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Critical factors influencing information disclosure in public organisations

Francisca Tejedo-Romero¹ & Joaquim Filipe Ferraz Esteves Araujo²  

Open government initiatives around the world and the passage of freedom of information laws are opening public organisations through information disclosure to ensure transparency and encourage citizen participation and engagement. At the municipal level, social, economic, and political factors are found to account for this trend. However, the findings on this issue are inconclusive and may differ from country to country. This paper contributes to this discussion by analysing a unitary country where the same set of laws and rules governs the constituent municipalities. It seeks to identify critical factors that affect the disclosure of municipal information. For this purpose, a longitudinal study was carried out over a period of 4 years using panel data methodology. The main conclusions seem to point to municipalities' intention to increase the dissemination of information to reduce low levels of voter turnout and increase civic involvement and political participation. Municipalities governed by leftist parties and those that have high indebtedness are most likely to disclose information. Additionally, internet access has created new opportunities for citizens to access information, which exerts pressure for greater dissemination of information by municipalities. These findings are important to practitioners because they indicate the need to improve citizens' access to the Internet and maintain information disclosure strategies beyond election periods.

¹University of Castilla-La Mancha, 13071 Ciudad Real, Spain. ²Research Center in Political Science (CICP), University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal. email: jfilipe@eeg.uminho.pt

Introduction

Access to information has opened public organisations to citizen scrutiny and contributed to increasing trust in public organisations' activities (Navarro-Galera et al., 2018; Tejedó-Romero and Araujo, 2021). Demand for transparency has grown rapidly since the global Transparency International movement began; more recently, the Open Government Partnership initiative has become a massive movement of countries engaged in initiatives to promote transparency in public organisations (Ball, 2009; Garrido-Rodríguez et al., 2022; Tejedó-Romero et al., 2023). The pressure to become transparent largely comes from the passage of Freedom Of Information (FOI) laws and the implementation of government open-data initiatives.

Transparency and the openness of government operations are considered necessary to improve government outcomes and produce managerial effectiveness, which are key features of good governance (Huang et al., 2021; Muñoz et al., 2022; Piotrowski, 2007). The challenge of providing information to citizens goes far beyond just passively providing information at the request of citizens and the discretion of governments. Thus, governments are engaged in more active information disclosure where public organisations provide understandable information to external stakeholders.

For public administrations to progress, they must be enabled to be more effective and efficient, be accountable to citizens, and facilitate citizens' participation in public life (Schmidhuber et al., 2021). Increasing citizens' trust in administrative processes and actions and bringing citizens closer to public services requires, among other things, transparent government behaviour, which reduces information gaps between governments and citizens (Khan et al., 2021; Kim and Jooho, 2012) and enhances citizens' perception of institutions' responsiveness to citizens' actions (Chen et al., 2023). Governments' concern with transparency may be explained by different theoretical approaches such as agency theory and legitimacy theory. The relationship between governments and citizens, when seen as an agency relationship, entails citizens' strong demand for information and government officials' need to meet this demand (Haustein and Lorson, 2023). Furthermore, legitimacy theory claims that political officials disclose information that is designed to change citizens' perceptions of the government in order to increase the legitimacy of their actions (Kornreich, 2019; Wagner, 2023). In the case of local governments, this relationship is particularly strong, making the demands for access to administrative information stronger. For these reasons, local governments are particularly interesting contexts for interrogating information disclosure because citizens are in close proximity to these governments and show growing demand for improved transparency (Porumbescu, 2015).

The proximity between local governments and citizens is a key element that justifies the study of information disclosure at the local level (Tejedó-Romero et al., 2023). However, even now, findings on this subject are inconclusive and may differ from country to country. According to Krah and Mertens (2020) and Kempeneer et al. (2023), there is no clear evidence in the literature of transparency on differences in levels of information disclosure between local governments and the critical factors for transparency. Thus, the aim of this study is to provide fresh insights into the factors that explain information disclosure from local governments. For this purpose, Portugal was chosen as an interesting case study because its socio-political context has been marked by the 2010–2014 Portuguese financial crisis and low levels of trust in the government vis-à-vis other European countries (Hardiman et al., 2019; Muñoz, 2017). In this context, transparency and information disclosure become increasingly relevant as a counterpoint to inefficient public management and act as a reason to promote good governance.

This study focuses on municipal transparency as measured in the four editions of the municipal transparency index published since 2013 by the Civic Association for Transparency and Integrity (TIAC), which is the Portuguese representative of Transparency International. Among municipalities, there is a growing interest in the index because it has been used as a benchmark for good governance. Since the regulatory context of Portuguese municipalities is the same, with municipalities obliged to apply the same laws, they use identical policy instruments. Thus, it is expected that variations in transparency levels are a consequence of municipal actions and political and socio-economic factors. Furthermore, at the municipal level, the interactions and relationships between governments and citizens are crucial for local representative democracy because of citizens' proximity to political actors. This growing interactive role can contribute to the well-being of citizens and can be reinforced by initiatives that promote the dissemination and transparency of information.

This paper contributes to the literature on information disclosure by testing the ability of a theoretical framework on transparency to explain the critical factors that influence public organisations' disclosure and transparency. There are two reasons for empirically examining the evidence from municipalities: first, the analysis aims to understand the evolution of information disclosure in the Portuguese case; second, the study aims to analyse the critical factors that determine municipal information disclosure. This is a longitudinal study covering a four-year period using panel data methodology. By capturing no observable heterogeneity, panel data analysis improves the efficiency of econometric estimates (Tejedó-Romero and Araujo, 2018; Wooldridge, 2010).

There are few studies analysing information disclosure in Portuguese local governments. This study helps to explain the responses of municipalities to civil society's growing demand for transparency. The empirical analysis targets the critical factors that influence information disclosure and transparency using panel data.

The paper is organised as follows: the first section introduces the subject; the second section reviews the literature on information disclosure and transparency and develops the hypotheses; the third section develops the research methodology; the fourth section presents the main results; the fifth section discusses the findings; and the final section presents the conclusions.

