REVISTA CONTABILIDADE, GESTÃO E GOVERNANÇA E-ISSN 1984-3925

JOURNAL OF ACCOUNTING, MANAGEMENT AND GOVERNAM



Editor Responsável: Rodrigo de Souza Gonçalves Andrea de Oliveira Gonçalves Editor Associado: Pedro Miguel Alves Ribeiro Correia Processo de Avaliação: Double Blind Review pelo SEER/OJS

Factors that Influence the Probability of Rejection of Government **Accounts in Pernambuco Municipalities**

ABSTRACT

Objective: Check what are the factors that influence the probability of rejection of government accounts judged by the Pernambuco State Audit Court (TCE/PE).

Method: Logistic regression was used to verify the probability of rejection of government accounts based on the profile of mayors and socioeconomic characteristics of municipalities.

Originality/Relevance: This research innovates by testing variables that make it possible to help mayors and society to what observe characteristics of public managers and municipalities are a desired profile in order to reduce the number of rejected accounts, promoting good governance practices and greater participation of social control in the use of public resources.

Results: The findings suggest that political experience and education level are the factors that most influence, respectively, increasing and decreasing, the probability of rejection of municipal government accounts. With regard to the variables related to the socioeconomic characteristics of the Municipalities, the results suggest that an increase in the Financial Performance Index of the Municipality, in the GDP per capita and in the Firjan Municipal Development Index, decrease the probability of rejection of the government accounts judged by the TCE/PE.

Theoretical/Methodological Contributions: It contributes by expanding the list of research on the subject, analyzed from the perspective of a quantitative methodology, exploring new results with a local sample and inferring possibilities to identify factors that influence account rejection.

Keywords: TCE/PE, Profile of Mayors, Socioeconomic Characteristics of Municipalities, Rejection of Accounts.

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Received: February 23, 2023 Revised: June 13, 2023 Accepted: June 13, 2023 Published: July 31, 2023



How to Cite (APA)

Santos, L. J. S., Libonati, J. J., Santos, J. M. A., Vieira, A. A., & Filho, J. E. B. (2023). Factors that Influence the Probability of Rejection of Government Accounts in Pernambuco Municipalities. Revista Contabilidade, Gestão e Governança, 26 (1), 121-152. http://dx.doi.org/10.51341/cgg.v26i1.3036

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1 INTRODUCTION

The search for better quality public services is becoming more and more the focus of citizens and internal and external control bodies of public organizations, making it clear that efficiency in the public sector reflects the problem of scarce resources and the quality of public decisions of the managers in the allocation of these (Vieira & Barreto, 2019). Society's needs are increasing, and resources are increasingly scarce (Slomski, 2008; Montanholi & Santos, 2021). In this context, in addition to society, bodies such as controllerships, internal audits, and especially the Courts of Auditors are fundamental in controlling public resources and improving management results (Vieira & Barreto, 2019).

For Matias-Pereira (2018), the control of public resources is also based on corporate governance, which covers how corporations are managed. When well practiced, this management prevents institutions from incurring irregularities of various kinds in their accounts, especially those that cause damage to public property and society. In the public sector, governance is associated with managing the existing agency conflict between the principal figure, assumed by society, represented by parliamentarians chosen in elections and who allocate public resources, arising from the payment of taxes and necessary for the functioning of the State, to the figure of agents, represented by governors, mayors and the president of the republic, also chosen in elections and who have the task of applying these resources for the benefit of society (Altounian et al., 2020).

Public managers can use tools that help them practice better governance to mitigate this conflict, in which each of these figures has their interests, such as, for example, the practice of adequate internal controls and management of corporate risks within the Institutions and the scope of external control, the practice of Accountability or reporting and being liable for one's actions (Vieira & Barreto, 2019). In the latter, according to Brasil (2012), governance agents

(mayors, governors, and the president of the republic) must account for their actions to those who delegated them (society) and are fully responsible for all acts they perform in the exercise of their mandate.

In the Municipalities, the practice of Accountability of public resources is exercised through external control, according to the provisions of the 1988 Federal Constitution in Article 31, to the legislative power that exercises this control with the help of the Courts of Accounts (Brazil, 1988). For Rocha (2013), such control is carried out through an annual accountability process of the municipal government accounts, in which the mayors' accounts are evaluated by auditors from the respective Courts of Accounts who issue prior opinions approving or rejecting them. Subsequently, the legislative power, through the Municipal Chambers, ratifies or not this opinion of the Court of Auditors.

The financial, budgetary, and fiscal analysis found in the previous opinions demonstrates the importance of the judgment of the government accounts by the audit courts in terms of contributing to the reduction of informational asymmetry on the management of public resources, thus serving as a control instrument both for society and for other internal and external control bodies, improving transparency and evaluation of public management (Bier & Assing, 2019).

Additionally, it is possible to identify some factors that can be decisive in the rejection of municipal accounts and factors related both to the personal and political profile of the mayors, such as their political experience, gender, age, level of education, and ideological spectrum, as well as to characteristics socioeconomic characteristics of the Municipalities, such as their financial performance, their per capita wealth, their income from the Municipalities Participation Fund, the size of their population and aspects related to employment, income, education and health of the Municipalities (IFDM). These factors may reflect the existence of good or bad governance practices and approval or not of the accounts of these municipal public

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managers (Revorêdo & Silva, 2005; Avellaneda, 2009; Modes, 2012; Velten, 2015; Freier & Thomasius, 2016; Milanezi & Monte-Mor, 2017).

