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ARTICLE

Subsidized debt, corporate governance, and ownership concentration of Brazilian firms

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Abstract

Purpose – This paper evaluates the influence of corporate governance and ownership concentration on subsidized financing in Brazil.

Theoretical framework – The effect of governance and ownership concentration on subsidized debt is analyzed from the perspective of agency conflicts (Agency Theory) and company behavior in relation to debt (Trade off and Pecking Order Theories).

Design/methodology/approach – Corporate governance is approximated by an index and presence on the Novo Mercado. Models are estimated by FGLS and Logit for a panel with 1387 annual observations of 147 companies with more liquidity on B3 in the period 2010-2019.

Findings – Ownership concentration has a positive quadratic relationship with subsidized debt, which was not sensitive to corporate governance. There is a preference for subsidized debt by managers in companies with low ownership concentration and by controlling shareholders in companies with high concentration. The more lenient monitoring from subsidized debt's creditor may be an explanatory factor. In addition, companies with high ownership concentration face difficulties for share issuance and consider it uninteresting. All that leads these firms to intensify debt raising.

Practical & social implications of research – It may be interesting for the government strengthening the analysis of corporate governance aspects in the assignment of subsidized credit.

Originality/value – The recent evolution and the determinants of subsidized debt in Brazil are analyzed under the agency conflicts approach. This is an innovative approach that takes into account the specialization of debt composition and an important funding source.

Keywords: Incentivized debt, corporate governance, ownership concentration, trade off theory, agency theory.

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1 Introduction

The importance of business investment, at both the micro and macroeconomic levels, for the development of firms and countries has been highlighted in the literature (De Long & Summers, 1991). In order to develop, firms need funds to finance their investment projects. However, there are market imperfections that mean that the availability of these funds is not perfect (Stein, 2003). Market imperfections can arise from endogenous problems directly related to the firm and its relationship with the financing market (Myers, 2003), as well as from exogenous factors related to the institutional environment in which the firm is located (Beck et al., 2010). In addition to the firm's actions aimed at reducing agency conflicts and information asymmetry problems, in many cases the State also tries to improve the availability of funds to finance investments, whether by promoting interest rate reductions or sponsoring tax incentives, and even by lending subsidized funds with more favorable interest rates and/or grace periods than those practiced by the market (Chen et al., 2008; Hu et al., 2019).

Since the proposition that capital structure is irrelevant to firm value under certain perfect market conditions (Modigliani & Miller, 1958), research has found evidence to the contrary. In fact, it has been documented that there are factors that can affect a firm's capital structure, although there is still no single theory that explains a firm's capital structure decisions (Barclay & Smith, 2005; Correa et al., 2013; Harris & Raviv, 1991; Myers, 2001). Capital structure theories can be classified into several groups, with issues related to information asymmetry and aspects arising from agency conflicts being two very relevant ones (Harris & Raviv, 1991).

From the perspective of agency theory, it can be suggested that agency conflicts may interfere with the decision of how to finance a firm, as they are interpreted by market agents (Harris & Raviv, 1991). A firm's ownership structure and corporate governance are strongly related to agency conflicts. Corporate governance aims at reducing conflicts and improving the firm's relationship with investors. Aspects of ownership structure also seem to be able to influence the intensity of these conflicts by defining the correlation of forces between ownership and management. This interrelationship has encouraged research on the effects of ownership structure and corporate governance on the capital structure of firms, but to the best of our knowledge, there is still little research on subsidized debt (Pinheiro et al., 2017; Póvoa & Nakamura, 2015).

As mentioned above, it is also common for the State to act to facilitate access to funds for companies to finance their projects. Among the forms of action, there is the possibility of the State granting subsidized loans. In a way, in addition to the tax advantage foreseen by the trade-off theory, subsidized financing has another incentive associated with its lower cost. This double benefit can discourage both the use of cash flow and the possible raising of funds by issuing shares.

