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Factors Influential on the Levels of Brazilian Municipal Transparency

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ABSTRACT

Objective: to investigate which variables comprise the three sets of transparency influencers for Brazilian municipalities with low, medium, and high levels of transparency. **Methods:** a quasi-Cauchy quantile regression model was used, where the 0.75, 0.50, and 0.25 quantiles of transparency represented the groups of municipalities with high, medium, and low levels of transparency, respectively. **Results:** three sets of 13, 16, and 14 variables impact the transparency of Brazilian municipalities with high, medium, and low levels of transparency, respectively. The variables gender, experience, and education of the mayor, difficulty in accessing the internet, economic development, and state political strength of the local administration influence only specific levels of transparency. **Conclusions:** the research brings important theoretical implications by refuting the prevailing assumption in the literature that a single set of variables impacts all levels of transparency. Among the practical contributions, audit courts can use negative influences as red flags to profile municipalities that tend to be less transparent, enabling preventive guidance. Furthermore, this article's methodological design is replicable in investigations of influencers of transparency in governments in other countries.

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INTRODUCTION

The paradigm of transparency in public administration was forged by the emerging democratic ideology in the second half of the 20th century. Timely and relevant information would optimize accountability, enable external oversight, and foster social participation (Gramacho, 2025). Currently, information disclosure is a legal imperative in democracies, and national and subnational governments use this expedient to legitimize their administrations (Annisa & Murtini, 2018; Fenner et al., 2022; Ott et al., 2019; Sun & Andrews, 2020). However, due to varying levels of transparency among municipalities within the same country, researchers have grown interested in identifying the drivers of municipal transparency.

This line of research has investigated which variables impact the transparency of local governments in countries such as Portugal, the United States, Indonesia, South Korea, Spain, and Brazil (Baldissera et al., 2023; Hong, 2020; Kang & Chen, 2022; Ríos et al., 2019; Tejedo-Romero & Araujo, 2023; Yuniarta & Purnamawati, 2020). The results differ, even among studies evaluating municipalities within the same country. The number of inhabitants, GDP per capita, total asset value, percentage of the elderly population, and the financial dependence of municipalities are examples of factors whose influence on transparency is not well defined in terms of the existence and direction of their effects.

International research has identified positive (Brás & Dowley, 2021; Ribeiro et al., 2017), negative (Tejedo-Romero & Araujo, 2023), and null (Tavares & Cruz, 2020) influences of the number of inhabitants on the transparency of Portuguese municipalities. In Indonesia, Yuniarta and Purnamawati (2020) indicate that the higher the value of assets, the more transparent local governments tend to be, while Adiputra et al. (2018) and Annisa and Murtini (2018) find no significant effects of this variable. The impact of the proportion of elderly people on municipal transparency also varies between positive (Tejedo-Romero & Araujo, 2023) and negative (Martinho et al., 2023) in Portugal.

The divergences between the results extend to the national literature. Although Batista et al. (2022) and Herman et al. (2022) suggest that municipal GDP per capita positively impacts the transparency of Brazilian municipalities, Lopes et al. (2020) identified negative effects, and Pagliari et al. (2020) and Silva and Bruni (2019) found no significant effects. Differences are also identified in relation to other variables, such as population (Araujo et al., 2020; Baldissera et al., 2023), financial dependence (Araujo et al., 2020; Mota et al., 2017; Romero & Mello, 2021), and political competition in municipalities (Baldissera et al., 2023; Diniz et al., 2020; Fenner et al., 2022).

This empirical literature, with such inconsistent results, hinders the development of robust theoretical arguments that clarify the dynamics of these variables' influence on local government transparency (Gramacho, 2025). Across these studies, a common gap is observed that would help explain such divergences: analyses of the effects of influencers are restricted to a conditional average of transparency. This limitation stems from the use of econometric models that disregard the possibility of a variable asymmetrically affecting transparency across its distribution. Thus, a single set of variables would impact all levels of local government transparency. This implies that managers — those responsible for transparency — would have the same incentives to disclose information, regardless of their municipalities' transparency levels. If this is not confirmed in practice, the results of this literature may be biased.

Considering that different levels of transparency may represent groups of municipalities with diverse transparency cultures, it is suggested that some variables may influence only certain levels. Thus, to fill this critical gap in the literature on the topic, in the Brazilian context, the following question emerges: Which variables comprise the three sets of influencers of transparency in Brazilian municipalities with low, medium, and high levels of transparency? Therefore, the objective of this study is to identify the factors that impact these three levels of transparency in Brazilian municipalities.

LITERATURE REVIEW AND RESEARCH HYPOTHESIS

Public transparency

The term 'transparency,' which originated in the 15th century and is not related to its current meaning in public administration, has a conceptual extension that can lead to inaccuracies regarding the idea it seeks to represent and the meaning generated in the mind of the recipient. The different categories and classifications of transparency proposed by Michener and Bersch (2011) and Heald (2006), presented in Table 1, demonstrate the breadth of this concept.

Table 1. Categories, classifications, and meanings of transparency.

Categories	Classification	Meaning
Vertical	Descendant	Flow of information from top (bosses/managers) to bottom (subordinates/managed).
	Ascendant	Bottom-up information flow.
Horizontal	Exterior	Flow of information from the organization to the external environment (society, parliament, press, etc.).
	Interior	Intra-organizational information flow.
Focus	Events	Information on specific events that can be directly observed (fait accompli).
	Processes	Information on the stages and internal routines of policy formulation and implementation (trajectory and dynamics).
Time	Retrospect	Information made available after decisions and actions have been completed.
	Real time	Information made available as decisions or actions are taking place.
Initiative	Passive	Information made available to fulfill a request.
	Active	Information disclosed at the organization's initiative, whether legally or voluntarily.
Quality	Nominal	All information provided.
	Effective	Information made available that allows recipients to properly process, understand, and use it.
Features	Visibility	Public, accessible, and complete information.
	Inference	Information that provides the recipient with knowledge to draw reasonable conclusions and make rational decisions.

Note. Source: Based on Michener, G., & Bersch, K. (2011). Conceptualizing the quality of transparency. *Political Concepts, 49*, 1 — 27. http://www.concepts-methods.org/Files/WorkingPaper/PC_49_Michener_Bersch.pdf and Heald, D. (2006). Varieties of transparency. In C. Hood & D. Heald (Eds.), *Transparency: The key to better governance?* (pp. 24-43). Oxford University. https://doi.org/10.5871/bacad/9780197263839.003.0002

Based on Table 1, it is possible to define the intended concept of transparency and enable a more objective and rational analysis. Public transparency — essential to democracy because it promotes accountability of government officials, external oversight, and social participation — can be classified primarily as top-down and external. Regarding focus and timeframe, although the classifications are not mutually exclusive, public transparency of events and retrospective transparency are more common. Furthermore, accountability in the public sector is expected to encompass active and passive transparency, as well as the characteristics of visibility and inference. It should be noted that the mere provision of information (nominal transparency) is insufficient to promote effective public transparency.

In this context, given its democratic nature, public transparency is an important legitimizing instrument used by national and subnational governments (Annisa & Murtini, 2018; Birskyte, 2018; Fenner et al., 2022; Sun & Andrews, 2020; Ott et al., 2019). Legitimacy theory assumes that organizations are embedded in a social environment with established rules, beliefs, and values, where citizens generate a set of expectations regarding how organizations operate (Dias et al., 2012). Thus, in countries with a democratic culture, managers would have incentives to disclose information and increase/maintain their legitimacy before citizens.

