure of budget conservatism proposed by Anessi-Pessina et al. (2015), which, according to Giacomoni (2010, p.215), corresponds to the denial of the desired integration between planning and budget.

Unprocessed Outstanding Commitments (RPNP) of the item showed a positive and significant relationship with the deviations for the groups of Other Current Expenditures and Investments. Thus, it can be inferred that the RPNP instrument is associated with a greater detachment of the execution in relation to the initial appropriation approved. It can be said, therefore, that for the sample analyzed there is a relationship between the enrollments in RPNP and the inaccuracy of government planning. In this sense, the empirical literature indicates that managers have incentives to boost spending in election periods. In the case of the investment group, these produce a positive effect for manager reappointment (Dias, Nossa, & Monte-Mor, 2018).

In the three proposed models, the forecast error variable showed significant association with the degree of financial autonomy, which refers to the exploitation of the municipality's tax base. The result corroborates hypotheses formulated by Giambiagi and Além (2011) and Boukari and Veiga (2018), that subnational governments that rely on own revenue generation tend to have greater tax responsibility, and is consistent with the previous study by Neduziak and Correia (2019), in which greater tax autonomy, in the case of states, produces adverse tax reactions, such as increased personnel expenditures. Moderate and weak association is found with the liquidity index of municipalities, leading to the interpretation that the recurrent practice of overestimated initial budgets may impact the financial sustainability of municipalities.

Investments represent the most easily contingent and manipulated expenditure nature, according to the theory of political cycles. It is noteworthy that, in the period under analysis, investment spending decreased, a phenomenon observed since the enactment of the LRF, possibly because of debt rules and to the detriment of the increase in personnel spending. It can be understood that the absence of tax rules translates into greater dispersion of the forecast error values. Furthermore, part of these expenditures is realized through current surpluses and credit operations.

Finally, regarding the political variables, and restricted to the sample and period analyzed, the influence of the budget manager was low or non-existent. The variables for

political party change in elections and for Legislative fragmentation showed statistical significance and negative sign of the coefficient only for the Other Current Expenditure model. The variable was significant only in the groups with higher accuracy (P50) and that overestimated the initial budget (P10 and P25), having a negative relationship with fragmentation, exercising greater control over budget execution. As for the fragmentation of the legislature, the result proved consistent with the study of Sjahrir, Kis-Katos, and Schulze (2014) for administrative expenditures in Indonesian districts. The results also align with Meneguin et al.'s (2005) study for municipal spending in reelected governments and with Cavalcante (2013) on electoral competition. Similarly, to the study of Benito et al. (2015), Turnout and Electoral Competition variables also proved inconclusive for the models developed. Regarding voter turnout, mandatory voting rules and fixed electoral calendar encourage turnout. On the other hand, citizens lack the ability to directly observe the competence of politicians.

Additionally, tests of difference of means were performed for binary variables that identify the year of municipal elections and the occurrence of change of public manager. In relation to the year 2016, it was verified through the Mann-Whitney U test, the occurrence of statistically significant differences for the EP at the 1% level. On average, the EP of personnel expenditures and investments were higher in an election year. For the management change, the results for the year 2017, representative of the budget execution of the previous manager, indicated a significant difference at the 1% level between the two groups for the expenditure items Other Current Expenditures and Investments.

6. CONCLUDING REMARKS

As mentioned initially, the structuring of the budget cycle comprises the basic phases of: (i) preparation and presentation; (ii) legislative authorization; (iii) programming and execution; (iv) evaluation and control. The budget execution is the main stage of this process and represents the sum of actions aimed at the realization of the established programs, which aims to achieve the objectives when the budget was prepared. In this sense, accuracy in government planning is an important pillar for tax management.

The execution of expenditures is one of the ways in which the public administration interferes in the economy. The objective of the research was to evaluate the accuracy in forecasting budget expenditures in Brazilian municipalities and the influence of accounting,

economic and management variables in the period from 2015 to 2018. The study contributes to the understanding of budget manipulations by Brazilian subnational entities. Thus, it was sought a reflection on the rationality of the budget process and the coherence between its integral parts.

The use of quantile regression proved to be particularly interesting for the research objective, given the heterogeneity of the data and the objective of verifying the degree of realism of government planning in different parts of the distribution.