Theoretical background and hypothesis development

Transparency refers to the dissemination of and access to information on public organisations (Garrido-Rodríguez et al., 2022; Huang et al., 2021; Roberts, 2006; Tejedó-Romero and Araujo, 2021). It concerns the access to and usability of information by citizens and other stakeholders (the supply side of transparency). The literature about transparency claims that disclosure of information on policy and administrative and managerial effectiveness can improve good governance (Backstrand and Saward, 2004; Bauhr and Grimes, 2014; Hirsch and Osborne, 2000; Piotrowski, 2007). The dissemination of information allows citizens to scrutinise and verify the performance of public organisations (Grimmelikhuijsen and Welch, 2012; Meijer, 2013).

Depending on the characteristics of the administrative system, the way in which information is disclosed and the transparency that is implemented can vary (Tejedó-Romero et al., 2023). There are countries where information is disseminated proactively, with public organisations actively disseminating understandable information to citizens. In other countries, there is a passive approach to transparency, where public organisations respond

reactively to external demands and where information is made available only when requested by citizens (Araujo and Tejedo-Romero, 2016; Muñoz et al., 2022). Whatever way the information is disseminated, according to Hood (2006), to be transparent, it must be easy for citizens to understand.

For the purposes of this study, transparency is related to the proactive disclosure of information, with municipalities understood as transparent when they are active in providing intelligible information to citizens and external stakeholders (Bauhr and Grimes, 2014; Navarro-Galera et al., 2018).

Studies on transparency that analyse the incentives behind governments' decisions to be more transparent and active in providing understandable information are based on agency theory (Eisenhardt, 1989) and legitimacy theory (Shapiro, 2005). Agency theory states that there are information asymmetries in the relationships between governments and citizens (Lane, 2005; Zimmerman, 1977). To hold public officials accountable for their actions and for whether they have acted according to their responsibilities, citizens must have access to information to monitor the officials (Laswad et al., 2005). Transparency, whether a voluntary or mandatory disclosure of information, can reduce information asymmetries and increase public trust in public officials (Fung, 2013). Likewise, legitimacy theory states that the disclosure of information can be used to improve citizens' confidence in the activities and actions of public organisations (Archel et al., 2009; Patten, 1992), reinforcing the legitimacy of elected officials. According to Licht et al. (2011), the legitimacy of representatives' decision-making can be improved by transparency. Information dissemination and transparency reinforce citizens' perception of control, which has a positive effect on citizens' opinions about political decisions and decision-makers (Tejedo-Romero and Araujo, 2021). Transparency can be a tool to transform citizens' perceptions of government, regain citizens' trust, reinforce the legitimacy of decision-making, and improve the reputation of public organisations (Navarro-Galera et al., 2018; Pina et al., 2010).

Information disclosure in municipalities. Portugal is a unitary, centralised state with 308 municipalities and two autonomous regions, the Atlantic archipelagos. According to the Portuguese Constitution, there are three levels of government below the national level. Nonetheless, only two levels are implemented: the municipalities and the parishes (*freguesias*). Municipalities are divided into parishes. Parishes are the smallest administrative unit and have scarce resources, with a very limited range of responsibilities in the provision of public services. However, they play an important role in linking local communities' needs with their municipalities.

The provision of local public service to citizens is the responsibility of municipalities. Each municipality has a governance structure composed of the Municipal Assembly (legislative body) and the Municipal Council (executive body), with members elected for four-year terms. The members of the deliberative and executive bodies are elected directly by the citizens. The elected mayor is the candidate who tops the most-voted list for the City Council.

The evolution of freedom of information legislation. Portugal is at the forefront of countries that regulate citizens' access to public information. The right of citizens to public information is a constitutional principle established since 1989. Article 268.2 of the constitution establishes that citizens have the right to access administrative information, excepting for matters that concern national security or the personal data of citizens. An additional FOI law was passed later (Law No. 65/1993) that defines the

requirements for citizens' access to public information. However, the law did not compel public organisations to disclose information to citizens about their activities.

Subsequently, the socialist government revoked the 1993 FOI law and passed Law No. 46/2007. In Article 5, the new law settled the right of access to administrative documents, which includes the right of consultation, reproduction, and information about their existence and content. However, when the FOI law was discussed, the centre-right parties rejected the socialist government's proposal to pass a law that would oblige all public organisations to disclose information through webpages in a complete and organised manner with the information made understandable for citizens. As such, the law maintained the passive approach to transparency, with access to public information only at citizens' request. Public organisations were not required to disclose information about their activities.

It was only in 2016 that the socialist government passed an FOI law (Law No. 26/2016) covering the active dissemination of information about the activities of public organisations. The FOI law established an obligation to disclose regularly updated information on terms that allow access to its content in an unconditional way and in open, readable formats that allow for its further automated processing (Article 10.3). Public entities should disclose information freely on their websites, ensuring its understandability, with open access, ensuring the interoperability, quality, integrity, and authenticity of data as well as its identification and location (Article 2). The data to be disclosed includes information about organisations' administrative activities (Tejedo-Romero and Araujo, 2021). This marked a move from a passive form of transparency toward an active one.

Access to public information contributes to reducing information asymmetry between governments and citizens, which is considered essential for good governance (Piotrowski, 2007; Roberts, 2006; Tejedo-Romero and Araujo, 2021). Transparency and access to information are important for public scrutiny, participation, and accountability, increasing citizens' trust in the government. Several international organisations have created indicators to measure the level of transparency.