Thus, this research is justified by its contributions in aggregating greater knowledge on the subject, as well as in enabling the identification of aspects that influence the probability of rejection of municipal government accounts, providing a search for a manager profile and municipal socioeconomic characteristics that serve as a basis for good public governance practice. In this sense, the research aims to verify the factors that influence this probability of rejection of government accounts judged by the Pernambuco State Audit Court (TCE/PE). It aims to answer the following question: What factors influence the probability of rejection of accounts judged by the Pernambuco State Audit Court – TCE/PE?

In addition to this introduction, this study presents four more sections. The second section presents the literature on the subject, addressing issues related to external control and Accountability in Brazilian municipalities, external municipal control carried out by the TCE/PE, and previous studies on the research theme. The third section, methodology, explains the method used to reach the objective and answer the research question. The fourth section presents the results by applying the methodology and discussing the findings. Finally, the fifth and last section presents the final considerations of the research, its limitations, and suggestions for future research.

2 THEORETICAL FRAMEWORK AND CONSTRUCTION OF HYPOTHESES

2.1 Accountability and External Control Exercised by the TCE/PE

For Chamoun (2020), in public governance, the promotion of Accountability is specifically attributed to independent institutions with the constitutional competence to evaluate government action and produce legal and technical opinions on the accounts of public managers. These institutions are inserted into two existing control systems in the world, the controllership system or general audit system and the system of audit courts. These institutions are traditionally called Supreme Audit Institutions - SAI (Chamoun, 2020).

In Brazil, the external control of public accounts is exercised by the legislative branch, with the help of the Court of Auditors, which has the role of verifying, under different approaches, in addition to accounting, the legitimacy, economy, and legality of public accounts (Martins et al., 2020). In this context, the Courts of Accounts are of crucial importance to consolidating Accountability in the Municipalities, as they act in a sanctioning and supervisory way of public accounts (horizontal Accountability), as well as providing society with relevant information on how public managers manage resources, influencing society to carry out vertical Accountability, that is, to exercise the right to choose its representatives, based on their performance in the management of the Municipality (Souza & Fadul, 2020).

For Velten (2015), the Courts of Auditors must exercise Accountability, taking the accounts of those responsible for managing public resources and punishing them when they do not act within the principles established for managing public money. One of these forms of punishment for managers who commit irregular acts in their accounts is their judgment as irregular, a fact that makes it possible to make these managers ineligible in the next elections.

In this sense, the act of accountability is how public managers provide due transparency of acts related to the use, custody, management, and administration of public resources, subjecting themselves to the consequences of these and allowing their accountability, especially in the case of actions that trigger irregularities, accounting or operational fraud (Peter & Machado, 2014; Oliveira et al., 2017).

According to Coutinho and Santos (2018), government accounts concern the distribution of resources among public administration bodies, having a character of compliance or not with the budgetary provisions approved by the legislature. It is about judging political acts of planning, organization, direction, and control of public policies, subjecting them to the

issuance of a prior opinion which, for Alves & Ribeiro (2020), consists of a general and reasoned assessment of budgetary, asset management and financial aspects explained in the rendering of accounts by public managers, seeking to give an opinion, for judgment by the city council, on these aspects.

Chamoun (2020) clarifies that the Federal Constitution of 1988, in its article 71, defined the competencies of the Federal Court of Accounts, which, by symmetry, also apply to the state and municipal Courts of Accounts. In this sense, the constitution of the State of Pernambuco (Pernambuco, 1989), where the Municipalities that are the object of this research are located, also in article 29, paragraph 1, and article 30 establishes that the accounting, financial, budgetary, operational and property inspections of the State and entities of indirect and foundational Administration, will be exercised by the legislative assemblies of the Municipalities, through external control, with the help of the Court of Auditors, and by the internal control systems of the legislative, executive and judiciary powers (Pernambuco, 1989).

For Lins (2012), in the scope of the State of Pernambuco, the external control of municipal public accounts is exercised by the municipal councils with the help of the Pernambuco State Audit Court - TCE/PE, the body responsible for issuing a prior opinion on the accounts of the chiefs of the Executive Power of the 184 Municipalities of the State. For the author, the internal regulations of the TCE/PE discipline the content of the prior opinion as always being justified and conclusive, recommending the approval, approval with reservations or rejection of the accounts, the same, enables the municipal legislative power, represented by the City Council, to form an opinion on aspects related to fiscal, financial, budgetary, operational and property management of the municipal entities, informing the community of the result of these public accounts, that is, whether public resources are being applied correctly (Oliveira et al., 2017).

2.2 Previous studies

Given the importance of constantly checking the aspects that influence the rejection of municipal government accounts because of the legal provision of the accountability of mayors, several authors (Avellaneda, 2009; Freier & Thomasius, 2016; Milanezi & Monte- Mor, 2017; Modes, 2012; Revorêdo & Silva, 2005; Velten, 2015;), have already carried out research in order to verify which determinant variables influence the probability of rejection of government accounts in the judgment of the State Audit Courts (TCEs).

The studies by Avellaneda (2009), Freier and Thomasius (2016), and Modes (2012), despite not specifically studying the rejection of municipal bills, investigated the variable political experience of the mayor, relating it, respectively, to the municipal performance in the education area, with the tendency of municipalities to have better fiscal results and with the quality of public spending. In these studies, the authors identified that mayors with greater political experience necessarily presented better performances in these respective areas, thus proving an equally interesting variable to verify its influence on the probability of rejection of municipal accounts. Thus, this study increases the use of the political experience variable as a possible influence on the probability of rejection of municipal government bills, making it possible to formulate the following research hypothesis.