The results obtained allow us not to fully reject the stated hypotheses. The analysis of expenditures showed a pattern of underestimation or overestimation, depending on the nature of the item. The estimated results point to an apparently non-linear pattern of the coefficients, which can be explored in future studies. Due to the quantile decomposition, it is also possible to observe differences in the magnitude of the coefficients, evidencing a heterogeneous distribution. Thus, the low efficiency of the planning activity in Brazilian municipal governments was evidenced.

The fact is that budget values based on forecasts made in the previous year inevitably have some degree of inaccuracy, both in revenues and expenditures. However, what is observed is that this magnitude can identify low state planning capacity, characteristic of the *soft budget constraint* model, added to conjunctural uncertainties, rather than political opportunism occurring in the local context.

Inadequate management planning, as well as inefficient control systems can cause a greater number of alterations, translated into an increase in budget supplementation. We conclude, therefore, that budget forecasting errors are mainly the result of administrative inefficiencies, without exempting possible effects of political maneuvering or signaling the manager's competence. Forecast errors can identify problems in the implementation of previously announced policies. Thus, such deviations stem from the low planning capacity of the public entity, coupled with involuntary error due to systemic uncertainty.

On the other hand, the evidence of low forecast errors for personnel expenditures, as well as the association with the degree of budget incrementalism, reinforce the argument that a set of legal and constitutional limitations reduce the manager's degree of discretion, evidencing a framework of budget rigidity.

The results are limited mainly to the sample selected and the analysis techniques employed. It is noteworthy that the analysis covered a period of great political and economic instability, which may have worsened the tax situation of the municipalities and contributed to

the heterogeneity among the observations. Another relevant aspect was the error calculation based on the Commitment Expenditures, without considering possible practices of commitment cancellations by the municipalities.

For future studies, in addition to the verification of the limitations already mentioned, it is suggested to deepen the analysis of the EP of expenditures, as well as to investigate the relationship with expenditure limits of the LRF, the existence of municipal spending contingency decrees established in the Budget Guidelines Law (LDO), and the revenue forecast methods used by the municipalities. Since expenditures with Interest and Debt Charges were not subject to analysis (due to the great heterogeneity), it is suggested that they be analyzed individually, considering their evolution in the period, as well as their relation to the limit for credit operations in municipalities and to indebtedness. Finally, due to the availability of data, the values of the initial appropriation approved by the municipal legislature were obtained, and it is also worthwhile to verify forecast errors in relation to the Annual Budget Law Project (PLOA).

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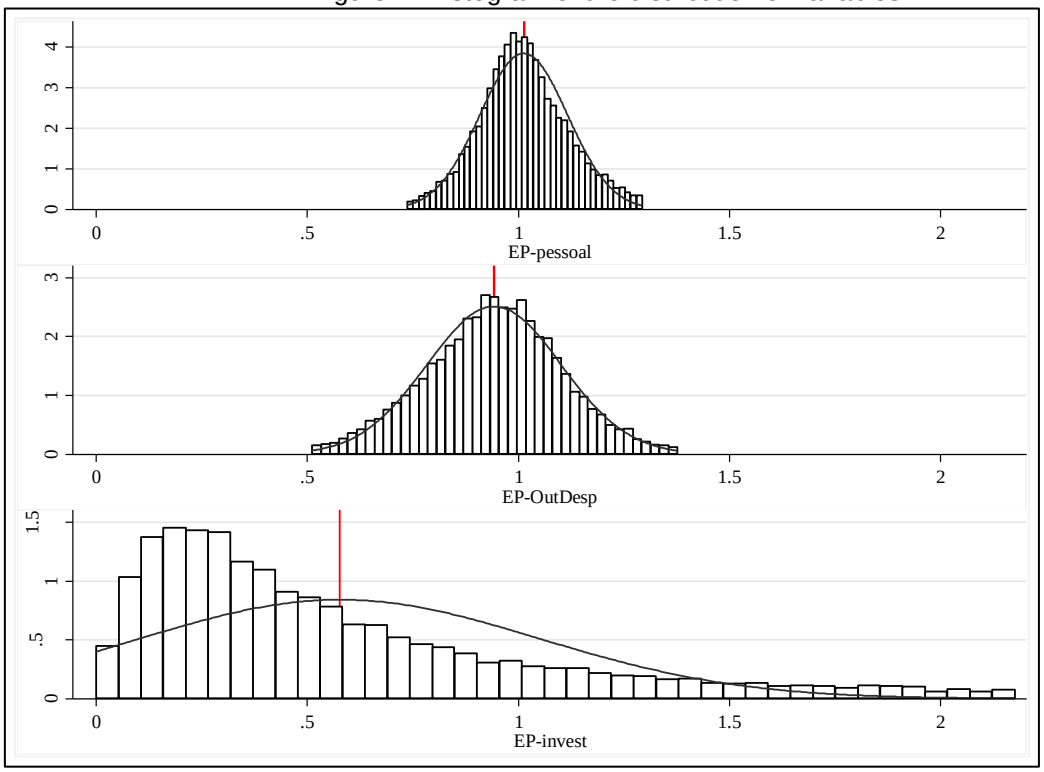
APPENDIX A