In the Portuguese case, the level of transparency of municipalities has been assessed since 2013 by the TIAC. Based on the information disclosed on the Municipal Councils' portals about their governments' operation, composition, and management, an index was created to measure transparency, the last edition of which was published in 2016. The index incorporates information disclosed on municipal websites through 76 indicators that are compiled into seven dimensions: information on the organisation, structure, and functioning of the executive body (constituting 18 indicators); information on municipal plans (constituting 13 indicators); information on fees, local taxes, and regulations (constituting 5 indicators); information on interaction with citizens (constituting 8 indicators); information on transparency in public procurement (constituting 10 indicators); information on fiscal transparency (constituting 12 indicators); and information on transparency of urban planning (constituting 10 indicators) (TIAC, 2013). The indicators assume the value 1 if the corresponding information is disclosed online or 0 if not. The score for each dimension is the sum of the indicators. The index is the aggregation of weighted dimensions. The index score ranges from 1 to 100. The index only measures information disclosure, not other characteristics like information intelligibility, information accessibility, or the quality of information. Hence, the transparency index analyses information about local governance available on municipalities' websites, creating universal criteria for measuring the levels of transparency in the form of proactive disclosure of information. The dissemination of municipal rankings puts pressure on

municipalities to enhance the process of communication with citizens, making the information more accessible and responsible. According to agency theory (Serrano-Cinca et al., 2009), to reduce agency costs from information asymmetry, governments will disclose more information. This, according to the legitimacy theory (Navarro-Galera et al., 2018), is a way to reinforce the legitimacy of decision-making and improve the reputation of municipalities. As a result of these incentives, we propose the following hypothesis:

H1: Portuguese municipalities have been disclosing more information over time (measured in years).

Critical factors for disseminating information in municipalities. In recent years, the internet in general and websites, in particular, have generally been adopted as information dissemination tools. They are good communication channels that greatly facilitate the availability of information to a large number of users in an easy way, satisfying their need for information (Gavriliuță et al., 2022). Access to the internet influences the pattern of citizens' demand for information and their pressuring of governments for information disclosure and transparency. As the number of internet users increases, pressure for the disclosure of information through websites also increases (Pina et al., 2010). Hence, the level of information disclosed is strongly influenced by the availability of and citizen access to the internet (Caba Pérez et al., 2014). According to Gandía and Archidona (2008) and Pina et al. (2010), the possibility for citizens to access the websites of municipalities to obtain responsible, efficient, and transparent information on the activities of municipalities has increased with access to the Internet. It is expected that citizens using the Internet will put greater pressure on municipal officials to manage their affairs. According to legitimacy theory (Licht et al., 2011), municipalities are expected to seek to increase information disclosure to respond to citizens' demands in order to legitimise their actions. Because of these factors, we propose the following hypothesis:

H2: There is a positive relationship between information disclosed by municipalities and citizen internet access.

Several studies on transparency show that wealthy municipalities with high-income populations are where citizens are most attentive to accountability and transparency (Giroux and McLelland, 2003; Muñoz et al., 2022; Piotrowski and Van Ryzin, 2007). According to Gaia and Jones (2019), greater citizen income levels correspond to stronger pressure on local authorities to disclose information via the Internet. In the same way, Ho (2002) found that municipalities with lower per capita income are less likely to adopt innovations on their websites because of lower demand for web-based services. Likewise, it is expected that high-income populations will exert more pressure on their local authorities for access to relevant administrative information. Citizens with higher incomes expect to have access to more information about whether taxes are being spent effectively and will be more attentive to managing local finances. A wealthier municipality is a sign of management quality, which may be beneficial for the political agents (Laswad et al., 2005). According to legitimacy theory (Navarro-Galera et al., 2018), disclosure can improve mayors' reputations and the chances of re-election (Gandía and Archidona, 2008). It is expected that wealthier municipalities will increase information disclosure, as proposed in the following hypothesis:

H3: There is a positive relationship between information disclosed by municipalities and wealthier municipalities.

Municipal revenues come from two kinds of sources: (a) sources from within the municipality (own-source revenue) and (b) intergovernmental transfers. The more financial resources come from own-source revenue, the higher the financial independence of the municipality. It is expected that greater financial independence will require greater disclosure of financial and accounting information and that more transparency will be needed to report on the use of collected taxes. Financial independence plays a significant role in municipal transparency and information disclosure because elected officials should be accountable for financial management. According to Alcaide-Muñoz et al. (2017) and in line with agency theory, an increase in tax collection is an incentive for the disclosure of fiscal information to reduce agency costs (Laswad et al. 2005) and is likely to stimulate accountability toward local taxpayers. This disclosure is a way to demonstrate that the funds received have been managed in a transparent manner and that public managers have acted in accordance with their responsibilities. The dissemination of financial information on municipalities' websites will be higher when they receive larger financial resources from their own sources, as proposed in the following hypothesis:

H4: There is a positive relationship between information disclosed by municipalities and the financial independence of municipalities.

The capacity to fund public services and programmes depends on the level of municipal debt. According to Padovani et al. (2018), the credibility of municipalities vis-à-vis external entities is influenced by the municipalities' indebtedness and their ability to provide financial support for the provision of services and local policies. When the debt-to-revenue ratio (indebtedness) is high, the disclosure of financial information can be a way of showing that, even with indebtedness, the municipality can meet its financial responsibilities. This is because the disclosure of financial information reduces information asymmetry and increases the degree of confidence in the organisation (Cárcava-García and García-García, 2010; Eisenhardt, 1989). This disclosure influences the cost of taking out new third-party loans and shows creditors the true financial situation. According to Albalade (2013), debt levels influence the level of disclosure of financial information. As such, we propose the following hypothesis:

H5: There is a positive relationship between information disclosed by municipalities and the debt-to-income ratio of municipalities.