Among studies of transparency as a tool for legitimizing subnational governments, one line of research has sparked the interest of researchers in several countries. The aim is to understand which factors influence local government transparency. One justification for this line of research is the identification of different levels of transparency among municipalities subject to the same legal requirements for disclosing information (Birskyte, 2018; Sun & Andrews, 2020; Tavares & Cruz, 2020). That is, the legal imperative alone would not be sufficient to explain these levels of transparency.

In Brazil, legislation is also insufficient to explain municipal transparency levels. Complementary Law 101/2000 (Lei Complementar n. 101, 2000) was a milestone in the quest for a more transparent public administration. Subsequently, Complementary Law 131/2009 (Lei Complementar n. 131, 2009) and the Access to Information Law 12,527/2011 (Lei n. 12.527, 2011) increased the demand for government information disclosure to society. Although these laws are valid nationwide, transparency levels vary widely across municipalities (Herman et al., 2022; Silva & Bruni, 2019). Thus, it is possible to suggest that extralegal factors also influence the transparency levels of Brazilian local governments.

The influencers of local government transparency

Given the variation in transparency levels among municipalities subject to the same legal requirements, and ruling out the hypothesis that such heterogeneity is due solely to randomness, it remains to consider what other factors may contribute to explaining these differences. Such factors would be those that influence municipal transparency (Baldissera et al., 2020; Gramacho, 2025; Waheduzzaman & Khandaker, 2022). Although some studies use the term 'determinants' (Araujo et al., 2020; Baldissera et al., 2023; Bastida et al., 2020; Birskyte, 2018), it is important to consider that the statistical models used work with confidence intervals, indicating that the estimated effects are probabilistic, not deterministic. This semantic load may convey a notion of causal precision that is unsupported, given the complexity of the concept of transparency and the variability of empirical results in the literature. It is understood that the term 'influential' recognizes that certain factors can favor or inhibit transparency without reducing the phenomenon to deterministic relationships.

The influencers of local government transparency can be classified as internal or external. Internal variables refer to characteristics of municipal management, such as financial autonomy, debt, administrative capacity, and complexity (Annisa & Murtini, 2018; Brás & Dowley, 2021; Ott et al., 2019; Shin et al., 2020). To the extent that they are part of the government's decision-making dynamics, the profile of managers — age, gender, education, and political ideology — can also be considered internal variables (Araujo et al., 2020; Silva & Bruni, 2019; Possamai & Schindler, 2017). External variables refer to conditions and pressures external to the government, such as electoral participation, and the wealth and education of citizens (Baldissera et al., 2023; Fenner et al., 2022). Factors can also be classified by demographic, social, economic, accounting, political, and institutional dimensions (Baldissera & Dall'Asta, 2020; Sun & Andrews, 2020).

Among these classifications, dozens of variables are identified as influencing local government transparency in an extensive national and international empirical literature. By identifying the variables, their directions, and effect sizes, the authors suggest explanations for how each can influence managers' information disclosure. Table 2 presents this literature through the review conducted by Baldissera and Dall'Asta (2020) and its update promoted in this research.

Table 2. Articles that investigated the influencers of local government transparency.

New literature review		Literature review carried out by Baldissera and Dall'Asta (2020)	
Authors	Code	Authors	Code
Baldissera et al. (2023)	01	Puron-Cid and Bolívar (2018)	55
Tejedo-Romero and Araujo (2023)	02	Fiirst et al. (2017)	56
Thuy and Lim (2023)	03	Guillamón et al. (2011)	57
Martinho et al. (2023)	04	Lowatcharin and Menifield (2015)	58
Batista et al. (2022)	05	Keerasuntonpong et al. (2015)	59
Herman et al. (2022)	06	García-Tabuyo et al. (2015)	60
Kang and Chen (2022)	07	Alcaraz-Quiles et al. (2015)	61
Fenner et al. (2022)	08	Sol (2013)	62
Waheduzzaman and Khandaker (2022)	09	García-Sánchez et al. (2013)	63
Brás and Dowley (2021)	10	Caamaño-Alegre et al. (2013)	64
Santos et al. (2021)	11	Martani and Lestiani (2012)	65
Santos and Machado (2021)	12	Esteller-Moré and Otero (2012)	66
Tavares and Cruz (2020)	13	Cruz et al. (2012)	67
Sun and Andrews (2020)	14	Guillamón et al. (2011)	68
Bastida et al. (2020)	15	Gallego-Álvarez et al. (2010)	69
Hong (2020)	16	Pina et al. (2010)	70
Shin et al. (2020)	17	García and García-García (2010)	71
Tejedo-Romero and Araujo (2020)	18	Serrano-Cinca et al. (2009)	72
Yuniarta and Purnamawati (2020)	19	Gandia and Archidona (2008)	73
Pagliari et al. (2020)	20	Pérez et al. (2008)	74
Araujo et al. (2020)	21	Laswad et al. (2005)	75
Badillo and Corona (2020)	22	Smith (2004)	76
Galli et al. (2020)	23	Giroux (1989)	77
Piña and Avellaneda (2019)	24		
Silva and Bruni (2019)	25		
Ott et al. (2019)	26		
Ríos et al. (2019)	27		
Adiputra et al. (2018)	28		
Birskyte (2018)	29		
Annisa and Murtini (2018)	30		
Tejedo-Romero and Araujo (2018)	31		
Bernardo et al. (2017)	32		
Ribeiro et al. (2017)	33		
Araujo and Tejedo-Romero (2016)	34		
Bearfield and Bowman (2016)	35		
Beblavá et al. (2016)	36		
Tejedo-Romero and Araujo (2015)	37		
Ribeiro and Zuccolotto (2014)	38		
Polo-Otero (2011)	39		
Cruz et al. (2009)	40		
Mata (2022)	41		
Romero and Mello (2021)	42		
Carlos et al. (2021)	43		

(continue)

Table 2. Articles that investigated the influencers of local government transparency. (continuation)

New literature review		Literature review carried out by Baldissera and Dall'Asta (2020)	
Authors	Code	Authors	Code
Baldissera et al. (2020)	44		
Costa et al. (2020)	45		
Lopes et al. (2020)	46		
Nascimento (2020)	47		
Diniz et al. (2020)	48		
Divino et al. (2019)	49		
Brocco et al. (2018)	50		
Kretschmer (2018)	51		
Possamai and Schindler (2017)	52		
Mota et al. (2017)	53		
Avelino et al. (2024)	54		

Note. Prepared by the authors.

The parameters used to review this literature are presented in the Methodology section, as are the 31 explanatory variables extracted from these studies. The studies listed in Table 2 differ regarding the positive, negative, and insignificant impacts of variables such as population, taxes, political competition, and the proportion of elderly individuals. Therefore, there is no consensus on the set of variables that influence local government transparency. In fact, divergences are observed among studies that analyzed municipalities within the same country.

While Brás and Dowley (2021) and Ribeiro et al. (2017) suggest that the larger the population, the more transparent Portuguese local governments tend to be, Tejedo-Romero and Araujo (2023) find negative effects, and Tavares and Cruz (2020) indicate that the variable has no significant effect. While Yuniarta and Purnamawati (2020) point out that the higher the value of assets, the more transparent local governments in Indonesia tend to be, Adiputra et al. (2018) and Annisa and Murtini (2018) suggest that this variable has no significant influence. The direction of the effects of the percentage of the elderly population on the transparency of Portuguese municipalities also presents competing results and explanations across studies (Martinho et al., 2023; Tejedo-Romero & Araujo, 2023).