Table 7- Descriptive statistics of the independent variables

Variable	N	Average	DP	min	p50	max
eprectrib	14,070	1,198	10,838	0,002	0,979	1,225,223
eptransfcorr	14,070	0,960	0,268	0,001	0,965	28,080
eptransfcap	11,239	683,429	28,271,286	0,000	0,348	2,90e+06
rpnppessoal	4,909	6,62e+05	4,49e+06	-4,69e+07	25,984,061	1,31e+08
rpnpoutdesp	12,122	3,23e+06	2,91e+07	-4,77e+07	1,94e+05	1,69e+09
rpnpinvest	10,675	2,44e+06	1,90e+07	-5,17e+06	4,58e+05	1,56e+09
incr_pess	13,862	1,078	0,146	0,000	1,071	7,819
incr_outr	13,850	1,069	1,038	-0,054	1,051	110,562
incr_invest	13,846	1,132	2,409	-0,157	0,946	227,834
varpib	10,569	0,074	0,181	-0,785	0,064	8,167
admdiret	10,523	1,245,797	3,579,322	69,000	530,000	1,38e+05
Popul.	14,090	46,982,230	2,68e+05	931,000	12,431,000	1,22e+07
ifgfauton	13,932	0,459	0,399	0,000	0,418	1,000
ifgfpess	13,932	0,440	0,310	0,000	0,419	1,000
ifgfliqu	13,932	0,518	0,321	0,000	0,549	1,000
ifgfinvs	13,932	0,455	0,267	0,001	0,401	1,000
come to	14,090	0,858	0,058	0,625	0,855	0,988
compet	14,090	0,808	0,220	0,000	0,878	1,000
fragment	14,090	0,619	0,158	0,182	0,636	1,000