H1: municipalities are less likely to have their accounts rejected when the mayor has more political experience.

Studies such as Milanezi and Monte-Mor (2017), Revorêdo and Silva (2005), and Velten (2015) researched, respectively, in the municipalities of Espirito Santo, Pernambuco, and again Espírito Santo, the variable gender of the mayor concerning its influence on the rejection of municipal accounts, considering in its results that the fact that the mayor is male has a greater influence on the probability of rejection of municipal accounts than when the management is a female mayor. In this sense, given this set of empirical evidence, this research formulated the following research hypothesis.

H2: municipalities where the mayor is male are more likely to have their accounts rejected.

As with the gender variable, the age variable was also studied in studies by Milanezi and Monte-Mor (2017), Revorêdo and Silva (2005), and Velten (2015), where the authors observed a positive relationship between older ages of mayors and the probability of rejection of bills. Thus, based on this empirical evidence, this study formulated the following research hypothesis.

H3: municipalities are more likely to have their accounts rejected when the mayor is older.

Revorêdo and Silva (2005) studied the mayor's ideological spectrum variable in Pernambuco municipalities, showing that mayors more focused on the ideological spectrum of parties considered of the right are more likely to have their bills rejected. Given this evidence, this study formulated the following research hypothesis.

H4: municipalities governed by mayors with a right-wing ideological spectrum are more likely to suffer the rejection of their accountability.

The studies by Milanezi and Monte-Mor (2017) and Velten (2015) also verified the variable level of education or level of schooling of the mayor concerning its influence on the rejection of government accounts, identifying results that suggest that the higher the degree education, the mayor's schooling, the lower the probability of bill rejection. This set of evidence made it possible to formulate the following research hypothesis.

H5: mayors with higher education are less likely to have their accounts rejected.

Milanezi and Monte-Mor (2017) and Velten (2015), in addition to researching the influence of variables from the mayor's profile, also studied the influence on the probability of

rejection of municipal government accounts through variables related to the socioeconomic characteristics of the Municipalities, the which, verified whether the financial performance index of the Municipality, given by the ratio between revenues and expenses, also had influence in this rejection of accounts, where the results suggested that the higher the result of this index, the less likely the court rejects the accounts of mayors. In this way and based on these empirical studies, this research makes the following research hypothesis.

H6: municipalities with higher levels of financial performance are less likely to suffer rejection of accountability.

Milanezi and Monte-Mor (2017) and Revorêdo and Silva (2005) included in their studies the verification of the variable Gross Domestic Product (GDP) per capita as a determinant of the probability of rejection of municipal government accounts, finding a negative relationship for this, that is, the higher the GDP per capita of the municipality, the lower the probability of rejection of municipal accounts. Thus, given the empirical evidence discussed above, this research formulated the following research hypothesis.

H7: municipalities with higher levels of per capita wealth are less likely to be rejected in the rendering of accounts presented by the executive branch.

The study of Revorêdo and Silva (2005) also verified whether the variable revenue from the Municipality Participation Fund (MPF) influenced the rejection of government accounts. This variable was used in this study to measure, in particular, the economic independence of the federative unit concerning the central government and its capacity to generate revenue. The research obtained results indicating that the greater this type of revenue in the municipality, the greater the probability of rejection of the bills. In this context, this study formulated the following research hypothesis.

H8: municipalities with higher volumes of revenue collection from the MPF are less likely to be rejected in the rendering of accounts presented by the executive branch. The studies by Milanezi and Monte-Mor (2017), Revorêdo and Silva (2005), and Velten (2015) also verified the population variable as a determinant of the probability of rejection of municipal government accounts, in which, for the most part, the results suggested that the larger the population of the municipality, the greater the probability of rejection of municipal accounts when judged by the court of accounts. Thus, based on this empirical evidence, this study formulated the following research hypothesis.

H9: municipalities with larger populations are more likely to suffer the rejection of accountability.

The study by Milanezi and Monte-Mor (2017) verified whether the variable Firjan Index of Municipal Development (IFDM), which captures the effects of Employment and Income, Education, and Health in Municipalities, is a determinant in the rejection of municipal accounts when judged by the court of bills. For this variable, the relationship found in the study was negative. The higher this index, the lower the probability of rejection of municipal bills. Thus, based on this evidence, this study formulated the following research hypothesis.

H10: municipalities with higher levels of municipal development in employment, income, education, and health are less likely to suffer bill rejection.

3 METHODOLOGY

A list was collected on the TCE/PE website to answer the research question, and it contained 1,892 municipal accounts judged as approved or rejected from all 184 municipalities in Pernambuco between the years 2005 and 2016, characterizing the judged accounts of the cycle of political elections held in 2004, 2008 and 2012. The time cut of the research took into account that the rendering of accounts for the most recent years still lacks a complete analysis by the TCE/PE; that is, most of them still do not have a prior opinion issued by the TCE/PE suggesting the rejection or approval of these accounts, while the period analyzed showed a

significant rate of approximately 86% of accounts judged concerning the universe of accounts possible to be judged in this period.

Using the statistical software Stata, in its version 16, the hypotheses raised in this research were tested regarding their influence on the probability p of rejection of the municipal accounts judged by the TCE/PE. This study uses binary logistic regression with fixed effects of time and region. Equation (1) demonstrates the calculation of the probability of an event, and equation (2), the regression model used in the study.

$$p = \frac{1}{1 + e^{-Z}} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_{1itj} + \beta_2 X_{2itj} + \dots + \beta_k X_{kitj})}}$$
(1)

According to Woodridge (2010), after some mathematical procedures known as logistic transformation, it is possible to arrive at equation (2), where the vector of variables X in equation (1) is represented by the independent and control variables on the side right side of equation (2) and the probability of rejection is represented by the dichotomous variable $RejeitTCE_{iti}$.