Electoral participation manifests itself through the involvement of citizens in politics. According to Hollyer et al. (2011) and Caamaño-Alegre et al. (2013), citizens' interest in municipal activities and their involvement in local politics is influenced by information provided by municipalities and ease of access to that information. In this sense, it is expected that there is a relationship between the dissemination of information and electoral participation. Low electoral participation may be a sign that citizens have little interest in local politics and municipal activities. Legitimacy theory claims that threats to organisations' legitimacy lead to efforts from organisations to promote legitimacy through more transparency (Roberts, 2006). Thus, a decrease in electoral participation will lead governments to increase transparency to regain citizens' trust and change their perceptions about the functioning of public organisations (Albalade del Sol, 2013; Araujo and Tejedero-Romero, 2016). Araujo and Tejedero-Romero (2016) claim that increasing the dissemination of public information can improve citizen involvement in local politics and local activities, reversing

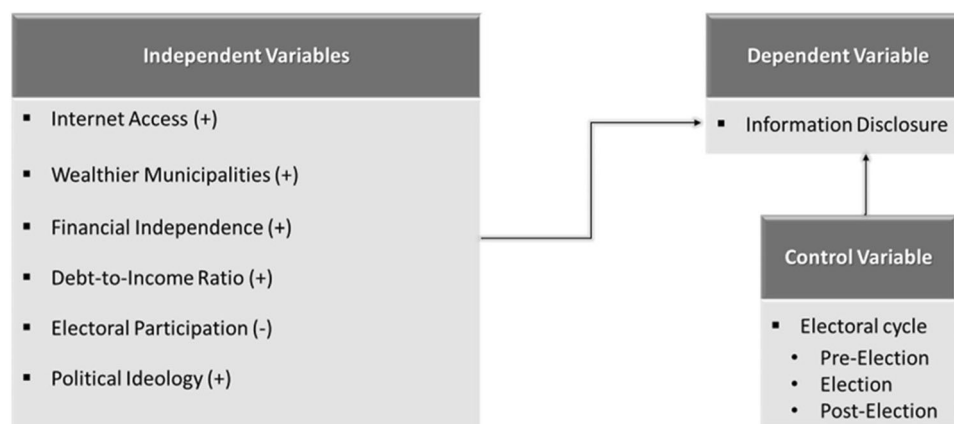


Fig. 1 Empirical model of the study. Figure shows the relationship between variables of the theoretical framework and empirical model of the study.

declines in electoral participation. This leads to the following hypothesis:

H6: There is a negative relationship between the dissemination of municipal information and municipal electoral participation.

Several studies on transparency (Araujo and Tejedo-Romero, 2016; Piotrowski and Van Ryzin, 2007) conclude that there is a link between political ideology and the dissemination of information. Political ideology influences responses to a wide range of political issues (Abramowitz and Saunders, 2006), including the adoption of practices to reinforce the legitimacy of a government's decisions (Cárcava-García and García-García, 2010). According to Guíllamon et al. (2011) and Albalade (2013), municipalities governed by rightist parties disclose less information and are less transparent than municipalities governed by leftist parties. A potential explanation for why leftist parties tend to disclose more information is that they need to justify their choices because they are more likely to defend state intervention. Therefore, we propose the following hypothesis:

H7: There is a positive relationship between information disclosed by municipalities and municipalities governed by leftist parties.

Research methodology

This section discusses the study sample, the selection of variables, the hypotheses, and the specification of the empirical model.

Sample. The sample covers all 308 Portuguese municipalities, with data published by TIAC covering a four-year period from 2013 to 2016. The analysis was performed using a panel data approach that has been used in several studies on transparency (Alt and Lassen, 2006; Bauhr and Grimes, 2014; Cuadrado-Ballesteros, 2014). This statistical approach allows for controlling for unobserved individual and/or time-specific heterogeneity that correlates with the included explanatory variables (Baltagi, 2014). The combination of time series and cross-sectional data allows specific individual unobservable effects (which can be correlated with other explanatory variables) to also be controlled for (Hausman and Taylor, 1981). In general, a data panel is defined as T observations (over time) of V variables (including the regression model) for N observations (in this case, individual municipalities). After excluding observations with missing data, we obtained an unbalanced data panel with 1098 observations (municipality–year) for 308 municipalities over four years.

Data and variables. The empirical model used in this study is represented in Fig. 1.

Dependent variable. The dependent variable is the information disclosure index (ID) of Portuguese municipalities that is published by TIAC. The index is a proxy measure of municipality information disclosure according to the information available on the web portals of municipal councils. It accepts values between 0 and 100. The information to operationalise the dependent variable was collected on the TIAC website (see <https://transparencia.pt/itm/>).

Independent variables. The selected variables that may influence the levels of information disclosure are the following:

Internet Access: This is the total number of residents with internet access divided by population density. It is a numeric variable.

Wealthier Municipalities: This is a numeric variable represented by the performance index as a proxy for wealthier municipalities. This variable is calculated based on indicators related to regional growth.

Financial Independence: This is the ratio between revenue from a municipality's own sources and the total actual revenue. Own-source revenues correspond to the sum of tax revenues (direct taxes, indirect taxes, fees, fines, and other penalties), revenue from sales of goods and services, income from property, and sales of investment properties. Total actual revenue corresponds to total revenues minus financial assets and liabilities. It is a numerical variable.

Debt-to-income Ratio: This is a numerical variable that represents the ratio between total debts and actual revenues. Total debts include loans, leasing contracts, and other debts to third parties resulting from budgetary operations. The gross debt of local authority services, inter-municipal entities, municipal membership entities, municipal corporations, and participating companies when out of financial balance is also considered. Actual revenues correspond to total revenues minus financial assets and liabilities.

Electoral Participation: This is the percentage of electoral participation in municipal elections. This is a numerical variable.

Political Ideology: This is a dummy variable that takes the value of 1 when the mayor is leftist and 0 otherwise.

Control variables. To avoid biased results, these variables control the effects of the electoral cycle, which can influence the level of information dissemination in municipalities. According to Alt and Lassen (2006), Vicente et al. (2013), and Cuadrado-

Ballesteros (2014), in pre-election periods, there may be manipulations of expenses or deficits to mitigate the disclosure of information by the incumbent political party to increase the chances of re-election.

Pre-election: This is a dummy variable that takes the value of 1 in the year prior to an election and 0 otherwise.

Election: This is a dummy variable that takes the value of 1 in an election year and 0 otherwise.

Post-election: This is a dummy variable that takes the value of 1 in the year following an election and 0 otherwise.

Data were collected from the annual publication “Finanças Municipais” by the General Directorate of Local Authorities, the National Election Commission, the National Statistics Institute of Portugal, and the Marktest Sales Index database. Election results data were collected from the November 2009 and November 2013 elections.