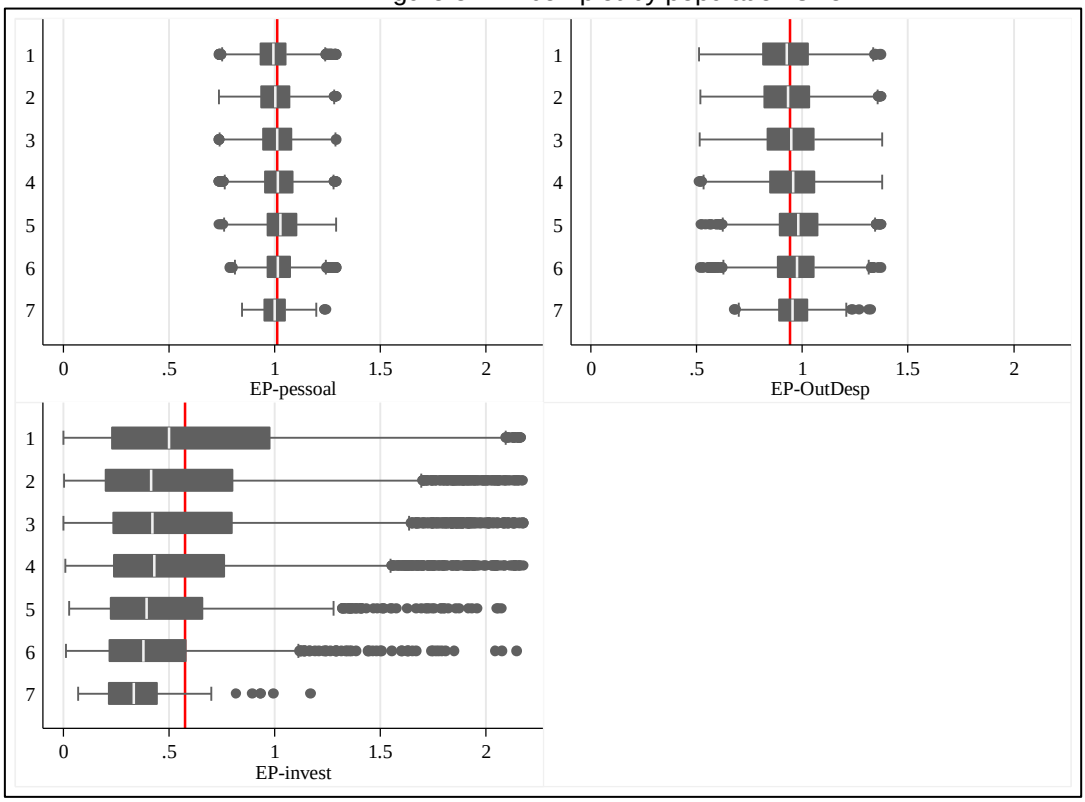
Source: Prepared by the author (2020) from SICONFI data (2019).

Figure 4- Histogram of the distribution of variables



Source: Prepared by the author (2020) from SICONFI data (2019).

Figure 5- PE box-plot by population size



Source: Prepared by the author (2020) from SICONFI data (2019).
Note: The vertical line in red identifies the average. Size according to IBGE criteria: (1) Very Small; (2) Small (3) Medium 1 (4) Medium 2; (5) Large; (6) Very Large; (7) Metropolis.

Table 8- Variation Inflation Factor (VIF)

	EP-Personal (Equation 2)	EP-Oct. Desp. (Equation 3)	EP-Invest (Equation 4)
EPdefasad	1.37	1.25	1.16
zEPrectrib	1.01	1.00	1.00
zEPtransf	1.33	1.03	1.01
increment	1.22	1.15	1.05
lnRPNP	1.19	1.71	1.38
ifgfauton	1.68	1.35	1.44
Ifgfliqu	1.14	1.04	1.06
ifgfpess	1.44		
IFGF-Invest			1.08
Var. GDP	1.02	1.00	1.00
Direct Adm	1.69		
Population		2.17	1.87
Attend.	1.21	1.38	1.30
Fragment.	1.06	1.06	1.06
mudarapartid	1.03	1.03	1.05
Compet.	1.03	1.02	1.03
Average VIF	1.24	1.24	1.18

Source: Prepared by the author (2020)

Table 9- Correlation Matrix EP-Personnel and Social Charges

	EPpersonal	EPdefas	EPrectrib	EPtransf	RPNP	increment	VarGDP	admdiret	ifgfaun	ifgfpess	ifgfliqu	come to	compet	fragm
EPpersonal	1.000													
EPdefas	0.534*	1.000												
Eprectrib	0.007*	0.026*	1.000											
Eptransf	0.199*	0.113*	0.002	1.000										
RPNP	0.018*	0.034*	-0.002	-0.012*	1.000									
Increase	-0.066*	0.338*	0.003	-0.014*	-0.001	1.000								
VarGDP	0.030*	-0.007	-0.004	0.007	-0.029*	0.018*	1.000							
Admdiret	0.027*	0.007	-0.005	0.008*	0.495*	-0.030*	-0.012*	1.000						
Ifgfauton	0.042*	0.040*	-0.005	0.080*	0.068*	0.005	-0.008*	0.197*	1.000					
Ifgfpess	-0.146*	-0.111*	-0.001	0.112*	0.015*	-0.016*	0.035*	0.084*	0.334*	1.000				
Ifgfliqu	0.011*	0.041*	0.020*	0.092*	-0.028*	0.037*	0.012*	-0.020*	0.119*	0.224*	1.000			
Comparec	-0.040*	-0.034*	-0.002	0.012*	-0.055*	0.008*	0.002	-0.151*	-0.106*	0.087*	0.095*	1.000		
Compet	0.010*	0.003	0.002	-0.004	-0.012*	-0.018*	0.009*	-0.012*	-0.053*	-0.084*	-0.014*	0.067*	1.000	
Fragm	0.004	0.009*	0.004	-0.010*	-0.028*	0.007*	0.001	-0.062*	-0.049*	-0.151*	-0.054*	-0.199*	0.013(	1.000