 $Z = RejeitTCE_{itj} = \beta_0 + \beta_1 exp_polit_{itj} + \beta_2 gender_{itj} + \beta_3 age_{itj} + \beta_4 ideology_{itj} + \beta_5 instruc_{itj} + \beta_6 fin_perf_indx_{itj} + \beta_7 GDPpc_{itj} + \beta_8 RMPF_pc_{itj} + \beta_9 pop_{itj} + \beta_{10} IFDM_{itj} + \beta_{10} IFDM_{itj}$

$$\varepsilon_{itj}$$
 (2)

Where i = 1, 2, ..., 184, indexes the municipalities of Pernambuco and *t* represents the years from 2005 to 2016, and *j* represents the administrative regions to which municipality *i* belongs. The dependent variable RejeitTCE_{itj}, rejection of the account by the TCE/PE was collected on the website of the respective court through the Tome Conta tool, which provided access to the list of mayors who had their accounts approved and rejected in the cut-off period of the research. It is a dichotomous variable, considering that it assumes only two possible

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values for this study were defined as 0 (zero) for the status of approved accounts and 1 (one) for rejected accounts.

In order to improve the efficiency of the estimators and the statistical inference of the estimated parameters, the existence of heteroscedasticity in the data was verified using the Breusch and Pagan test, which has the null hypothesis that the variance of the error terms is constant. Then, the existence of multicollinearity between the independent variables of the model was verified through the Variance Inflation Factor (VIF) test, where variables that present a VIF value greater than ten present multicollinearities, which can compromise the estimates obtained from the model parameters proposed above (Gujarati & Porter, 2011).

The exp_polit variable is a discrete variable represented by the years the mayor has been in politics holding political office. Their values were collected in the Superior Electoral Court (TSE) database.

The gender variable is dichotomous, assuming the value 0 (zero) for males and 1 (one) for females, being collected in the TSE database.

The age variable, again collected in the TSE database, is a discrete variable represented by the manager's age on the date of delivery of the municipal accounts for each fiscal year judged by the TCE/PE.

The variable ideology is dichotomous, representing the ideological spectrum of the party that is more toward the left, assigning it the value 0 (zero), and the ideological spectrum of the party that is more toward the right, assigning it the value 1 (one)—variable collected again from the TSE database.

The variable instruc, collected from the TSE database, is a categorical variable represented by the value 1 (one), encompassing the education levels Read and write, Incomplete Elementary School and Complete Elementary Education, 2 for the Incomplete High School

education levels, Complete High School and Incomplete Higher Education and 3 for Complete Higher Education.

Fin_perf_indx is a continuous variable obtained by the ratio between the budget revenue collected by the committed budget expenditure. Values closer to 1 indicate a greater balance between income and expenditure and, consequently, better allocation of funds collected. Its values were obtained through the database available on the FINBRA (Finances of Brazil) portal of the National Treasury (for data from 2005 to 2012) and on the Brazilian Public Sector Accounting and Tax Information System – SICONF (for data from 2013 to 2016), which contains data on revenue collected and expenditure committed by the Municipalities.

The GDPpc is a continuous variable representing the monetary values of municipal Gross Domestic Product divided by the number of inhabitants of the respective Municipalities. Its values were obtained through the database available on the State Agency of Planning and Research website of Pernambuco - Condepe Fidem.

RMPF_pc is a continuous variable represented by monetary values related to the Participation Fund of the Municipalities divided by the number of inhabitants of the respective Municipalities. The division by the number of inhabitants increases the analysis capacity of the variable, considering the dispersion of the actual values between the Municipalities. Its data were collected through the database made available by the FINBRA (Finances of Brazil) portal of the National Treasury (for data from 2005 to 2012) and in the Brazilian Public Sector Accounting and Tax Information System – SICONF (for data from 2013 to 2016).

The pop, collected from a database on the Brazilian Institute of Geography and Statistics (IBGE) website, represents the number of inhabitants per municipality. The IFDM variable, collected from the Firjan system database, is a continuous variable represented by values ranging from zero (0) to one (1), and the closer to 1, the better the development of the location in terms of refers to the Employment and Income, Education and Health.

In Table 1, a summary table of the variables used in this study is presented, as well as

the expected relationship of the variables on the probability of rejection of municipal bills.

Table 01

Variables related to the probability of rejection of municipal bills

Variable	Proxy	Expected relationship with the probability of rejection of accounts	Source
exp_polit	Mayor's political experience	The higher, the less likely the accounts will be rejected	Avellaneda (2009), Freier e Thomasius (2016) and Modes (2012)
gender	Mayor's gender	If male, he is more likely to reject accounts	Revorêdo e Silva (2005), Velten (2015) and Milanezi e Monte- Mor (2017)
age	Mayor's age	The higher, the greater the probability of rejection of the accounts	Revorêdo e Silva (2005), Velten (2015) and Milanezi e Monte- Mor (2017)
Ideology	Ideological spectrum of the mayor	If from the right-wing political spectrum, the greater the probability of rejection of accounts	Revorêdo e Silva (2005), Milanezi e Monte-Mor (2017)
Instruc	Level of Education/Level of education of the mayor	The higher, the less likely the accounts will be rejected	Velten (2015) and Milanezi e Monte-Mor (2017)
fin_perf_indx	Municipal budgetary/financial performance	The higher, the less likely the accounts will be rejected	Velten (2015) and Milanezi e Monte-Mor (2017)
GDPpc	Wealth of the municipality by the number of inhabitants	The higher, the less likely the accounts will be rejected	Revorêdo e Silva (2005), Milanezi e Monte-Mor (2017)
RMPF_pc	Income from the Participation Fund of Municipalities per capita	The higher, the greater the probability of rejection of the accounts	Revorêdo e Silva (2005)
рор	Size of the Municipality's population	The higher, the greater the probability of rejection of the accounts	Revorêdo e Silva (2005), Velten (2015) and Milanezi e Monte- Mor (2017)
IFDM	Firjan Human Development Index (IFDM)	The higher, the less likely the accounts will be rejected	Milanezi e Monte-Mor (2017)