Model specification and estimation. An unbalanced panel data regression was adopted and tested by the following econometric models:

$$\begin{aligned} \text{Information Disclosure}_{it} = & \alpha + \beta_1 \text{Internet Access}_{it} + \\ & \beta_2 \text{Wealthier Municipalities}_{it} + \beta_3 \text{Financial Independence}_{it} \\ & + \beta_4 \text{Debt-to-Income Ratio}_{it} + \beta_5 \text{Electoral Participation}_{it} \\ & + \beta_6 \text{Political Ideology}_{it} + \beta_7 \text{Pre-Election}_{it} + \beta_8 \text{Election}_{it} \\ & + \beta_9 \text{Post-Election}_{it} + \mu_{it} \end{aligned} \quad (1)$$

where Information Disclosure is determined by a linear combination of several explanatory variables (Internet Access, Wealthier Municipalities, Financial Independence, Debt-to-Income Ratio, Electoral Participation, and Political Ideology) and control variables (Pre-Election, Election, and Post-Election); α is a scalar; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8$, and β_9 are estimable parameter vectors; $I = 1, \dots, 308$; $t = 2013, 2014, 2015$, and 2016 ; and μ_{it} is the term of disturbance. Typically, panel data applications use disturbance as a one-way error component model, with

$$\mu_{it} = \mu_i + \varepsilon_{it} \quad (2)$$

where μ_i is the unobservable specific effect of the municipality and is invariant in time. It represents the ability of municipalities to disseminate information. The rest of the disturbance ε_{it} varies according to the municipality and year and can be analysed as the usual disturbance in the regression.

Different approaches were used to examine the static panel model: pooled ordinary least squares (OLS), fixed effects, and random effects. The pooled OLS estimator assumes that μ_i is equal. The fixed effects estimator was generated by allowing μ_i to differ but assuming all μ_i are fixed numbers. The random effects estimator considers that unobserved effects are random variables. Panel data analysis is advantageous over cross-sectional analysis (e.g., pooled OLS) because it can consider unobserved individual factors and time-variant factors and thus produce more efficient and less biased coefficient estimates (Baltagi, 2014; Wooldridge, 2010). The pooled regression was evaluated supposing that the intercept is the same across municipalities and years. Various constants were also assumed for each municipality, after which both random effect and fixed effect regressions were carried out.

The choice between regressions is based on the researchers' assumptions and the structure of their specific model. Researchers often use Breusch and Pagan's multiplier test to choose between OLS and random effects. The variances across municipalities are zero for the null hypothesis, and there is no evidence of any significant differences across the municipalities, which means that there is no panel effect. Thus, on one hand, fixed effects analysis is effective at dealing with time-invariant individual effects that

Table 1 Descriptive statistics for the information disclosure index.

Information Disclosure (ID)	2013	2014	2015	2016	2013-2016
Mean	34	35	45	53	42
Standard deviation	10	12	17	20	17
Maximum	61	82	94	100	100
Minimum	7	3	8	16	3

Source: Own elaboration.

cause biased coefficient estimates (Bell et al., 2019), while on the other hand, random effects analysis allows researchers to handle time-variant and time-invariant individual effects and provides more efficient coefficient estimates compared to fixed effects analysis due to its tendency to have smaller variances (Baltagi, 2014). The Hausman test was used for selection between the random and fixed effects estimation methods because it detects the presence of statistically significant unobserved fixed effects (Hausman, 1978). The null hypothesis (H_0) considers the best model to be a random effects model, meaning that there is no correlation between independent variables and error terms in the panel data model (Wooldridge, 2010). The alternative hypothesis (H_1) assumes that the appropriate model is a fixed effects model and that there is a statistically significant correlation between independent variables and error terms in the panel data (Bell et al., 2019). Based on the Hausman specification tests, the fixed effects model was favoured over the random effects model in our data. Therefore, this study applied fixed effects analysis to the specified model. Finally, the correlation and heteroscedasticity problems of the fixed effects model were corrected using the panel-corrected standard errors (PCSE).

Results

This part of the study presents the results through descriptive, bivariate, and multivariate analyses. Continuous variables were winsorised to avoid the influence of outliers: Internet Access, Wealthier Municipalities, Financial Independence, and Debt-to-Income Ratio were in the top and bottom 5% percentiles of their distribution.

Descriptive analysis. Table 1 shows the descriptive statistics for the dependent variable Information Disclosure.

The table above shows that, over the years, the municipalities that were analysed greatly increased the average ID value. In the period of 2013–2016, the average value of the ID index was 42. The average ID value increased from 34 in 2013 to 53 in 2016. In 2016, the year in which the FOI law was approved, the maximum value was reached. This suggests that municipalities are increasing the disclosure of information about their activities to have more legitimacy with citizens. It is possible that the politicians who govern the municipalities are realising that citizens are demanding more responsible actions and consider the dissemination of information a way to regain citizens' trust. This confirms the first hypothesis that there would be an increase in the level of information disclosure over time. The results are in line with those obtained in previous works on municipal transparency (Albalade, 2013; Tejedo-Romero and Araujo, 2021).

The variables Internet Access and Wealthier Municipalities changed slightly over the years, a sign that the country is slowly recovering from the deep depression caused by the bailout in 2011. This argument is supported by the changes in the financial variables, which show improvements in the municipalities' financial situation. Financial Independence increased due to the

Table 2 Descriptive statistics on independent and control variables.