Brazil, an emerging economy, is characterized by high interest rates, cyclical economic crises, and an unstable institutional environment, which are factors that can contribute to companies facing financial constraints (Crisóstomo et al., 2014; Pellicani et al., 2019). In this context, the State has acted to define national economic and credit policies with the aim of improving the supply of funds to firms. This action has also taken place through the work of development banks to facilitate credit (Dutra et al., 2018; Horta & Giambiagi, 2018). Is subsidized debt, with its specificities, influenced by corporate governance and ownership concentration? This paper aims to investigate the influence of corporate governance practices and ownership concentration on the financing of Brazilian firms through subsidized debt.

The results obtained from the analysis of a sample of 147 non-financial companies listed on the B3 in the period 2010-2019 indicate that the quality of corporate governance has no influence on subsidized debt. On the other hand, this type of debt proved to be sensitive to the level of ownership concentration of the company, with a positive quadratic relationship (U-shaped relationship). In order to minimize excessive monitoring of their actions, managers of companies with low ownership concentration seem to prioritize subsidized debt, which usually plays a less intense role in the monitoring of debtor firms (Lin et al., 2013). As ownership concentration increases, this external monitoring, which is stronger for creditors of private bank debt, becomes of interest to shareholders, who see debt as an additional effective instrument of corporate governance (Jensen, 1986; López-Iturriaga & Crisóstomo, 2010). After a certain level of concentration, when shareholders with a lot of power start to emerge, the interest in this more effective external control is reduced, considering that such control can inhibit the use of private control benefits by large controlling shareholders. In addition, the alignment of interests between the ownership and

management of the firm, obtained through stronger monitoring of management by large shareholders with the incentive and ability to exercise it, observed at high levels of ownership concentration (Bozec & Bozec, 2007; Denis & McConnell, 2003; La Porta et al., 2000), may contribute to the procurement of subsidized debt (Crisóstomo & Pinheiro, 2015; Mande et al., 2012).

Recently, attention has been drawn to the fact that the literature usually treats the amount of corporate debt in a homogeneous way, without taking into account the fact that corporate debt may be structured based on financing instruments that have specificities such as origin, maturity, guarantees, cost, access, and grace period. The literature has not taken into account these specificities, which may be relevant but may not be sufficiently appreciated when assessing the company's total debt as a homogeneous whole, that is, without taking into account the specificities of each type of debt (Colla et al., 2013; Póvoa & Nakamura, 2015; Rauh & Sufi, 2010). In this regard, subsidized financing can be mentioned as having peculiarities that make it worthy of special attention, which are more favorable conditions for the firm. Thus, this work contributes to the advancement of capital structure research by considering the heterogeneity of the company's debt structure. In this case, it evaluates the determinants of an important source of financing in Brazil, which is subsidized debt, suggesting that agency conflicts play a relevant role in this type of debt, taking into account corporate governance and ownership concentration. This proposition represents a significant advance with respect to pioneering studies that only considered financial aspects, firm size, and risk (Póvoa & Nakamura, 2014, 2015) and another study that, in addition to these factors, considered corporate governance, using the company's presence in the B3 *Novo Mercado* trading segment as a proxy for governance (Pinheiro et al., 2017). This study uses an index of corporate governance, which allows for a more precise assessment of its relationship with subsidized debt. It also evaluates ownership concentration as a determinant of subsidized debt.

2 Theoretical framework

Subsidies can be considered as government assistance, commonly provided through financial benefits, and generally granted to an entity in exchange for meeting certain conditions related to its operations (CPC, 2010). Subsidized debt is that which is obtained with government funding that is provided directly or indirectly through development banks and/or programs to provide credit to companies (Póvoa & Nakamura, 2014). This form of financing is used in different markets as a way of promoting micro and macroeconomic development (Chen et al., 2008; Hu et al., 2019; Simonassi III et al., 2017). From the perspective of promoting economic development, the State can act by providing subsidized financing to meet pent-up demand for business credit, stimulate certain crucial segments of the production chain that need development stimuli, and promote activities with higher economic risk, such as investments in R&D, which are subject to more restrictions on access to credit and higher debt procurement costs (Crisóstomo et al., 2011; Póvoa & Nakamura, 2015).