Source: Prepared by the author (2020) based on data from SICONFI, IBGE, FIRJAN, and TSE.
Note: *0.05 significance.

Table 10- EP-Other Current Expenditures Correlation Matrix

	EPoutdesp	EPdefas	EPrectrib	EPtransf	RPNP	Increment	VarGDP	Pop	Ifgfauton	Ifgfliqu	come to	compet	Fragm
EPoutdesp	1.000												
EPdefas	0.556*	1.000											
EPrectrib	-0.007*	0.014*	1.000										
EPtransf	0.244*	0.173*	0.004	1.000									
RPNP	0.024*	0.023*	-0.002	-0.002	1.000								
Increment	-0.023*	0.322*	0.001	-0.003	-0.002	1.000							
VarGDP	-0.006	-0.011*	-0.006	0.008*	-0.018*	0.001	1.000						
pop	0.029*	0.031*	-0.003	-0.001	0.891*	-0.002	-0.021*	1.000					
Ifgfauton	0.228*	0.249*	-0.007*	0.078*	0.110*	0.007*	-0.007	0.144*	1.000				
ifgfliqu	0.023*	0.031*	0.021*	0.064*	-0.024*	0.005	0.016*	-0.023*	0.079*	1.000			
Comparec	-0.013*	-0.018*	-0.002	0.010*	-0.070*	-0.004	-0.001	-0.098*	-0.106*	0.110*	1.000		
compet	-0.009*	-0.017*	0.003	-0.006*	-0.010*	0.006	0.008*	-0.009*	-0.055*	-0.027*	0.070*	1.000	
Fragmt	-0.033*	-0.032*	0.006	-0.009*	-0.057*	-0.007*	0.003	-0.068*	-0.051*	-0.045*	-0.202*	0.012*	1.000

Source: Prepared by the author (2020) based on data from SICONFI, IBGE, FIRJAN, and TSE.
Note: *0.05 significance.