Source: Prepared by the authors.

4 SEARCH RESULTS

In order to know the main characteristics of the sample concerning the judged accounts, the profile variables of the mayors, and the socioeconomic characteristics of the Municipalities, Table 2 presents the descriptive statistics of these data.

Table 02

Descriptive statistics of the variables judged accounts, the profile of mayors, and socioeconomic characteristics of municipalities.

Variables	Average	Reading metrics	D. Standard	Min	Max
TCE	0.377	%	0.485	0	1
Exp_polit	4.643	Years	2.883	1	13
Gender	0.0803	%	0.272	0	1
Age	50.24	Years	10.16	22.28	83.08
Ideology	0.649	%	0.477	0	1
Instruc	2.295	Category	0.719	1	3
fin_perf_indx	1.01	Index	0.103	0.131	2.255
GDPpc	6.539	Value	5.868	1.844	86.892
RMPF_pc	521.6	monetary	230.1	57.73	1.937
Рор	42.160	Population	110.437	3.681	1.54E+06
IFDM	0.564	Index	0.087	0.284	0.791
Number of observations: 1.892					

Source: Prepared by the authors based on research data.

The results presented in Table 2 demonstrate that, on average, approximately 38% of the accounts judged between 2005 and 2016 by the TCE/PE were rejected. The political experience of mayors is, on average, 4.6 years. It is also verified that only 8% of the city halls are commanded by female mayors, and the average age of the mayors was 50 years old, with a minimum of 22 years and a maximum of 83 years. The ideological spectrum of mayors pointed out that approximately 65% of these are from right-wing parties. The level of education indicates that most mayors have, on average, incomplete secondary or higher education.

Additionally, the financial performance index was, on average, 1.01; the municipalities are maintaining a balance between their revenues and expenses. However, it is possible to identify in the sample municipalities that obtained financial performance indexes considered very low (0.103) and high (2.255), indicating, respectively, excess expenditure and excess revenue for these Municipalities. The per capita GDP of the sample was, on average, R\$ 6,539.00, with Municipalities presenting a minimum and maximum of R\$ 1,844 and R\$ 86,892, indicating how much less and wealthy Municipalities characterize the sample.

Revenue from the Municipal Participation Fund shows that, on average, municipalities received resources from this type of intergovernmental transfer in the order of R\$ 521.60, with a maximum and minimum of R\$ 57.73 and R\$ 1,937.00, respectively. The average number of inhabitants in the Municipality sample was 42,160 inhabitants, and the Firjan Human Development Index presented an average of 0.564 with a minimum and maximum of 0.284 and 0.791, respectively, indicating a disparity in terms of income, education, health, and employment among the Analyzed municipalities. Table 3 presents the percentage of accounts rejected by the development region of the State.

Table 03

Development Region	Number of Municipalities	Percentage of rejected accounts
Agreste Central	26	28,4%
Agreste Meridional	26	47,2%
Agreste Setentrional	19	28,9%
Mata Norte	19	51,7%
Mata Sul	24	46,6%
Metropolitana	14	26,3%
Sertão Central	8	26,2%
Sertão de Itaparica	7	31%
Sertão do Araripe	10	50%
Sertão do Moxotó	7	42,8%
Sertão do Pajeú	17	26,5%
Sertão do São Francisco	7	37,8%

Percentage of accounts rejected by Pernambuco development region from 2005 to 2016

Source: Prepared by the authors based on research data.

According to Table 3, it is possible to verify that the development regions of Mata Norte, Sertão do Araripe, Agreste meridional, and Mata Sul are the regions that have the most, proportionally, government accounts rejected by the TCE/PE in the period from 2005 to 2016 and that are represented by the darkest areas of the map in Figure 1.

Figure 01

Spatial distribution of the percentage of accounts rejected by the TCE in the accountability of mayors from 2003 to 2016.



Source: Prepared by the authors based on research data (2023).

Figure 02

Temporal trend of the percentage of rejection of accounts by the TCE from 2005 to 2016.



Source: Prepared by the authors based on research data.

In Figure 2, it is possible to verify differences throughout the study period in the percentage of rejection of accounts in the Administrative Regions of Pernambuco, indicating that regional differences can influence the probability that an account rendering will be rejected.

The interpretation of the Logit model results took into account the statistical significance of the variables at the usual levels of 1% and 5% of the p-value and the analysis of the odds ratio of the occurrence of the dependent variable that makes it possible to present the results indicating the estimate of the occurrence of rejection of the mayors' accounts when there is an increment of one unit in each explanatory variable of the proposed model, as well as in percentage terms of probability of occurrence of this rejection (Fernandes et al., 2021).