The national literature also diverges. While Batista et al. (2022) and Herman et al. (2022) suggest that the higher the municipal GDP per capita, the more transparent Brazilian municipalities tend to be, Lopes et al. (2020) find negative effects, and Pagliari et al. (2020) and Silva and Bruni (2019) find no significant effects. Regarding the number of inhabitants, Baldissera et al. (2023) suggest a positive effect, and Araujo et al. (2020) find no effect. The effects of municipalities' financial dependence on transparency vary between positive (Araujo et al., 2020), negative (Mota et al., 2017), and null (Romero & Mello, 2021). Political competition also appears as a positive influence (Baldissera et al., 2023) and as non-influential (Diniz et al., 2020; Fenner et al., 2022).

One of the gaps identified in this literature is the omission of important variables. Some studies failed to consider the age of residents and the region where the municipality is located (Brás & Dowley, 2021; Kang & Chen, 2022), the wealth and education levels of residents (Shin et al., 2020; Waheduzzaman & Khandaker, 2022), municipal political competition (Brás & Dowley, 2021; Sun & Andrews, 2020), and revenue collected (Hong, 2020; Tejedo-Romero & Araujo, 2023). Studies should consider, at least preliminarily, all factors that would help explain transparency. Ignoring relevant variables can lead to specification biases in the econometric model and, therefore, to biased and/or inefficient estimators (Wooldridge, 2010).

The strong theoretical implications arising from the choice of econometric models are another critical gap in this literature. Among the methodological approaches, the studies used traditional linear regressions with cross-sectional (Baldissera et al., 2023; Shin et al., 2020) and panel data (Tejedo-Romero & Araujo, 2023; Thuy & Lim, 2023), two-stage least squares model (Araujo & Tejedo-Romero, 2016; Bastida et al., 2020), logistic (Kang & Chen, 2022; Yuniarta & Purnamawati, 2020), TOBIT (Santos et al., 2021; Silva & Bruni, 2019), Poisson (Bernardo et al., 2017; Fenner et al., 2022), and the generalized method of moments (Brás & Dowley, 2021; Tejedo-Romero & Araujo, 2020). Given that these models limit the analysis of the effects of independent variables to a conditional mean of the dependent variable, they all assume that the impacts of the explanatory variables are strictly equal across all levels of transparency. Thus, a single set of variables would influence all levels of transparency. This premise implies that managers would have the same incentives to disclose information, regardless of the level of municipal transparency. The next subsection discusses the flexibility of this premise.

Development and definition of the research hypothesis

The political-institutional, socioeconomic, demographic, and accounting variables that influence local government transparency levels are associated with changes in citizens' ability and motivation to pressure and demand information (Baldissera & Dall'Asta, 2020). These changes would culminate in greater or lesser incentives for managers to be transparent. However, the literature provides competing arguments explaining the direction of these variables' effects on municipal transparency. Gramacho (2025) develops some of these contrasting arguments related to variables such as financial dependence, debt, and municipal revenue.

In municipalities dependent on intergovernmental transfers, residents would contribute less to local revenue flows, and transfers would not promote the expected well-being for citizens (the flypaper effect). These factors would discourage local governments from disclosing information. Thus, the greater the financial dependence, the lower the municipal transparency. On the other hand, municipal funders — states and the federal government — must monitor the resources provided. In this scenario, more financially dependent municipalities would be required to report or would have a greater incentive to voluntarily be more transparent in order to maintain transfers. Thus, the greater the financial dependence, the greater the municipal transparency. This contradiction, highlighted by Gramacho (2025), offers an explanation for the divergent findings in the literature (Araujo et al., 2020; Mota et al., 2017; Romero & Mello, 2021).

Regarding debt, more indebted governments would be less transparent so that citizens do not reflect on this vulnerability. Nevertheless, the possibility of reducing the cost of interest would encourage more indebted municipalities to disclose financial information. From this perspective, the incentive to disclose information would be lower in less indebted municipalities, given that the signaling cost might not outweigh potential gains obtained from disclosure (Gramacho, 2025). Thus, the opposition of arguments related to municipal debt remains exposed.

Competing arguments can also explain the relationship between revenue and municipal transparency. On the one hand, municipalities with large revenues are expected to be more transparent due to their greater ability to bear the costs of disclosing information. Furthermore, these municipalities offer more services to citizens and face greater pressure to be accountable. In this context, there are greater incentives for administrators to adopt a transparent local government. On the other hand, municipalities with large revenues would face greater political competition. Thus, in the presence of an aggressive local opposition, the information disclosed may be misinterpreted and/or distorted, inhibiting the adoption of a more transparent government (Gramacho, 2025).

These conflicting explanations emphasize the importance of empirical work in selecting the most appropriate theories and arguments (Gramacho, 2025). However, as reported in the previous subsection, there is no consensus in the empirical literature. This reality weakens potential hypotheses that indicate the direction of the variables' effects on local government transparency. In turn, it is plausible to suggest that municipalities be segregated into groups based on their cultural levels of local transparency.

Cultural levels of municipal transparency would be determined by conditions that alter transparency, regardless of the current administration. For example, a higher level of transparency is expected in environments where governments have historically favored transparency, whether through the computerization of public services, widely publicized official websites, or other factors. Conversely, a lower level of transparency is expected in environments where there is a perception that data published on electronic portals are used more by political opponents to launch attacks on local governments than by citizens.

Ribeiro and Zuccolotto (2014) indicate the existence of three levels of transparency by classifying 1,710 Brazilian municipalities with high, medium, and low fiscal transparency performance. It would be unwise to rule out the possibility that some variables influence the transparency of only municipalities at specific levels. The literature's neglect of this possibility explains, to some extent, the divergent results. Segregating transparency indices by quantiles would be a way to identify groups of municipalities with different cultural levels of transparency.

Thus, considering the existence of different levels of transparency among Brazilian municipalities, and in view of the competing theoretical arguments, methodological gaps, and divergences of results in the empirical literature, the following hypothesis (H1) is suggested: Three different sets of variables influence the three groups of Brazilian municipalities with high, medium, and low levels of transparency.

METHODOLOGY

Variables and sample

The dependent variable is municipal transparency (MT). The scores assigned by the Federal Public Prosecutor's Office (MPF) in its evaluation of Brazilian municipalities' electronic portals — published as the National Transparency Ranking — were used as a proxy. The MPF assessed active and passive transparency, as well as items related to international best practices. Table 3 presents the items evaluated in each of these dimensions.

Table 3. Indicators evaluated by the MPF in the National Transparency Ranking (2016).

Dimension	Indicator
General	1 — Does the entity have information about transparency on the internet?
	2 — Does the website contain a content search tool that allows access to information?
Revenue	3 — Is there information about revenue in the last 6 months, including nature, expected value and amount collected?
Expense	4 — Expenses present data from the last 6 months containing: a) Commitment value; b) Settlement value; c) Payment value; d) Beneficiary.
Tenders and contracts	5 — The website presents data from the last 6 months containing: a) Full text of bidding notices; b) Result of bidding notices (one winner is sufficient); c) Full contracts.
	6 — Does the entity disclose the following information concerning bidding procedures with data from the last 6 months? a) Modality; b) Date; c) Value; d) Number/year of the notice; e) Purpose.
Reports	7 — The website presents: a) The financial statements (management report) of the previous year; b) Summary Report of Budget Execution (RREO) of the last 6 months; c) Fiscal Management Report (RGF) of the last 6 months; d) Statistical report containing the amount of information received, attended to and rejected, as well as generic information on the applicants.
	8 — Does the site allow the recording of reports in various electronic, open and non-proprietary formats, such as spreadsheets and text (CSV), in order to facilitate the analysis of information?
Citizen information Service (passive transparency)	9 — Possibility of submitting an access request in person. Is there a clear indication on the website of the operation of a physical Citizen Information Service (SIC)? a) Is the agency indicated? b) Is the address indicated? c) Is the telephone number indicated? d) Is the opening hours indicated?
Electronic citizen information service (passive transparency)	10 — Is it possible to send information requests electronically (e-SIC)?
	11 — Is there a possibility of subsequent monitoring of the request?
	12 — Is the request through e-SIC simple, that is, without requiring identification items from the applicant that make access to information difficult or impossible, such as: sending documents, notarized signature, declaration of responsibility, age of majority?
Disclosure of structure and contact details	13 — Is the registration of the entity's competencies and organizational structure available on the website?
	14 — Does the Portal provide addresses and telephone numbers of the respective units and opening hours to the public?
Good transparency practices	15 — Is there disclosure of individual remuneration by name of the public agent?
	16 — Are daily allowances and tickets published by the name of the beneficiary including the date, destination, position and reason for the trip?