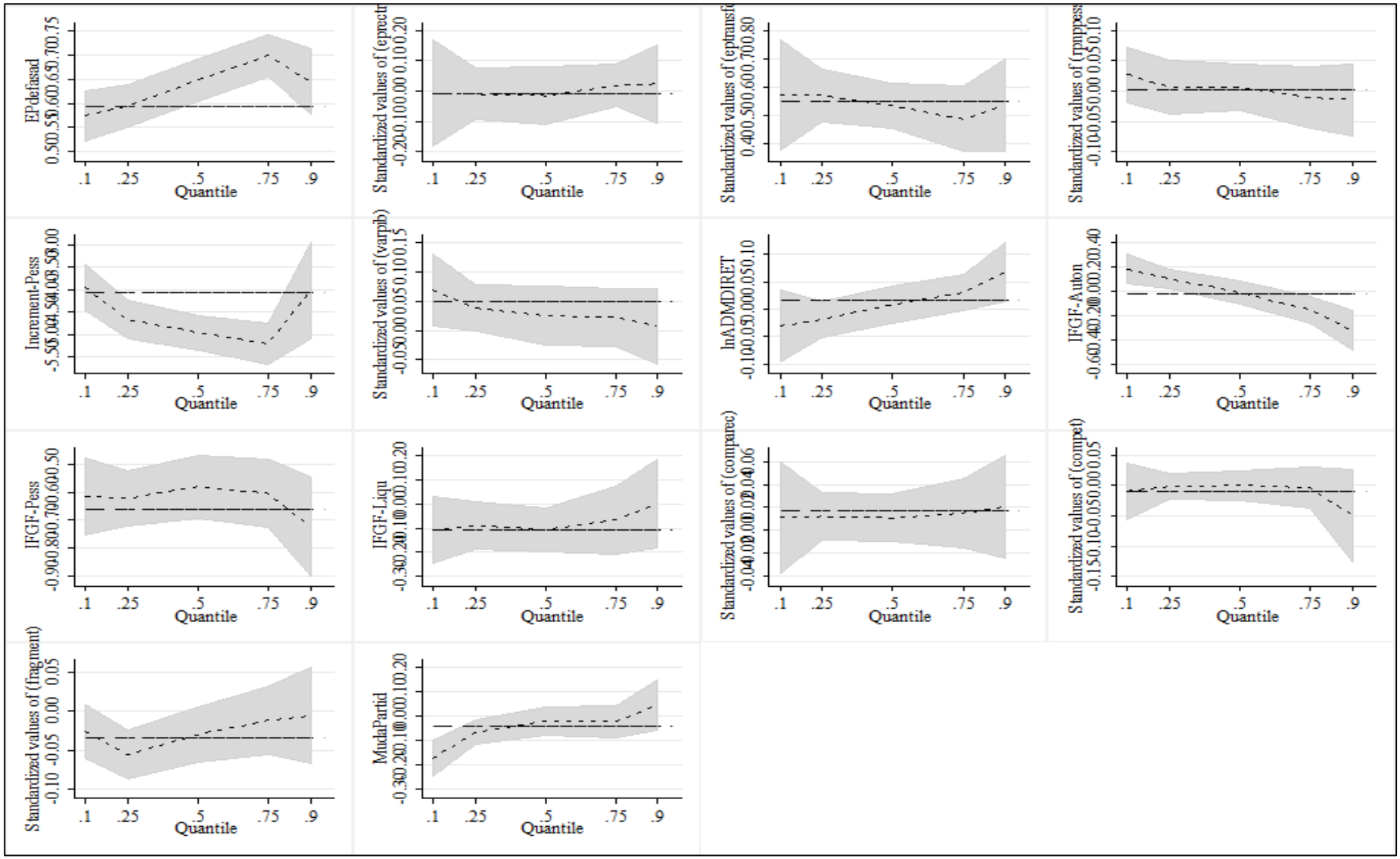
Table 11- EP-Investments correlation matrix

	EPinvest	EPdefas	EPrectrib	EPtransf	RPNP	increment	VarGDP	POPUL	Ifgfauton	ifgfliqu	ifgfinvs	come to	compet	Fragmt
EPinvest	1.000													
EPdefas	0.5308	1.000												
EPrectri	-0.005	-0.005	1.000											
EPtransf	0.078*	0.070*	-0.001	1.000										
RPNP	0.003	-0.015*	-0.002	-0.002	1.000									
increment	-0.007*	0.086*	0.000	-0.001	0.000	1.000								
VarGDP	0.012*	-0.001	-0.006	-0.010*	-0.015*	-0.011*	1.000							
Pop	-0.044*	-0.038*	-0.003	-0.004	0.767*	-0.009*	-0.022*	1.000						
ifgfauton	0.248*	0.253*	-0.008*	0.025*	0.108*	0.007*	-0.013*	0.154*	1.000					
Ifgfliqu	0.141*	0.146*	0.023*	0.017*	-0.005	0.012*	0.008*	-0.007*	0.131*	1.000				
ifgfinvs	0.350*	0.113*	0.000	-0.006	-0.002	0.053*	0.023*	-0.028*	0.016*	0.105*	1.000			
Comparec	0.095*	0.082*	0.000	0.014*	-0.054*	0.012*	-0.002	-0.095*	-0.103*	0.087*	0.127*	1.000		
compet	-0.073*	-0.049*	0.003	0.011*	-0.010*	-0.002	0.007*	-0.012*	-0.061*	-0.004	-0.059*	0.074*	1.000	
Fragmt	-0.053*	-0.060*	0.007*	-0.015*	-0.051*	-0.012*	-0.003	-0.072*	-0.0588	-0.058*	-0.058*	-0.184*	0.015*	1.000

Source: Prepared by the author (2020) based on data from SICONFI, IBGE, FIRJAN, and TSE.
Note: *0.05 significance.