In Brazil, the National Bank for Economic and Social Development (BNDES) is the main development bank, and one of its objectives is to improve the investment financing process in Brazil. The BNDES has played an important role in long-term financing concessions for the country's industry and productive infrastructure (Torres Fo & Costa, 2012). Siqueira (2019) believes that the search for subsidized financing in Brazil is related to its nascent securities market. However, the search for this form of financing is not limited to non-listed companies. It should be noted that subsidized debt has the additional advantage of a more attractive interest rate, in addition to the attractive tax benefit mentioned by the trade-off theory. These advantages may encourage the search for subsidized debt.

2.1 Subsidized debt and corporate governance

The structuring of a good corporate governance system by a company, which includes the good practices recommended by corporate governance codes, signals to the financing market the company's concern about having a management policy that favors certain elements: the ethical behavior of managers, with the mitigation of their propensity to engage in moral hazard; more transparency of the company through a process of information disclosure that adequately meets market demand; more protection of shareholders' rights; more guarantee of return to creditors. This set of elements is intended to facilitate the company's access to external financing, since creditors want less risk in their credit operation, i.e., more guaranteed return on their capital (Aras & Furtuna, 2015; Francis et al., 2013;

Lagos Cortes & Vecino Arenas, 2014). The State, which can act as a financier of productive activities, should also be interested in this signaling of the company, even if its main interest is the return in terms of micro and macroeconomic development (Castro et al., 2020).

In the case of subsidized credit from the State, both the fact that the State acts as a creditor and the reality of the government's objective of promoting economic and social development highlight the importance of the company's alignment with the principles of good corporate governance. This importance is mainly due to the need for widespread disclosure about the use of government funds earmarked for subsidized financing, thus aligning with the principles of public administration such as publicity, and the responsibility of public agents for the quality and allocation of public spending, aiming at resource management that promotes efficiency, efficacy, and effectiveness in the use of public funds, in accordance with previously defined government programs and in line with budgetary and financial execution (Torres & Zeidan, 2016).

The adoption of good corporate governance practices can be an important tool that signals to the market the company's concern about mitigating the risks it faces in its activities, including the risk of carrying out its investment projects, including the risk of misuse of the funds raised if the manager engages in moral hazard (corruption), which is an important concern in subsidized loans granted by the State to finance productive activities (Musacchio et al., 2015). The importance that the market has given to corporate governance issues can be seen in the actions of the Brazilian Association of Financial and Capital Market Entities (ANBIMA), which in January 2020 issued recommendations that the analysis of credit allocations for investments should include the requesting company's attention to sustainability and corporate governance issues (Associação Brasileira das Entidades dos Mercados Financeiro e de Capitais, 2020). In the same vein is Resolution No. 4,327/14 of the Central Bank of Brazil (Banco Central do Brasil, 2014).

In Brazil, the BNDES guidelines are based on the principle of corporate social responsibility and are designed to promote, as a priority, companies that can demonstrate their commitment to the environment, sustainability, and the adoption of corporate governance practices. The Company Assessment Methodology (MAE, from *Metodologia de Avaliação de Empresas* in Portuguese) developed by the BNDES takes into account the company's commitment to sustainability and corporate governance practices. This methodology was used from 2012 to 2018, performing hundreds of credit assessments, generally of large companies, in order to better assess the credit risk of each company (Cervieri Jr & Oliveira, 2021). Currently, the MAE has been replaced by the Project Investment Impact Thesis (TIIP, from *Tese de Impacto de Investimento em Projetos* in Portuguese), which also incorporates and improves the assessment of the company's concern about aspects of corporate governance (Almeida & Braga, 2017). More recently, in 2021, the BNDES created the Sustainability Bond Framework (SBF) to structure the issuance of green bonds by the bank. These bonds are intended to be traded in the international capital market, with the aim of financing projects (new or not) of companies committed to environmental, social, and governance (ESG) actions.