Note. Ministério Público Federal. (2016). *Ranking Nacional de Transparência*. http://combateacorrupcao.mpf.mp.br/ranking

As shown in Table 3, the MPF indicators seek to measure effective transparency. Furthermore, it is the only available index that analyzed all Brazilian municipalities. This allows for a thorough investigation of the influencers of transparency at different levels, justifying the use of the variable.

Regarding the independent variables, the selection was based on the literature review shown in Table 2. Baldissera and Dall'Asta (2020) reviewed articles indexed in the SPELL, Scopus, and Web of Science databases to identify the determinants of public transparency. The authors selected 23 articles that indicated variables influencing local government transparency. This study updated that review based on the same parameters used by Baldissera and Dall'Asta (2020). The results of this new review returned a total of 945 articles. The selection criteria were: (1) investigating variables that influence local government transparency; (2) empirical studies; and (3) not limited to descriptive and/or correlational analyses. Descriptive statistics summarize and organize the data, while correlation analysis only allows measuring the degree of association between two variables. That is, such techniques do not suggest the existence of a functional relationship between variables (Gujarati & Porter, 2011). As a result of this review, 22 articles were selected. From their references, 18 additional studies were identified.

Of the 63 studies identified, 12 analyzed Brazilian municipalities. Given the uniqueness of the Brazilian political, institutional, legal, administrative, and cultural context, further searches were conducted in the national literature. As a result, 14 articles that met the selection criteria were added, totaling 77 studies in Table 2. Based on these articles, Table 4 presents the independent variables, what they seek to capture, the measurement method, the source and base year of the data, as well as the type of expected influence: positive (+), negative (–), or not significant (NS).

Table 4. Presentation of independent variables.

Variable	What are you trying to capture?	Measurement	Source (base year)	Expected influence
Total inhabitants (POP)	Size of the municipality	Estimate of municipal population	IBGE (2016)	(+): 01, 03, 05, 06, 07, 10, 14, 15, 26, 27, 31, 33, 34, 36, 43, 44, 45, 52, 56, 57, 58, 59, 62, 63, 65, 68, 69, 70, 71, 72; (-): 02, 17, 18, 29, 39, 66; NS: 04, 08, 12, 13, 18, 20, 21, 24, 41, 42, 50, 60, 61, 64, 73, 74, 76.
North (N), Northeast (NE), Central-West (CO), and South (S)	Cultural differences in each region	1 if the municipality is in the region and 0 otherwise	IBGE (2016)	(+): 01, 18, 44, 45; (-): 11, 18; NS: 11, 14, 45, 67.
Metropolis (METROP)	Complexity of municipal management	1 if the municipality is part of a metropolis and 0 otherwise	IBGE (2016)	(+): 14, 30; NS: 14, 30, 37, 67.
Age of citizens (IM)	Maturity of citizens	Average age of citizens	Ministério da Saúde (2016)	(+): 25; (-): 13, 51; NS: 58.

(continue)

Table 4. Presentation of independent variables. (continuation)

Variable	What are you trying to capture?	Measurement	Source (base year)	Expected influence
Elderly (IDO)	Aging of the municipal population	Percentage of elderly people in relation to the municipal population	Ministério da Saúde (2016)	(+): 02, 17, 29; (-): 04, 21; NS: 17, 23, 39.
Education of citizens (IFDME15 and IFDME16)	Level of education of citizens	Firjan Municipal Development Index — Education	Firjan (2018, 2021)	(+): 01, 06, 07, 11, 18, 21, 25, 32, 36, 38, 41, 44, 45, 50, 52, 58, 73; (-): 21; NS: 13, 14, 18, 20, 21, 23, 24, 27, 29, 33, 35, 42, 46, 49, 52, 57, 61, 67, 72, 74.
Municipal employment and income (IFDMER15 and IFDMER16)	Employment level and income of residents	Firjan Municipal Development Index — Employment and income	Firjan (2018, 2021)	(+): 01, 02, 08, 15, 18, 26, 27, 33, 34, 35, 37, 38, 42, 46, 47, 50, 52, 58, 59, 64, 65; (-): 07, 20, 57; NS: 04, 23, 26, 32, 36, 41, 45, 56, 61, 62, 63, 68, 70, 75, 77.
Health of citizens (IFDMS15 and IFDMS16)	Health level of citizens	Firjan Municipal Development Index — Health	Firjan (2018, 2021)	(+): 21, 38, 50, 52; NS: 21, 41, 49, 52.
Economic development (PIBpc)	Economic development of the municipality	Municipal gross domestic product per capita	IBGE (2016)	(+): 05, 06, 11, 43, 48, 52; (-): 14, 20, 40, 46, 55; NS: 21, 25, 45, 49, 50, 54, 56.
Internet (NET)	Difficulty accessing the internet	1 if the municipality typology is rural and 0 otherwise	IBGE (2016)	(+): 32; (-): 14, 18, 21, 27, 29, 31, 33, 58, 60, 73; NS: 10, 21, 23, 24, 36, 57, 61, 70.
State political force (FPE)	Political strength of local government at the state level	1 if the mayor is from the same party as the governor and 0 otherwise	TSE (n.d.)	(+): 01, 31, 44; NS: 18, 21, 48, 63, 68.
National political force (FPN)	Political strength of local government at the national level	1 if the mayor is from the same party as the president and 0 otherwise	TSE (n.d.)	(+): 05; (-): 21; NS: 01, 44, 63, 68.
Political views (IPO)[a]	Identify whether the mayor is left-wing	1 if the mayor is left-wing and 0 otherwise	TSE (n.d.)	(+): 02, 05, 10, 15, 24, 31, 62, 64; (-): 34; NS: 13, 15, 16, 18, 23, 27, 33, 39, 44, 48, 51.
Re-election (REE)	Horizon problem	1 if the mayor ran for re-election and 0 otherwise	TSE (n.d.)	(+): 13, 36; (-): 05, 08; NS: 01, 23, 44, 51.
Political competition (CP)	Lack of political competition in the municipality	Percentage point differences between the top two candidates in the municipal elections	TSE (n.d.)	(+): 01, 13, 16, 24, 30, 44, 66; (-): 18, 34, 35, 39, 71, 73; NS: 04, 08, 16, 18, 31, 33, 35, 36, 45, 48, 63, 74, 75, 76.
Voter turnout (CE)	Political engagement of citizens	Percentage of participation in municipal elections	TSE (n.d.)	(+): 06, 08, 39, 72; (-): 02, 04, 17, 18, 29, 34, 37, 51; NS: 07, 09, 13, 17, 18, 23, 27, 33, 52, 62, 64, 68, 73.
Mayor's age (IP)	Mayor's experience	1 if the mayor is over 29 years old and 0 otherwise	TSE (n.d.)	(+): 11; NS: 13, 23, 25, 52.
Mayor's gender (GEN)	Identify if the mayor is female	1 if the mayor is a woman and 0 otherwise	TSE (n.d.)	(+): 13, 21; (-): 08; 15, 27; NS: 15, 21, 23, 24, 34, 52, 54.
Mayor's education (EDU)	Mayor's level of education	1 if the mayor has completed higher education and 0 otherwise	TSE (n.d.)	(+): 35; NS: 13, 23, 25, 35, 52, 54.
Financial dependence (DEPEND)	Level of financial dependence of the municipality	Intergovernmental transfers received divided by total revenue	Secretaria do Tesouro Nacional (s.d.)	(+): 15, 18, 21, 24, 68; (-): 01, 03, 13, 14, 19, 29, 33, 48, 53, 56, 61; NS: 17, 18, 21, 23, 30, 42, 44, 57, 65, 66, 72, 74, 77.
Fiscal pressure (PF)	Municipality's fiscal pressure level	Total taxes collected per capita	Secretaria do Tesouro Nacional (s.d.)	(+): 03, 31, 39, 55; (-): 61, 77; NS: 26, 15, 37, 64.
Fiscal management (IFGF15 and IFGF16)	Quality of the municipality's fiscal management	Firjan Fiscal Management Index — debts, personnel expenses, investments, and liquidity	Firjan (2018, 2021)	(+): 01, 07, 10, 12, 39, 71, 76; (-): 03, 07, 12, 29, 33, 44, 74; NS: 01, 04, 09, 07, 08, 12, 14, 15, 23, 27, 32, 34, 37, 44, 54, 56, 62, 64, 66.
Municipal revenue (RECpc)	Municipal collection capacity	Total revenue per capita	Secretaria do Tesouro Nacional (s.d.)	(+): 09, 25, 32, 38, 41, 49, 59, 67, 68; (-): 11, 29, 46, 56; NS: 20, 21, 24, 42, 74, 75.
Assets (ATIVO)	Size of municipal government	Total value of accounting assets	Secretaria do Tesouro Nacional (s.d.)	(+): 16, 19, 59; (-): 09; NS: 14, 16, 20, 28, 30.