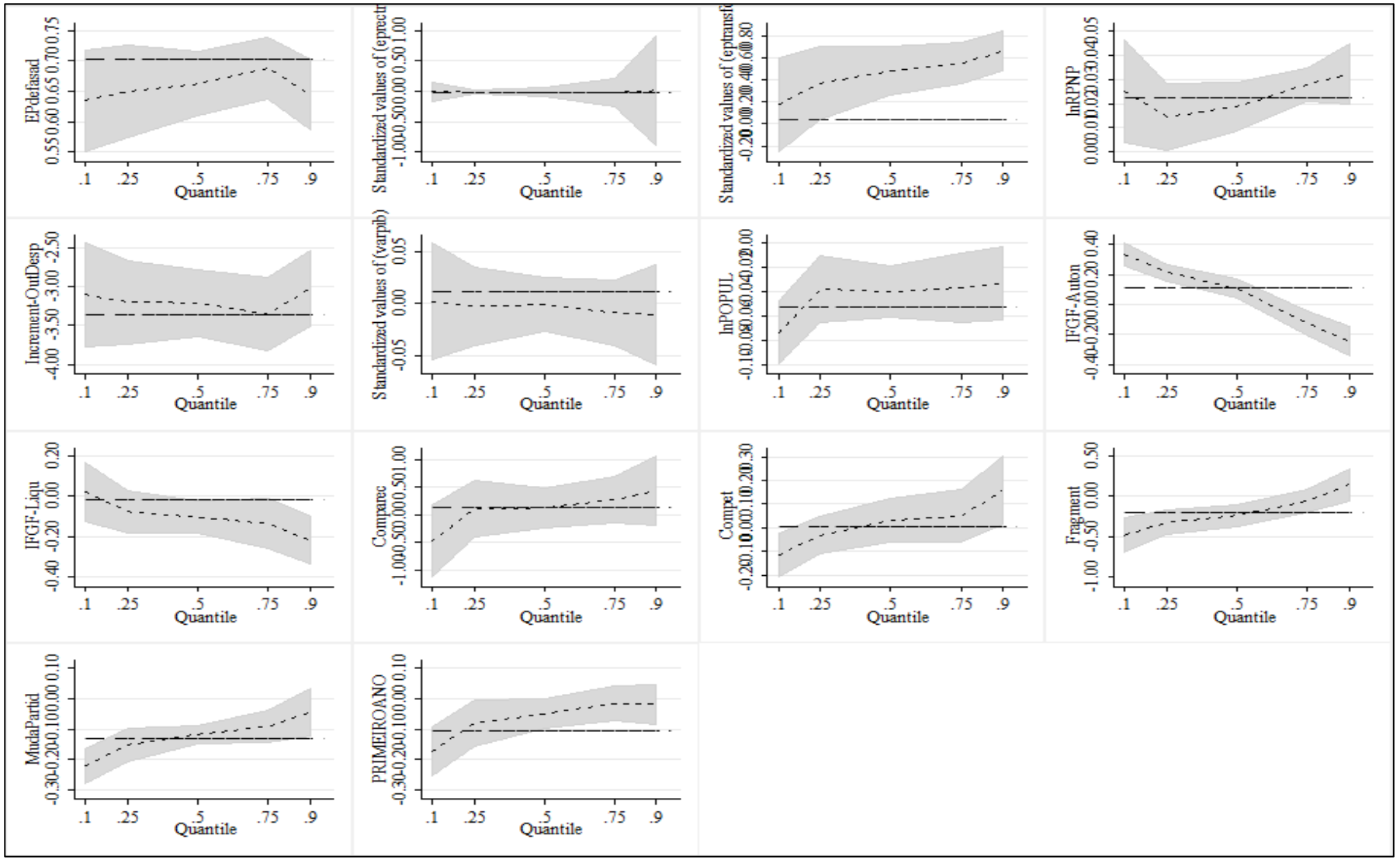
Figure 6- Estimates and confidence interval for PE-Personnel and Social Charges

Public Finance Notebooks, Brasília, v. 21, n. 2, p. 1-46, sep. 2021



Source: Research data (2020).