Variables	2013	2014	2015	2016	2013-2016
Internet Access					
Mean	0.0434	0.0502	0.0564	0.0563	0.0516
Standard deviation	0.0385	0.0413	0.044	0.0442	0.0423
Wealthier Municipalities					
Mean	0.287	0.281	0.285	0.285	0.284
Standard deviation	0.343	0.343	0.346	0.346	0.344
Financial Independence					
Mean	37.4	40.1	39.8	41.4	39.7
Standard deviation	15.9	16.5	16.9	16.9	16.6
Debt-to-Income Ratio					
Mean	46.01	81.30	69.49	62.40	64.81
Standard deviation	49.83	54.41	51.90	50.42	53.14
Electoral Participation					
Mean	63.41	58.79	59.0	59.1	60.11
Standard deviation	7.6	9.1	9.2	9.2	8.98
Ideology (left)					
Percentage (%)	55.5	62.3	61.9	61.5	60.3
PreElection					
Percentage (%)	0	0	0	100	25
Election					
Percentage (%)	100	0	0	0	25
PostElection					
Percentage (%)	0%	100%	0%	0%	25%

Source: Own elaboration.

increase in municipalities' own-source revenues and the decrease in transfers from the central government to the municipalities. Debt-to-Income Ratio increased until 2014, at which point it decreased. Concerning political variables, the reduction in electoral participation seems to demonstrate citizens' distrust of the austerity measures of previous years. This is reinforced by electoral results, with an increase in municipalities governed by leftist parties. It is worth pointing out that the central government was ruled by a rightist coalition during the implementation of the austerity programme. It seems that municipal elections were an opportunity for citizens to penalise the rightist parties that ruled the country during the financial crisis (Table 2).

Table 3 shows the correlation matrix using Pearson's correlation coefficient and the variance inflation factor (VIF).

Empirical results from the model. In this section, the presence or lack of linear relationships between all variables is analysed. Information disclosure is positively correlated at 1% with Internet Access, Wealthier Municipalities, Financial Independence, and Pre-Election years. Furthermore, disclosure is negatively correlated at 1% with Electoral Participation, Election years, and Post-Election years. It was not possible to confirm a significant paired correlation between information disclosure and the Debt-to-Income Ratio or Political Ideology. In addition, the values do not show collinearity. There is a serious collinearity problem if a pairwise correlation coefficient is >0.80 (Gujarati, 1995, p. 335). The mean VIF value was 1.7 (final column of Table 3), indicating that multicollinearity is not an issue in regression models (a rule of thumb states that there is evidence of collinearity if $VIF > 10$).

Table 4 shows panel data regressions for all estimators. The Breusch–Pagan Lagrange multiplier test, the F test for fixed effects, and the Hausman specification test (Wooldridge, 2010) were used to determine whether the correct estimator was used. The Breusch–Pagan Lagrange multiplier test ($p = 0.00$) confirmed that the random effects model was more adequate than the pooled OLS model. The F test shows that the fixed effects model

is more suitable than the pooled OLS model ($p = 0.00$). The Hausman test was used to verify the absence of correlation between the individual effects and the independent variables and to identify whether the fixed effects model or the random effects model was most adequate. The fixed effects model was found to be the most appropriate for the model ($X^2_8 = 27.21$, $\text{Prob} > X^2_8 = 0.0007$).

Further, autocorrelation, heteroskedasticity, and contemporaneous correlation were tested to verify if the fixed effects model was adequate. Initially, the Wooldridge test was applied for serial correlation. The result suggested rejecting the null hypothesis of no first-order autocorrelation ($F_{(1, 272)} = 123.329$, $p = 0.0000$). Then, a modified Wald test for group heteroskedasticity was applied to the residuals. This test found heteroskedasticity in the model ($X^2_{(278)} = 7.3e + 31$, $p = 0.0000$). Finally, the Pesaran test for cross-sectional independence was applied to the residuals to deal with contemporary correlation. There was a contemporary correlation ($CD = 10.996$, $p = 0.000$). When estimating Prais–Winsten regressions with PCSE, as suggested by Beck and Katz (1995), cross-sectional dependence, group heteroskedasticity, and AR(1) errors were corrected (see Table 4).

The results obtained (see column six) show that the variable Internet Access has a positive sign and a significant relationship at the 1% significance level ($\beta_1 = 0.0840$). This corroborates the hypothesis that internet access is a critical factor for information disclosure because it increases citizens' ability to access the information available on municipalities' websites. These results are supported by previous research by Gandía and Archidona (2008) and Caba Pérez et al. (2014). We thus accept hypothesis H2.

The variables Wealthier Municipalities and Financial Independence were not significant ($\beta_2 = 0.1125$ and $\beta_3 = 0.1125$, respectively). Therefore, hypotheses H3 and H4 were not confirmed.

In the case of the variable Debt-to-Income Ratio, there was a positive and significant relationship for a significance level of 1% with information disclosure ($\beta_4 = 0.0003$). Disclosure of financial

Table 3 Pearson correlation matrix.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	VIF
1. Information Disclosure	1										1.1
2. Internet Access	0.0933***	1									2.2
3. Wealthier Municipalities	0.1646***	0.1205***	1								3.1
4. Financial Independence	0.2363***	0.0665**	0.7311**	1							1.1
5. Debt-to-Income Ratio	0.0218	-0.1084***	0.0489	0.1164***	1						2.27
6. Electoral Participation	-0.2251***	-0.1697**	-0.5504***	-0.7042***	-0.025	1					1.0
7. Political Ideology	0.0284	0.1842**	0.0015	0.0072	0.0364	-0.04	1				1.5
8. PreElection	0.3905***	0.0646**	0.0003	0.0596**	-0.0261	-0.0650**	0.0147	1			1.7
9. Election	-0.2674***	-0.1122*	0.0038	-0.0788***	-0.2038***	0.2134***	-0.0568*	-0.3317***	1		1.5
10. PostElection	-0.2421***	-0.0191	-0.0059	0.0147	0.1790***	-0.0808***	0.0233	-0.3317***	-0.3317***	1	1.7
Mean VIF											

***1% significance, **5% significance, *10% significance.

information and transparency about the financial situation of municipalities and their credibility is considered important to prove to external agents the capacity of the municipality to comply with its financial obligations. The cost of funding from external sources is influenced by the municipalities' financial situation and risk. These results are supported by previous works (Albalade, 2013; Caamaño-Alegre et al., 2013; Gandía and Archidona, 2008). Thus, hypothesis H5 is accepted.