Note. Prepared by the authors. Studies related to each code are listed in Table 2. As some authors perform more than one type of analysis in the same work, some codes present more than one direction of influence. [a] In the IPO variable, the classification of left-wing parties was based on the work of Baldissera, J. F., Dall'Asta, D., Vesco, D. G. D., Scarpin, J. E. & Fiirst, C. (2023). Determinants of public transparency: A study in brazilian local governments. *Public Money & Management, 43*(4), 331-339. https://doi.org/10.1080/09540962.2021.1965390

Note that the reference year for the analysis is 2016. This choice sought to align the databases of the independent variables with the dependent variable, given that the most up-to-date Municipal Transparency Ranking was measured and published by the Federal Public Prosecutor's Office in 2016. The use of data prior to this period is a justifiable exception. Regarding the variables age (IP), sex (GEN), and education (EDU) of mayors in 2016, data from 2012 — the year in which they were elected — were used. The same justification applies to the variables political ideology (IP) and state and national political strength (FPE and FPN), which consider party data from the 2012 elections. It is expected that most of this information from 2012 was maintained in 2016. Furthermore, based on the results of Santos and Machado (2021), one-year lags were considered, on a preliminary basis, for the education (IFDME), health (IFDMS), fiscal management (IFGF), and employment and income (IFDMER) indexes of the municipalities.

The study population encompasses all 5,568 Brazilian municipalities. After 547 exclusions due to missing information on independent variables, the final sample consisted of 5,021 municipalities.

Descriptive analysis of municipal transparency

Selecting the appropriate econometric model requires prior analysis of descriptive statistics. Table 5 presents the minimum and maximum values, mean, median, standard deviation, and first, second, and third quartiles of the TM.

Table 5. Descriptive statistics on municipal transparency (TM) in 2016.

Variable	Minimum	Maximum	Mean	Median	Standard deviation	1º quartile	2º quartile	3º quartile
TM	0.00	1.00	0.54	0.57	0.28	0.34	0.57	0.76

Note. Prepared by the authors.

The TM, measured as a percentage, was rescaled as a continuous variable with a range [0,1]. Municipalities met, on average, approximately 54% of the maximum level of transparency. The TM quartiles suggest different levels of transparency in Brazil. The first group of municipalities did not obtain a TM higher than 0.34. The second group presented a TM between 0.35 and 0.57. The third group had a TM between 0.58 and 0.76. The most transparent municipalities obtained scores above 0.76. Furthermore, 240 and 121 municipalities obtained the minimum and maximum scores, respectively.

Econometric model

Based on the research objective, the identification of extreme TM values, and the distinct realities of municipal transparency levels in Brazil, the most appropriate model is quantile regression (QR). Unlike traditional econometric models, QR allows identifying which independent variables influence the quantiles of interest of the dependent variable, as well as the direction and intensity of this influence. QR also has the advantage of being robust to outliers and relaxing the assumptions of parameter homogeneity, normal distribution, and homoscedasticity of the error term (Koenker & Bassett, 1978).

However, conventional QR is also not suitable when the dependent variable is limited, since it does not restrict inferences to the range of that variable. Thus, given the limitation of TM to the interval [0,1], the quasi-Cauchy quantile regression model emerges as an ideal choice for addressing this problem while maintaining the advantages of QR. The structure of the model is given by (1),

$$tan[\Pi(y_i - 0{,}5)] = x_i^T \beta(\tau) + u_i(1), \quad (1)$$

where y_i is the variable to be modeled, $x_i = (1, x_{i2}, ..., x_{ik})^T$ are the control variables, $\boldsymbol{\beta}(\boldsymbol{\tau}) = (\boldsymbol{\beta}_1(\boldsymbol{\tau}), \boldsymbol{\beta}_2(\boldsymbol{\tau}), ..., \boldsymbol{\beta}_k(\boldsymbol{\tau}))^T$ are the parameters to be estimated, u_i is the error term, $\boldsymbol{\Pi} \in (0, \boldsymbol{\pi})$ is the adjustment parameter of the transformation of y_i, characterizes a family of link functions, and is calibrated on a sample basis via goodness of fit criterion, and tan is the tangent function.

To estimate (1), the method described in (2) is used,

$$\min_{\beta \in R^k} \sum_{i=1}^{n} \rho_\tau\{u_i\}(2), \quad (2)$$

where $\boldsymbol{\rho}_{\boldsymbol{\tau}}$ (u) = u($\boldsymbol{\tau}$ − $1_{\{u<0\}}$) is a weighting function and $1_{\{B\}}$ is an indicator function for set B. Estimates were performed using R software, after installing the 'qcauchyreg' package. Further details on quasi-Cauchy quantile regression can be obtained in Oliveira et al. (2023).