Figure 7- Estimates and confidence interval for PE-Other Current Expenditures


EPdefasad
Standardized values of (eprectr
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Increment-OutDesp
Standardized values of (varpib)
lnPOPUL
IFGF-Auton
IFGF-Liqu
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Compel
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MudaPartid
PRIMEIROANO
Quantile
.1
.25
.5
.75
.9

Source: Research data (2020).

Figure 8- Estimates and confidence interval for EP-Investments

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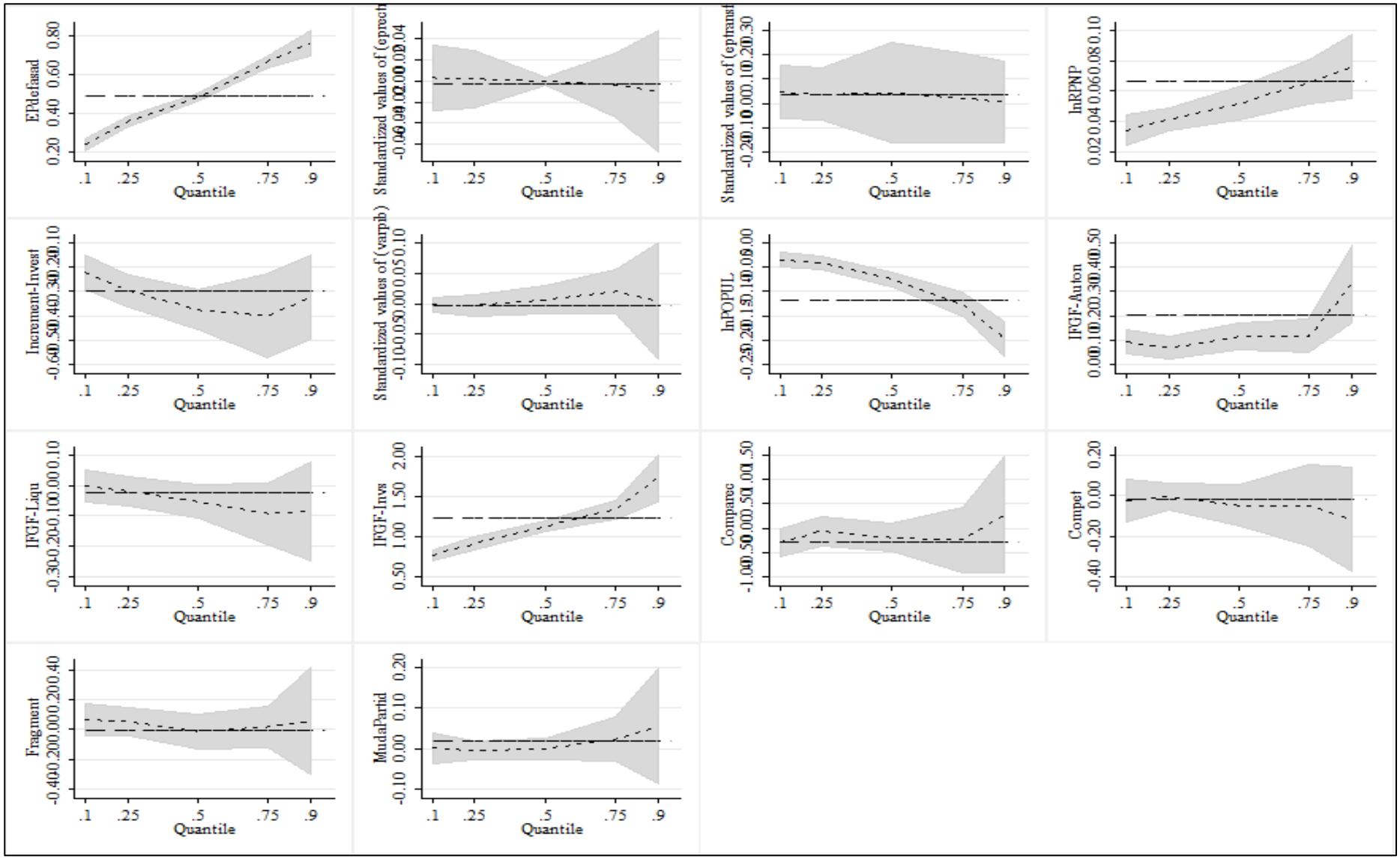

Source: Research data (2020).

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