Table 4 shows the result of the Logit model estimation for data from the accounts judged for the municipalities of Pernambuco from 2005 to 2016. First, a linear probability model was estimated using the Ordinary Least Squares (OLS) method, column (1) of Table 4, and the Variance Inflation Factor (VIF) test was performed, whose value was less than 5, indicating that there are no multicollinearity problems in the proposed model. The Breusch and Pagan heteroscedasticity test was also performed, where the null hypothesis of constant variance of the error term was rejected, indicating a heteroscedasticity problem in the data. In this way, the subsequent models, LOG1 and LOG2, were estimated with correction for heteroscedasticity through White's robust heteroscedasticity estimators (Gujarati & Porter, 2011).

Estimating the econometric model by OLS is not an acceptable way to estimate the probabilistic model due to the characteristic of the dichotomous dependent variable (Gujarati & Porter, 2011). Thus, the Logit model was estimated, as it considers the non-linear nature of the dependent variable, and the results of the estimates are shown in columns (2) and (3) of Table 4. In column (3), we added the fixed effects of time and region of development.

The Akaike and Schwartz model selection criteria were used to choose the most appropriate model for analyzing the results, where the model that presents the lowest value of these statistics is considered the best model. The Logit model estimated in column (3) presents a lower value for the Akaike (AIC) and Schwartz (BIC) statistics, indicating that this is the best model for interpreting the estimates obtained. This same result can be seen from the Pseudo- R^2

result, which can also be used to select the most appropriate model, where the model that presents the highest Pseudo- R^2 is the most appropriate (Wooldridge, 2010).

Table 04

Estimation result of the Linear Probability and Logit models from 2005 to 2016.

	Dependent Variable: <i>dummy=1</i> if the account was rejected			
	(1)	(2)		
Independent variables	OLS	LOGIT1	LOGIT2	
exp_polit	0.0193*** [8]	0.0901***	0.0589**	
	(0.01) [7]	(0.02)	(0.03)	
Instruc2	-0.0348	-0.1428	-0.2074	
	(0.03)	(0.15)	(0.16)	
Instruc3	-0.0879***	-0.3814***	-0.4066***	
	(0.03)	(0.14)	(0.15)	
Gender	0.0612	0.2795	0.1764	
	(0.04)	(0.18)	(0.19)	
Ideology	0.0538**	0.2516**	0.1785	
	(0.02)	(0.11)	(0.11)	
Age	-0.0001	-0.0004	-0.0018	
	(0.00)	(0.01)	(0.01)	
Inpop	-0.0216	-0.1183	-0.3270*	
	(0.03)	(0.12)	(0.17)	
fin_perf_indx	-0.2654**	-1.3131**	-1.6827**	
	(0.11)	(0.65)	(0.70)	
lnRMPF_pc	-0.0362	-0.1802	-0.6856*	
	(0.05)	(0.25)	(0.40)	
lnGDPpc	-0.0091	-0.0466	-0.3568**	
	(0.03)	(0.15)	(0.18)	
IFDM	-0.7647***	-3.3864***	-3.7858***	
	(0.20)	(0.88)	(1.08)	
Note	1860	1860	1860	
Pseudo R2	-	0.03	0.10	
VIF mean[1]	2.23	-	-	
Breusch-Pagan[2]	17.64***	-	-	
AIC[3]	2529.9	2409.4	2279.7	
BIC[4]	2596.3	2475.7	2467.7	
E.F. Time[5]	No	No	Yes	
E.F Region[6]	No	No	Yes	

Source: Prepared by the authors based on research data.

Considering only the analysis of the signs of the regression coefficients, the mayor's years of political experience have a positive relationship with the probability that accountability will be rejected; that is, the greater the political experience, the greater the probability of the account being rejected, this result was statistically significant at the usual 5% significance level. The level of education or education level of the mayors shows a negative relationship with the probability of rejection of accountability, considering its coefficient with a negative sign and a

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statistical significance level of 1%, indicating that cities where the mayor reaches the level Higher levels of formal education, are less likely to have their accountability rejected when compared to lower levels of formal education of these mayors.

With a significance level of 10%, the LOGIT2 regression coefficients show evidence that cities with a larger population have a negative relationship with the rejection of bills by the TCE/PE; that is, the larger the population of a municipality, the lower the probability of the court rejecting its account. Cities managed by mayors that obtained higher financial performance indices are less likely to have accountability rejected since there is a negative and statistically significant correlation of 5% between this variable and the dependent variable. Additionally, the probability of bill rejection decreases in cities with higher GDP per capita and higher IFDM since the results show a negative relationship between these variables and the dependent variable.

In Figure 3, the model's ability to discriminate the dependent variable categories is measured using the Receiver Operating Characteristics (ROC) curve. The model cannot discriminate the explained variable categories if the area under the curve is less than or equal to 0.5. The results show that the LOGIT1 models, panel (A), acceptably discriminate the categories of the dependent variable since the values under the ROC curve were of the order of 0.61. In contrast, the LOGIT2 model, panel (B), discriminates significantly the categories of the dependent variable were good since the value under the ROC curve was around 0.70, indicating a better global efficiency of the econometric model when including the entire set of explanatory variables of the model according to Hosmer & Lemeshow (1989).

Figure 03



ROC curve of the LOGIT1 and LOGIT2 models.

Source: Prepared by the authors based on research data.