Before generating the regression estimators, the problem of multicollinearity between the independent variables was addressed. To this end, this study used the correlation matrix and variance inflation factor (VIF) analysis techniques, both performed in the R software. In a conservative analysis, correlation matrix and VIF values were considered problematic above 0.9 and 6, respectively. The tests converged, indicating correlation between the following pairs of variables: IFDME15 and IFDME16; IFDMS15 and IFDMS16; IM and IDO. Therefore, the variables IFDME16, IFDMS16, and IDO were excluded. Equation (3) presents the general model.

$$\begin{aligned}\tan[\Pi\ (\text{TM-0.5})] = {} & \beta_0(\tau) + \beta_1(\tau)\text{POP} + \beta_2(\tau)\text{N} + \beta_3(\tau)\text{NE} + \beta_4(\tau)\text{CO} + \beta_5(\tau)\text{S} + \beta_6(\tau)\text{METROP} + \\ & \beta_7(\tau)\text{IM} + \beta_8(\tau)\text{IFDME15} + \beta_9(\tau)\text{IFDMER15} + \beta_{10}(\tau)\text{IFDMER16} + \beta_{11}(\tau)\text{IFDMS15} + \beta_{12}(\tau)\text{PIBpc} \\ & + \beta_{13}(\tau)\text{NET} + \beta_{14}(\tau)\text{FPE} + \beta_{15}(\tau)\text{FPN} + \beta_{16}(\tau)\text{IPO} + \beta_{17}(\tau)\text{REE} + \beta_{18}(\tau)\text{CP} + \beta_{19}(\tau)\text{CE} + \\ & \beta_{20}(\tau)\text{IP} + \beta_{21}(\tau)\text{GEN} + \beta_{22}(\tau)\text{EDU} + \beta_{23}(\tau)\text{DEPEND} + \beta_{24}(\tau)\text{PF} + \beta_{25}(\tau)\text{IFGF15} + \beta_{26}(\tau)\text{IFGF16} \\ & + \beta_{27}(\tau)\text{REEpc} + \beta_{28}(\tau)\text{ATIVO}(3)\end{aligned} \quad (3)$$

The model included 28 independent variables. The quantiles ($\boldsymbol{\tau}$) 0.75 (q75), 0.50 (q50), and 0.25 (q25) represented the high, medium, and low levels of municipal transparency, respectively.

RESULTS AND DISCUSSIONS

Model estimation and presentation of results

From the estimates of Equation (3), the best-fit models were obtained for each quantile, according to the Bayesian information criterion (BIC) for goodness of fit, with a 90% confidence interval. Table 6 presents the results.

Table 6. Quantile regression estimation.

Explanatory variables	Quantile 0.25 (q25)		Quantile 0.50 (q50)		Quantile 0.75 (q75)	
	Estimates	p-value	Estimates	p-value	Estimates	p-value
Intercept	-0.00101	0.00000	-0.00068	0.00000	-0.00022	0.00163
N	0.00019	0.00000	0.00014	0.00000	0.00012	0.00000
NE	0.00015	0.00000	0.00010	0.00002	0.00011	0.00000
CO	0.00006	0.01915	0.00009	0.00005	0.00009	0.00000
S	0.00025	0.00000	0.00020	0.00000	0.00017	0.00000
METROP	0.00007	0.00000	0.00006	0.00000	0.00003	0.00003
IM[a]	0.00011	0.00005	0.00013	0.00002	0.00008	0.00000
IFDME15	0.00042	0.00000	0.00024	0.00053	0.00027	0.00000
IFDMER15	0.00021	0.00063	0.00011	0.02796	-	-
IFDMER16	-	-	-	-	0.00008	0.01958
IFDMS15	0.00016	0.00600	0.00014	0.00005	0.00009	0.00823
PIBpc[a]	-	-	0.00004	0.06841	-	-
NET	-	-	-0.00002	0.03874	-	-
FPE	-	-	0.00002	0.09519	-	-
IP	0.00010	0.00657	-	-	-	-
GEN	-	-	-	-	0.00002	0.10167
EDU	0.00003	0.01067	0.00002	0.05012	-	-
DEPEND	-0.00036	0.00000	-0.00023	0.00000	-0.00032	0.00000
IFGF15	0.00012	0.00092	0.00012	0.00002	0.00009	0.00003
RECpc[a]	-0.00071	0.07959	-0.00090	0.00739	-0.00068	0.00227
BIC	-67435.638		-68583.446		-68859.923	
Number of variables	14		16		13	

Note. Prepared by the authors. [a] The variables IM, PIBpc, and RECpc were transformed. The average age of the population was considered in tens, and GDP and total income per capita were considered in hundreds of thousands.

Since three different sets of variables influence the transparency of Brazilian municipalities with high (q75), medium (q50), and low (q25) transparency levels, the research hypothesis (H1) cannot be rejected. A total of 14, 16, and 13 variables influence the q25, q50, and q75 levels of transparency, respectively.

The positive influences in q25 are: regions (N, NE, CO, and S), management complexity (METROP), mayoral experience and education (IP and EDU), quality of fiscal management (IFGF15), maturity (IM), education level (IFDME15), health (IFDMS15), and employment and income (IFDMER15) of residents. The variables financial dependence (DEPEND) and municipal revenue collection capacity (RECpc) have a negative impact. In q50, the variables municipal economic development (PIBpc) and state political strength (FPE) are included, with positive effects, and difficulty in accessing the internet (NET), with a negative effect. Mayoral experience has no influence in q50.

Regarding transparency q75, the positive influences are: regions (N, NE, CO, and S), management complexity (METROP), mayor's gender (GEN), quality of fiscal management (IFGF15), maturity (IM), education level (IFDME15), health (IFDMS15), and employment and income (IFDMER16) of citizens. As with the other levels, the variables financial dependence (DEPEND) and municipal revenue collection capacity (RECpc) negatively influence q75.

Having identified the variables that comprise the three sets of influencers on transparency in Brazilian municipalities with low, medium, and high levels of transparency, the main objective of the study is achieved. The next subsection discusses the implications of the results in theoretical and practical terms, compares them with the literature, and offers reflections on the Brazilian context.

Discussion of results

Theoretical implications

National and international literature assumes that the same set of variables influences local government transparency. This premise stems from the use of econometric models that disregard the possibility of a variable asymmetrically affecting transparency across its distribution. These methods limit the analysis to the average effect, assuming that the impact of each variable is strictly equal across municipalities. In this study, the 0.75 (q75), 0.50 (q50), and 0.25 (q25) quantiles of transparency represented groups of municipalities with high, medium, and low cultural levels of transparency, respectively. Thus, by suggesting that three different sets of variables influence transparency at each of these levels, the findings of this research contradict the studies identified and inaugurate a new paradigm in this literature.

Six of the 19 influential explanatory variables did not impact all transparency quantiles. That is, an analysis restricted to the average variation in transparency would result in a fixed set of variables, which, in turn, would not adequately explain the transparency of

Brazilian municipalities. Although this gap stems from the econometric models used, it presents important theoretical implications.

Organizations seek to align themselves with societal values in pursuit of acceptance that ultimately guarantees their survival. Although information disclosure is an important tool for ensuring this legitimacy (Fenner et al., 2022; Sun & Andrews, 2020), the local culture of transparency can influence managers' strategies in applying this tool. These cultures can be identified through a quantile approach, where municipalities would be classified into high (q75), medium (q50), and low (q25) cultural levels of transparency. Thus, given the results of this research, it is possible to argue that a variable can encourage or discourage managers to disclose information only in municipalities with certain levels of transparency.

The internet variable is an example. In the current era of e-government, the internet is one of the main means of interaction between governments and citizens (Tejedo-Romero & Araujo, 2018). Thus, the better the internet coverage/quality in a municipality, the more likely managers are to use this medium to disseminate information and legitimize their governments. Better internet access is also expected to increase citizens' pressure for information from the administration. Therefore, the argument that the internet positively impacts the level of municipal transparency is plausible (Araujo et al., 2020; Sun & Andrews, 2020). However, it would be problematic to assume that the existence of this influence, as well as the direction and intensity of its effects, remains independent of the local culture of transparency.

In municipalities with a low culture of transparency, administrations would have no incentive to provide a structure that effectively improves internet access, as this would increase pressure on governments. Furthermore, improvements through private means would not be sufficient to pressure administrators to disclose information. In these cases, other means of legitimization, such as the inauguration of projects, publicity, and legislative support, would be used. Therefore, it is plausible that the internet does not significantly impact the low level of municipal transparency. This argument converges with the results found, where limited internet access would not impact transparency q25.