Electoral Participation is significant at the 1% level and is negatively associated with the dependent variable ($\beta_5 = -0.0029$). Low electoral participation is a sign of low confidence in the municipal government. It is acceptable to assume that, in order to increase citizens' involvement and regain their trust in the functioning of municipalities, municipalities must provide relevant information about their budgets, plans, and activities. Hence, Electoral Participation contributes to municipal information disclosure. These results are supported by previous works (Araujo and Tejedo-Romero, 2016; Fung, 2013). Thus, hypothesis H6 is accepted.

Political Ideology is positively correlated with information disclosure at 1% ($\beta_6 = -0.0373$). This suggests that municipalities governed by leftist parties disclose more information than municipalities governed by rightist parties. These results agree with previous research by Guillamón et al. (2011), Albalade (2013), and Caamaño-Alegre et al. (2013), who found a positive relationship between the information disclosure index and municipalities governed by leftist parties. Thus, hypothesis H7 is accepted.

Finally, regarding the control variables, the influence of the electoral cycle on the dissemination of information was analysed. Results showed that Pre-Election years were positively correlated with information disclosure by 1% ($\beta_7 = 0.0720$). On one hand, this means that to influence voters' decisions, municipalities will disclose more information in the year before an election to show that they are competent in managing the resources received (Cuadrado-Ballesteros, 2014) and that politicians acted within their responsibilities. On the other hand, the results reveal that Election years and Post-Election years were negatively correlated with information disclosure at the 1% level ($\beta_8 = -0.0647$ and $\beta_9 = -0.1062$, respectively). According to studies of political cycles, after elections, the pressure for municipalities to disclose information decreases because it is the beginning of a new political cycle.

Discussion

This section examines and analyses the main contributions of the findings concerning information disclosure and its critical factors. It also discusses the implications for practitioners and future research directions.

Theoretical implications. This study has theoretical implications for information disclosure research in a local government context. Initially, the authors observed that information disclosure increased over the years, confirming the results of studies in different contexts (Araujo and Tejedo-Romero, 2018). Perhaps the pressure from international organisations (e.g., International Transparency, Open Government Partnership, and OECD) and citizens has exerted a strong influence on disclosure. Similarly, it seems there is some sort of self-improvement among municipalities which has increased the desire for higher levels of transparency (Pawson, 2002) and which corroborates the agency theory. Further, because Portuguese municipalities are obliged to implement the same FOI laws, differences in disclosure are influenced by the characteristics of each municipality. Thus, in this context, it is worth identifying the behaviour patterns of public managers regarding the disclosure of information.

Table 4 Panel regression model.

	Hypothesis/predict sign	Pooled ordinary least squares	Fixed effects	Random effects	Panel-corrected standard errors ^a
Internet Access	H2(+)	0.0061 (0.0058)	0.0767* (0.0407)	0.0069 (0.0086)	0.0840*** (0.0287)
Wealthier Municipalities	H3(+)	0.0085 (0.0191)	0.1651 (0.2753)	0.012 (0.0278)	0.1125 (0.1425)
Financial Independence	H4(+)	0.0016*** (0.0005)	0.0011 (0.0012)	0.0014** (0.0006)	0.1125 (0.0010)
Debt-to-Income Ratio	H5(+)	0.0000 (0.0001)	0.0003 (0.0002)	0.0001 (0.0001)	0.0003*** (0.0001)
Electoral Participation	H6(–)	–0.0011 (0.0007)	–0.002 (0.0023)	–0.0011 (0.0010)	–0.0029*** (0.0011)
Political Ideology	H7(+)	0.0032 (0.0091)	0.0380** (0.0185)	0.011 (0.0116)	0.0373*** (0.0106)
PreElection		0.0786*** (0.0125)	0.0808*** (0.0098)	0.0788*** (0.0096)	0.0720*** (0.0063)
Election		–0.1027*** (0.0131)	–0.0635*** (0.0211)	–0.0987*** (0.0110)	–0.0647*** (0.0067)
PostElection		–0.1064*** (0.0125)	–0.0953*** (0.0112)	–0.1046*** (0.0096)	–0.1062*** (0.0063)
(Constant)		0.4654*** (0.0568)	0.6682*** (0.2357)	0.4667*** (0.0767)	–0.0027 (0.0026)
R ² (overall)		26.8	16.8	26.7	47.5
F(9, 1088)/F(9, 811)		44.3***	62.9***		
Wald chi2(9)				585.6***	3638.9***

The disclosure index scale is 0–1. The Internet access variable is transformed into logarithmic. Standard error values are in parentheses.

***0.01 significance, **0.05 significance, *0.1 significance.

^aPanel-specific AR(1).

The present study contributed to this discussion by examining two aspects of this question. Based on agency theory, it identified critical factors that pressure governments to disclose information to reduce information asymmetry; based on legitimacy theory, it examined the interests of local politicians in obtaining the approval of citizens. The findings confirm citizens' use of the internet to access public information, with financial information being the most disseminated. This may be because local politicians are seeking legitimacy through acceptable practices for being accountable to citizens as a response to citizen pressure, as would be indicated by legitimacy theory. Further, contrary to other studies (Gaia and Jones, 2019; Muñoz et al., 2022), this study found that the variable of being a richer municipality, is characterised by citizens with high economic levels, who usually demand information to monitor public policies, had no effect on the dissemination of information (see Table 4).

Finally, the findings seem to indicate that political factors are critical in the dissemination and exchange of information between municipalities and citizens. The study corroborates other studies that identify municipalities governed by leftists as those that most disseminate information (Cicatiello et al., 2017; Citro et al., 2021). The findings also signal the importance of electoral cycles and of political concerns around reducing low levels of electoral participation through the dissemination of information, reflecting the complex political contexts in which political officials operate. This seems to be particularly relevant in pre-election periods. This result confirms that, in electoral cycles, the incumbent party's politicians try to legitimise their political decisions by disseminating more information, which corroborates the postulates of legitimacy theory.