Table 5 shows the odds ratios of the variables used in the probability logistic model. By analyzing Table 5, it appears that the odds ratio of an account being rejected by the TCE/PE when the mayor's political experience increases by one year is an increase of 1.060 times. This result is statistically significant and, in percentage terms, indicates that when the mayor's political experience increases by one year, the probability of the account being rejected by the TCE/PE is 6.06% higher, keeping the other variables constant. The level of education was also a statistically significant variable, suggesting that when the mayor reaches the whole higher education level, the chance of bills being rejected is 33.4% lower than those bills provided by mayors with lower levels of formal education.

Equally statistically significant, increases of 1% in their values for GDP per capita cause the probability of rejection of the accounts to reduce by 30.1%. For the Municipality's financial performance index, an increase of one unit in this index causes the probability of bill rejection to decrease by 81.5%. Regarding the Firjan Index of Municipal Development, adding one-tenth of a unit to the IFDM reduces the probability of rejection of the rendering of accounts by 9.8%. Furthermore, with significance only at 10%, the probability of an account being rejected decreases by 28% when there is a 1% increase in the population of the Municipalities. Finally,

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the variables gender, age, ideology, and MPF per capita did not show statistical significance at the p-value level of 5%.

Table 05

Odds Ratio of rejection of municipal accounts judged by the TCE/PE between 2005 and 2016

Dependent variable: <i>dummy</i> = 1 if the account was rejected						
Variables independent	Odds Ratio	Standard Error	Stat. Z	P-value	[95% Conf Interval]	
exp_polit	1.060649	0.030523	2.05	0.041	1.002482	1.122192
Gender	1.192943	0.228609	0.92	0.357	0.819408	1.736757
Age	0.998177	0.005552	-0.33	0.743	0.987354	1.009118
Ideology	1.195458	0.13436	1.59	0.112	0.959106	1.490055
Instruc 2	0.812663	0.126269	-1.34	0.182	0.599312	1.101965
Instruc 3	0.665911	0.101157	-2.68	0.007	0.494438	0.89685
fin_perf_indx	0.185866	0.130703	-2.39	0.017	0.046841	0.737521
lnGDPpc	0.699931	0.127288	-1.96	0.05	0.490069	0.999661
lnRMPF_pc	0.503763	0.200565	-1.72	0.085	0.230853	1.099304
lnpop	0.721057	0.122076	-1.93	0.053	0.517441	1.004798
IFDM	0.022691	0.024443	-3.51	0.00	0.002748	0.187395
Number of observations: 1.860						

Source: Prepared by the authors based on research data.

4.1 Discussion of Results

Based on the results presented and taking into account the studies by Avellaneda (2009), Freier and Thomasius (2016), and Modes (2012), who found positive relationships between greater political experience and results of mayors concerning municipal performance in the education area, fiscal performance and better quality of public spending in the Municipalities, respectively, it is possible to conclude that, although the comparison does not have as a dependent variable the rejection of municipal accounts in all surveys, it was expected that mayors with greater political experience would decrease the probability of these bills being rejected, a fact that did not occur in this research, therefore, hypothesis H1 is rejected that the greater the political experience of the mayor, the lower the probability of rejection of the bills judged by the TCE/PE. This result also makes it possible to carry out some additional questions that could be answered with other research, such as, for example, what would be the causes that make more experienced politicians unable to efficiently manage municipal public resources, causing their bills to be rejected by the TCE /PE?

The gender variable was not statistically significant, which leads to the rejection of the H2 hypothesis established in the literature that being male increases the probability of rejection of municipal bills, thus making it impossible to carry out a comparison with the results found in the studies by Milanezi and Monte-Mor (2017), Revorêdo e Silva (2005) and Velten (2015).

Equally statistically insignificant is the age variable, which allows us to reject hypothesis H3 established in the literature that municipalities where the mayor is older are more likely to have their rendering of accounts rejected, thus making it impossible to carry out a comparison with the results found in studies by Milanezi and Monte-Mor (2017), Revorêdo and Silva (2005) and Velten (2015).

For the ideological spectrum variable, we again obtained a result of statistical insignificance, allowing us to reject the hypothesis H4 assigned to it that municipalities governed by mayors with a right-wing ideological spectrum are more likely to suffer the rejection of their accountability. This result makes it impossible to compare with the study by Revorêdo and Silva (2005), used as a reference for establishing the hypothesis.

The result of the variable level of education corroborates the results found in the research by Milanezi and Monte-Mor (2017) and Velten (2015), making it possible to accept hypothesis H5 that the higher the level of education of the mayor, the lower the probability of rejection of the accounts. This result is relevant in demonstrating that more qualified public managers with a higher level of formal education, especially when reaching a higher level of education, tend to have their accounts approved or, analogously, better manage public resources.

For the variable financial performance index, its results could provide acceptance of hypothesis H6, which established that the greater the budgetary/financial performance of the Municipality, the lower the probability of rejection of the accounts, corroborating the results found by Milanezi and Monte-Mor (2017) and Velten (2015). This result demonstrates the importance of the public manager balancing revenues and expenses and using public resources efficiently.

For GDP per capita, the results found corroborate the results of studies by Milanezi and Monte-Mor (2017) and Revorêdo and Silva (2005) that the higher the GDP per capita, the lower the probability of rejection of the accounts, causing that it is possible to accept hypothesis H7 that municipalities with higher levels of per capita wealth are less likely to be rejected in the rendering of accounts presented by the executive branch. This result also makes it possible to infer that municipalities with greater dynamics and economic performance in producing goods and services tend to have their accounts approved.

The variable Participation Fund of Municipalities per capita proved to be statistically insignificant, making comparisons with the study by Revorêdo and Silva (2015) impossible and allowing the rejection of hypothesis H8 that municipalities with higher volumes of revenue collection from the MPF are less likely to having rejection in the rendering of accounts presented by the executive power.