On the other hand, in local governments with a strong culture of transparency, internet coverage and quality tend not to be a problem. In these cases, the internet would be used as an essential tool for disseminating information, and its fluctuations would not significantly influence this dissemination. This would occur because changing this situation by the manager could provoke social disapproval. This argument also converges with the research findings, which show that limited internet access would not impact the transparency of Brazilian municipalities.

In this sense, the internet would not influence the transparency of municipalities with extreme transparency cultures (q25 and q75). Thus, the impact of the variable is limited to the average cultural level of municipal transparency, where managers would be more sensitive to internet fluctuations when disclosing information. That is, they would take advantage of the difficulty of internet access to be less transparent. This argument aligns with the results found, where the negative effect of the difficulty-of-internet-access variable is limited to the q50 of transparency.

The manager's gender is another variable that may present a difference. Most studies have not identified significant impacts from this variable, as shown in Table 4. That is, there would be no difference between men and women in the disclosure of information about their administrations. However, this study provides evidence that the female gender of the manager would positively and exclusively influence the transparency of municipalities with a high culture of transparency (q75). In this context, women would seek to legitimize their governments not only from an electoral perspective but also from a gender perspective.

The mayor's experience and education, economic development, and the local government's political power also did not influence all quantiles of municipal transparency. In other words, these variables only impacted certain cultural levels of transparency. Therefore, this study inaugurates a new paradigm in this literature by producing evidence suggesting that municipal managers have different incentives to disclose information depending on the local culture of transparency. Studies in this line of research must not restrict their analyses to the average variation in transparency. It is expected that more reliable results will be produced by adopting quantile approaches with robust econometric models.

Explanation of the effects of variables and comparison with the literature

The impacts of factors that explain local government transparency vary across studies, ranging from positive to negative to null. Restricting analyses to the average variation in transparency may help explain these divergences. Thus, given the lack of consensus in the national and international empirical literature, the findings of this research necessarily confirm the results of some studies and contrast with others.

The following variables impacted q75, q50, and q25 of transparency in Brazilian municipalities: regions,

management complexity, financial dependence, fiscal management, revenue collection capacity, citizen maturity, education, health, employment, and income. Regardless of the local transparency culture, these variables influence management's decision to disclose information.

Taking the Southeast as a reference, Brazilian regions influence municipal transparency. Different regions present singularities that alter the motivations and conditions for managers to disclose information. It would be unwise to assume that information asymmetry and agency relationships between citizens and local governments in the Southeast and North, for example, are strictly identical. While Tejedo-Romero and Araujo (2020) also point out that the region influences the transparency of Spanish municipalities, Sun and Andrews (2020) found no effects of the eastern or western regions on the transparency of Chinese local governments. In the national literature, the results of Baldissera et al. (2020, 2023) converge with the findings of this study. Costa et al. (2020) indicate effects only in the North, Northeast, and South regions. Studies that disregard possible regional effects on transparency may have yielded biased results (Gramacho, 2025).

Management complexity positively impacts transparency. Managers of municipalities within metropolitan regions tend to be more transparent, either due to the greater availability of information resulting from management complexity or due to greater citizen pressure for transparency. Annisa and Murtini (2018) indicate that management complexity positively influences the accessibility of information for local governments on the island of Java, Indonesia. However, this variable does not affect information availability. Sun and Andrews (2020) and Kretschmer (2018) vary in whether there are effects, depending on how management complexity is measured in Chinese and Chilean municipalities, respectively. In Spain, Tejedo-Romero and Araujo (2015) found no differences in transparency levels between provincial capitals and other municipalities. In Brazil, Cruz et al. (2012, cited in Baldissera & Dall'Asta, 2020) indicate that the transparency of 96 large Brazilian municipalities is not influenced by being located in the capital, metropolis, or interior.

The average age of citizens positively impacts the transparency of Brazilian municipalities. Older citizens — expectedly more experienced — would participate more actively in local politics, demanding timely and relevant information. Nevertheless, Tavares and Cruz (2020) and Kretschmer (2018) identified a negative effect of the average age of the population on the transparency of Portuguese and Chilean municipalities, respectively. Lowatcharin and Menifield (2015, cited in Baldissera & Dall'Asta, 2020) found no effect of this variable on the transparency of 816 municipalities in the Midwest of the United States. In Brazil, the findings of Silva and Bruni (2019) converge with the results of this study, identifying positive effects of citizen age on municipal transparency.

Citizen education positively influences transparency. More educated citizens would exert more effective social control and greater pressure for a transparent municipality. This result converges with studies from the United States, Slovakia, and Spain (Beblavá et al., 2016; Lowatcharin & Menifield, 2015, apud Baldissera & Dall'Asta, 2020; Tejedo-Romero & Araujo, 2020;) and diverges from others from Portugal, China, Lithuania, Italy, the United States, Chile, and Spain (Bearfield & Bowman, 2016; Birskyte, 2018; Galli et al., 2020; Piña & Avellaneda, 2019; Ríos et al., 2019; Ribeiro et al., 2017; Sun & Andrews, 2020; Tavares & Cruz, 2020). In Brazil, there is also no unanimity. However, among the authors who used the IFDME as a proxy, all identified positive effects of education on municipal transparency (Baldissera et al., 2020, 2023; Costa et al., 2020; Ribeiro & Zuccolotto, 2014).

Health, employment, and income indices also positively influence transparency. In municipalities with quality health services and high employment and income levels, citizens would prioritize post-material demands more, such as pressure for a transparent local government. Among the authors who used the IFDMS as a proxy, this result converges with Ribeiro and Zuccolotto (2014) and diverges from Divino et al. (2019) and Mata (2022). Among the studies that used the IFDMER, the findings are consistent with those of Romero and Mello (2021) and Ribeiro and Zuccolotto (2014) and diverge from those of Costa et al. (2020) and Mata (2022). In this study, the IFDMER lagged by one year would impact the medium and low levels of municipal transparency (q50 and q25), while the index without lagging would impact the high level (q75).

Financial dependence negatively impacts transparency. That is, the more dependent municipalities are on intergovernmental transfers, the less transparent they tend to be. It is possible that the low contribution of residents to the revenue stream weakens the principal–agent relationship between government and residents, discouraging the disclosure of information. Although there are studies in line with these findings (Baldissera et al., 2023; Diniz et al., 2020; Sun & Andrews, 2020; Tavares & Cruz, 2020; Yuniarta & Purnamawati, 2020), many have not identified effects of this variable on municipal transparency (Annisa & Murtini, 2018; Baldissera et al., 2020; Galli et al., 2020; Romero & Mello, 2021; Santos & Machado, 2021; Shin et al., 2020).

The quality of fiscal management positively impacts the transparency of Brazilian municipalities. The better the fiscal management, the greater the incentive for managers to be transparent in order to legitimize their government. However, studies that used the IFGF as a proxy for fiscal management quality differ from the findings of this study (Avelino et al., 2014; Bernardo et al., 2017).

Tax collection capacity negatively influences transparency. One valid explanation is that, in municipalities with large revenues, information would be negatively exploited by the local opposition, discouraging disclosure. This finding is consistent with some national and international studies (Birskyte, 2018; Lopes et al., 2020; Santos et al., 2021; Waheduzzaman & Khandaker, 2022) and diverges from others (Divino et al., 2019; Mata, 2022; Silva & Bruni, 2019).

The variables economic development, difficulty in internet access, state political power of the local government, and the mayor's experience, gender, and education level impact transparency only in municipalities with certain cultural levels of transparency. In municipalities where the impacts were not significant, it can be inferred that local cultures nullify the incentives/disincentives for managers to disclose information based on these variables. In this context, managers would make rational and selfish decisions, prioritizing other means of legitimizing their governments, such as advertising, inaugurating public works projects, and legislative support.