In sum, the findings confirm prior research and draw attention to the importance of political issues, in particular the effect that electoral periods can have on the dissemination of information. Future research should therefore undertake more in-depth studies focused on political factors with the aim of identifying patterns of information disclosure during electoral cycles and privileged communication tools.

Practical implications. This study also has practical implications. The findings seem to indicate the importance of internet access for information dissemination, particularly if one considers the use of information and communications technology (ICT). In this sense,

public managers and local politicians should consider implementing innovative ICT tools to develop information disclosure in municipalities. The broad use of websites as a tool for transparency and disclosure needs to evolve into the use of more sophisticated and innovative tools using the potential of artificial intelligence (AI). AI has opened a wide window of opportunity for improving information dissemination that moves beyond the commonly used format of search and read-only dissemination towards a more participatory, interactive, issue-driven approach. If governments are committed to increasing public trust in and the legitimacy of policymaking and administration, they need to focus on improving transparency as it is understood by the public rather than how it is understood by elected officials. In this sense, AI can offer challenging opportunities to meet this goal. However, the context and administrative capacity in which information disclosure take place can influence the conditions and opportunities for using AI. Therefore, public managers and politicians should examine the requirements for success before designing and implementing AI. Similarly, regardless of the electoral cycle and the ideological orientation of the party that governs the municipality, politicians must identify the barriers encountered by citizens in the use of the Internet and its tools. Assisting citizens with overcoming barriers to internet use can contribute to increased transparency, as internet use is a critical factor in transparency.

When focusing on political factors, this study found significance in local politicians' desire to reverse low electoral participation through the increase of information dissemination. It seems that local politicians' quest for citizen support for re-election drives the dissemination of information in electoral periods. Analysing information disclosure during the pre-election period, which is a very active period of disclosure and political propaganda, can help policymakers identify innovative and effective disclosure practices and learn from their experience in this period. The identified good practices can be useful as a reference for future changes that could be introduced to FOI laws. Future research can contribute to this goal by analysing information dissemination practices and tools used during the electoral cycle to identify good practices to be institutionalised by FOI laws.

Finally, the findings suggest that public managers, politicians, and policymakers should analyse the opportunities that arise from advances in ICT and active periods of disclosure, learning from their experiences and introducing innovations in

transparency. The design of new tools and practices is a challenge that may vary depending on the institutional, political, and social contexts of each municipality.

Conclusions

This study provides new insights into the critical factors that influence municipal information disclosure in a unitary, centralised country. The findings show that local governments, regardless of FOI laws, show an increasing evolution in information disclosure. Empirical evidence was found for the critical factors that influence the level of information disclosure. The analysis of political factors shows that the variables considered (Electoral Participation, Ideology, and Electoral Cycle) most significantly influenced the dissemination of municipal information. A novelty of this research is the finding on the significant impact that the electoral cycle has on the dissemination of information as a way to improve local politicians' reputations and influence citizens' electoral participation by gaining voter sympathy for upcoming municipal elections. Disclosing information on municipalities' decisions, processes, and functioning increases public trust, reduces agency conflicts, and increases the legitimacy of municipalities, serving as a positive incentive for citizen support for future elections. Further, municipalities governed by leftist parties have higher levels of disclosure than those governed by rightist parties.

The results show that the wealth of a municipality does not influence its level of transparency. It was expected, and in line with other studies (Gaia and Jones, 2019; Muñoz et al., 2022), that in these municipalities, the high economic level of citizens would have a positive effect on the dissemination of information. Similarly, financial independence was not shown to influence transparency. It is possible that the specificities of the institutional, political, and social context of the Portuguese municipality have some influence on these results.

Finally, and in line with other studies (Caba Pérez et al., 2014; Gavriluță et al., 2022; Pina et al., 2010), internet access significantly influenced the disclosure of information. Internet access opens up new opportunities for citizens to access information by increasing citizens' ability to access a municipality's webpage, which drives pressure for greater dissemination of information by municipalities. In addition, the need to prove to external agents the ability to comply with financial obligations as a way of lowering funding costs influenced municipalities' decisions to disclose financial information. As such, those municipalities with high debt-to-income ratios were more transparent.

The study has several limitations. First, the study focused on the perspective of public organisations that disseminate information, which is the supply side of the equation. The disclosure of information can also be analysed from the perspective of citizens, which is the demand side. Second, the study does not analyse how citizens perceive the information that is disclosed by public organisations. Such an analysis can increase understanding of information disclosure. Third, this research was developed in a specific country characterised as unitary and centralised. Other studies on countries with different institutional, political, and social contexts may enrich this discussion and analyse whether the findings are affected by the context of the study. Finally, the endogeneity problem resulting from the possibility of inverse causality between municipal disclosure and the other variables considered in the study was not considered.

Data availability

The datasets generated during and/or analysed for the current study are available from the TIAC repository [<https://transparencia.pt/itm/>], the annual publication "Municipal Finances" from the

General Directorate for Local Authorities [<http://www.portalautarquico.dgal.gov.pt/pt-PT/financas-loais/publicacoes-e-estudos/>], the National Elections Commission [<https://www.cne.pt/content/eleicoes-referendos>], the Portuguese National Statistics Institute [<http://www.ine.pt>], and the Marktest's Sales Index database [<http://www.marktest.com/wap/a/grp/p~18.aspx>].

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Author contributions

FT-R: Conception and design of study, revising theoretical framework, acquisition of data, analysis and interpretation of data, Drafting the manuscript, revising the manuscript critically for important intellectual content, Approval of the version of the manuscript to be submitted. JFFE: Conception and design of study, revising theoretical framework, acquisition of data, analysis and interpretation of data, Drafting the manuscript, revising the manuscript critically for important intellectual content, Approval of the version of the manuscript to be submitted.

Competing interests

The authors declare no competing interests.

Ethical approval

This article does not contain any studies performed by any of the authors on human participants.

Informed consent

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Additional information

Correspondence and requests for materials should be addressed to Joaquim Filipe Ferraz Esteves Araujo.

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