The results presented for the population variable of the Municipalities contrast with the results found in the studies by Monte-Mor (2017), Revorêdo and Silva (2005), and Velten (2015) that the larger the population of the Municipality, the greater the probability of rejection of the accounts, therefore, hypothesis H9 is rejected. This result is interesting because it infers that even in large metropolises, managing public resources with quality can be a reality in the face of great population demand.

Finally, the results presented for the IFDM variable corroborate the results found in the research by Milanezi and Monte-Mor (2017), making it possible to accept hypothesis H10 that the higher the IFDM, the lower the probability of rejection of the accounts. This result demonstrates the importance of having high rates related to employment, income, education, and health in municipalities.

5 FINAL CONSIDERATIONS

This article aimed to verify the factors influencing the rejection probability of government accounts judged by the Pernambuco State Audit Court – TCE/PE.

The main results suggest that political experience and education level are the most determinant factors to influence, respectively, increasing and decreasing the probability of rejection of municipal government accounts. Concerning the variables related to the socioeconomic characteristics of the Municipalities, the most significant statistics suggest that an increase in the Financial Performance Index of the Municipality, in the GDP per capita, in the population, and the IFDM decrease the probability of rejection of the judged government accounts by TCE/PE.

These results represent a scientific contribution about which profiles of mayors and socioeconomic characteristics of municipalities are desirable to seek to reduce the number of rejected bills. Furthermore, it contributes towards giving greater solidity to the literature on factors that determine the rejection of accounts by the State Audit Courts.

As the main limitations of the research, there is the restricted quantitative use of profile variables of mayors and socioeconomic characteristics of the Municipalities, the universe of Municipalities being only from the state of Pernambuco, and the time cut defined for accounts judged by the TCE/PE that was between the years 2005 to 2012.

In this sense, for future research, it is proposed that a more in-depth study be carried out to identify new variables that may be the object of analysis as determining factors in the rejection of municipal government bills, such as, for example, new profile variables of the mayors such as their marital status or occupation, as well as new variables that represent socioeconomic indices of municipalities such as the Municipal Human Development Index -IDHM.

The spatial dimension can also be considered for a greater scope of analysis in more than one State, States with a more significant number of Municipalities or in geographic regions, as well as the expansion of the temporal aspect, which can be the object of analysis in a larger amount of political cycles older than 2004 and more recent than 2012. The research also allows the observation and choice of other methods or econometric models that best fit the characteristics of the dependent and independent variables and their proposed relationships.

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NOTES

1 VIF - Variance Inflation Factor

2 Breusch-Pagan heteroscedasticity test

3 AIC – Akaike model selection criterion

4 BIC – Schwarz's model selection criteria

5 E. F. Time - vector of dummy variable from year k that is equal to one (1) if it is from year k and zero (0) otherwise, where k takes values between 2016 to 2018

6 E. F. Region – dummy variable vector that represents the development region of the ith municipality. It assumes a value equal to one (1) if it belongs to region g and zero (0) otherwise. g represents the development regions: Agreste Central, Agreste Meridional, Agreste Norte, Mata Norte, Mata Sul, Metropolitana, Pajeú, Sertão Central, Sertão de Itaparica, Sertão do Araripe, Sertão do Moxotó, Sertão do São Francisco

7 Standard error in parentheses

8 * p<0.10, ** p<0.05, *** p<0.01

Fatores que Influenciam a Probabilidade de Rejeição das Contas de Governo dos Municípios **Pernambucanos**

RESUMO

Objetivo: Verificar quais são os fatores que influenciam a probabilidade de rejeição das contas de governo julgadas pelo Tribunal de Contas de Pernambuco (TCE/PE).

Método: Utilizou-se regressão logística para verificar a probabilidade de ocorrer rejeição das contas de governo com base no perfil dos prefeitos e características socioeconômicas dos Municípios.

Originalidade/Relevância: Essa pesquisa inova ao testar variáveis que possibilitam auxiliar prefeitos e sociedade a observar quais características dos gestores públicos e dos municípios são um perfil desejado para que se busque diminuir o quantitativo de contas rejeitadas, fomentando boas práticas de governança e uma maior participação do controle social na utilização dos recursos públicos.

Resultados: Os achados sugerem que a experiência política e o nível de escolaridade são os fatores que mais influenciam, respectivamente, aumentando e diminuindo, a probabilidade de rejeição das contas de governo dos Municípios. No que se refere às variáveis relacionadas às características socioeconômicas dos Municípios, os resultados sugerem que um aumento do Índice de desempenho financeiro do Município, do PIB per capita e do Índice de Desenvolvimento Municipal Firjan, diminuem a probabilidade de rejeição das contas de governo julgadas pelo TCE/PE.

Contribuições Teóricas/Metodológicas: Contribui ampliando o rol de pesquisas sobre o tema, analisado sob a ótica de uma metodologia quantitativa, explorando novos resultados com uma amostra local e inferindo possibilidades de identificar fatores que influenciam na rejeição de contas.

Palavras-chave: TCE/PE, Perfil dos prefeitos, Características socioeconômicas dos Municípios, Rejeição de contas.

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Recebido: Fevereiro 23, 2023 Revisado: Junho 13, 2023 Aceito: Junho 13, 2023 Publicado: Julho 31, 2023



Revista Contabilidade, Gestão e Governança. Brasília, V.26 N.1, p. 121-152, Jan.-Apr. 2023 151

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