Economic development positively influences only the average level of municipal transparency. In these municipalities, in addition to better financial conditions to cover the costs of information, local development would be conducive to the manager gaining political capital through disclosure. Among the authors who used GDP as a proxy, positive effects were found (Batista et al., 2022; Carlos et al., 2021; Diniz et al., 2020; Herman et al., 2022; Santos et al., 2021), negative effects (Lopes et al., 2020; Sun & Andrews, 2020), and non-significant effects (Araujo et al., 2020; Costa et al., 2020; Divino et al., 2019; Pagliari et al., 2020; Silva & Bruni, 2019).

Difficult internet access negatively influences only the average level of transparency. In municipalities with this cultural level of transparency, poor internet access would lead to management omitting information. Most studies agree with these results (Araujo et al., 2020; Diniz et al., 2020; Kretschmer, 2018; Sun & Andrews, 2020; Tejedo-Romero & Araujo, 2020, 2018; Ríos et al., 2019). However, many authors have not identified any effects of this variable (Beblavá et al., 2016; Galli et al., 2020; Piña & Avellaneda, 2019; Possamai & Schindler, 2017). Among those who used rural dummies, Birskyte (2018) and Kretschmer (2018) also indicate a negative relationship between a municipality's predominantly rural location — expected to have greater difficulty accessing the internet — and its level of transparency. Piña and Avellaneda (2019) found no significant effects.

The state political power of the local government only positively impacts transparency in municipalities with a medium cultural level of transparency. In these cases, partisan alignment would create an environment of low local political competition, reducing concerns about information being exploited by the opposition. This would encourage information disclosure. Baldissera et al. (2020, 2023) also point out that mayors and governors belonging to the same coalition positively influence municipal transparency. In turn, other studies have not identified any effects of state political strength on municipal transparency (Araujo et al., 2020; Diniz et al., 2020).

The mayor's age only positively influences transparency in municipalities with a low cultural level of transparency. In these cases, older — and more experienced — managers would be expected to be more aware of the importance of transparency as a legitimizing tool. Tavares and Cruz (2020) and Galli et al. (2020) found no influence of the mayor's age on transparency in municipalities in Portugal and Italy, respectively. In Brazil, Santos et al. (2021) found positive effects, while Silva and Bruni (2019) found no significant influence.

Having a female mayor only positively impacts transparency in municipalities with a high cultural level of transparency. In these municipalities, female mayors are more sensitive to the need to disclose information. The fact that women still hold few positions in the municipal executive branch would explain the search for legitimacy not only from an electoral perspective but also from a gender perspective. Although some studies confirm this finding (Araujo et al., 2020; Tavares & Cruz, 2020), there is evidence indicating a negative (Fenner et al., 2022; Ríos et al., 2019) and null effect of the female gender (Araujo & Tejedo-Romero, 2016; Avelino et al., 2014; Galli et al., 2020; Piña & Avellaneda, 2019).

Mayoral education positively influences transparency in municipalities with low and medium cultural levels of transparency. In these environments, more educated mayors would be more aware of the importance of transparency to legitimize their administrations. Bearfield and Bowman (2016) also identify a positive effect of this variable in small North American cities in Texas, but not in large cities. Many studies have found no significant effects (Galli et al., 2020; Possamai & Schindler, 2017; Silva & Bruni, 2019; Tavares & Cruz, 2020).

All these detailed analyses by transparency levels/quantiles would not be possible using traditional econometric models, which, in turn, assess the effect of explanatory variables only on the average variation of the dependent variable. Furthermore, given the limitations of the transparency indices used in this literature, the quasi-Cauchy model guarantees robust results that would not be provided by traditional quantile regression.

Practical implications and reflections in the Brazilian context

The incipient transparency rates of thousands of Brazilian municipalities, evidenced by descriptive statistics, suggest the low effectiveness of laws such as Complementary Law 131/2009 (Lei Complementar n. 131, 2009) and the Access to Information Law 12,527/2011 (Lei n. 12.527, 2011). The significant variation in these rates across municipalities confirms that legal imperatives are insufficient to explain the transparency of Brazilian municipalities. Thus, the first practical implication is the need for enforcement of national laws that address mandatory transparency. However, effective transparency should not be confused with the mere disclosure of information. In the absence of timeliness, comprehensibility, relevance, and accessibility, information does not guarantee effective transparency.

Similar problems have been identified in several countries, including local governments in developed nations such as the United States, Spain, and South Korea. However, legal, political, institutional, and cultural peculiarities make it impossible to import ready-made, decontextualized solutions to Brazil. In general, adequate change should not be limited to the creation of laws that establish the mandatory disclosure of certain information. In addition to agile and independent oversight, accessible reporting channels and swift and impartial trials are also necessary, with the effective application of established legal sanctions. It is important to note that these changes will not be possible without the participation of stakeholders such as the legislative and judicial branches, audit courts, public prosecutors, and organized civil society.

This study provides evidence that highlights the demographic, socioeconomic, political-institutional, and accounting-fiscal influences on the transparency of Brazilian municipalities. Three different sets of variables impact the transparency of municipalities with high, medium, and low transparency cultures. These findings have important practical implications for audit courts and legislative branches in the exercise of their oversight functions. Variables with negative effects could be used as red flags. For example, since more financially dependent municipalities with limited internet access tend to be less transparent, it is possible to identify municipalities with this profile and conduct preventive guidance.

Transparency is an essential public policy in democratic contexts, as it strengthens governance, enables oversight, and ensures social control. The factors that impact transparency are related to the conditions and motivations of managers to disclose information (Baldissera & Dall'Asta, 2020). In other words, knowing the influencers of transparency means understanding managers' motivations. This type of information empowers citizens and strengthens independent media. Better-informed citizens are expected to make more rational decisions. This is one of the most relevant practical implications of this study.

FINAL CONSIDERATIONS

This study investigated the influences of three levels of transparency in Brazilian municipalities. A quasi-Cauchy quantile regression was used, where the 0.75, 0.50, and 0.25 quantiles of transparency represented municipalities with high, medium, and low levels of transparency, respectively. The results do not reject the hypothesis that different sets of variables influence each of these levels of transparency. These findings contradict a premise adopted in national and international studies, which assumes that a single set of variables influences all levels of transparency. Thus, this research inaugurates a new paradigm in this literature.

Restricting the analyses to the average variation in transparency imposes a fixed set of variables that would not adequately explain municipal transparency. This limitation, common to the literature, helps explain, to some extent, the divergence of results across studies. This hinders potential consensus and discourages the practical application of the results. Therefore, given the robustness of the econometric model and the originality of the results, we hope that this study represents a theoretical and conceptual improvement capable of advancing the state of the art on the topic.

In practice, the findings are useful to Brazilian citizens, legislatures, and external oversight bodies. Among the implications discussed, the possibility of audit courts using factors that negatively influence transparency as red flags — difficulty accessing the internet, financial dependence, and tax collection capacity — stands out. The goal would be to profile municipalities that tend to be less transparent and conduct guidance.

The limitations of the proxies used also constitute limitations of this study. In the theoretical dimension, although the results indicate 11 variables that influence

high, medium, and low levels of transparency, possible differences in effect size were not investigated.

As new transparency indices — which also cover a representative portion of Brazilian municipalities — become available, further studies are suggested to update the data used in this article. The municipal transparency index of the National Public Transparency Program, led by the Association of Members of the Brazilian Audit Courts, is one alternative worth analyzing. Examining the effect sizes of influential variables across all quantiles of municipal transparency is another way to advance the state of the art on this topic. Furthermore, this article's methodological design can be replicated in investigations of influencers of transparency in local governments in other countries.

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