The argument about the relevance of corporate governance for the financing market in general (Aras & Furtuna, 2015; Francis et al., 2013; Lagos Cortes & Vecino Arenas, 2014) is considered to apply also to subsidized credit. This can also be seen in the Brazilian case, through the formal inclusion of the assessment of ESG aspects of companies applying for subsidized financing from the State. In this sense, a hypothesis is proposed that companies with better corporate governance standards have more potential to obtain subsidized financing, in the following terms:

> **Hypothesis 1:** The adoption of corporate governance practices has a positive effect on the acquisition of subsidized debt.

2.2 Subsidized debt and ownership concentration

Research on the possible effect of concentration of ownership with voting power on access to debt has progressed, focusing largely on debt as a whole. However, as far as we know, the study of this effect taking into account debt specialization is still in its infancy, as is the case with subsidized debt.

Ownership concentration, an important aspect of ownership structure, has been shown to affect the debt of firms in different markets. Some arguments have been used to explain this relationship, such as the hypothesis of expropriation of minority shareholders by majority shareholders, which is associated with the entrenchment of controlling shareholders, the hypothesis

of the incentive of shareholders to actively monitor the company's management, and the external monitoring by the company's creditors (Brailsford et al., 2002; Caixe & Krauter, 2013; Céspedes et al., 2010; Crisóstomo & Pinheiro, 2015; Ganguli, 2013; Lin et al., 2013).

The hypothesis of alignment of interests between shareholders and company management suggests that more concentrated ownership contributes to this alignment by reducing agency conflicts, which has a positive impact on the relationship with the financing market. In another sense, the expropriation hypothesis is associated with the entrenchment of large shareholders who can make use of private benefits of control, which can exacerbate agency conflicts between controlling and minority shareholders and can influence the company's financing strategy. External monitoring by the firm's creditors, in turn, is a factor that can be highly relevant to the preference for subsidized financing (Lin et al., 2013).

In firms with low ownership concentration, there will be a preference for subsidized financing on the part of management, which is highly empowered in these firms. This preference is motivated by the intensity of creditor monitoring, which is lower in the case of government-subsidized debt (Lin et al., 2013). To the extent that there is a higher degree of ownership concentration, there are less empowered managers and therefore shareholders may consider debt as an interesting additional corporate governance instrument, either because it limits the free cash flow available to management (Jensen, 1986) or because of the monitoring role played by debt creditors (Lin et al., 2013). In this case, more intense monitoring by private debt creditors becomes attractive to shareholders, which may contribute to a lower demand for subsidized debt. However, after a certain level of ownership concentration, there are very empowered shareholders who see subsidized financing as a lower-cost source of debt and also with less intense monitoring by creditors. Thus, at high levels of ownership concentration, there may be a strong demand for subsidized financing. The large controlling shareholder wants less external control over the firm in which it can reap private benefits of control (Dyck & Zingales, 2004; Lin et al., 2013). In addition, controlling shareholders use the additional argument of fewer agency conflicts and easier alignment of interests between shareholders and managers to facilitate access to subsidized or unsubsidized debt. Also contributing to this search for subsidized debt are two factors that make it difficult for firms with high ownership concentration to issue shares: the fear of losing control that may arise from issuing shares, and the fear generated in the market by the expropriation effect (Crisóstomo & Pinheiro, 2015; Ganguli, 2013).

This set of arguments motivates the hypothesis that there is a positive quadratic effect of ownership concentration on the level of subsidized debt of Brazilian firms. Up to a certain level of concentration, the relationship is negative because more empowered managers in firms with low ownership concentration prefer subsidized debt due to the lower intensity of creditor monitoring. As ownership starts to become more concentrated, this external monitoring becomes more attractive to shareholders, who prefer unsubsidized bank debt, which generates more effective external control over the firm's management. On the other hand, when ownership concentration increases significantly, large shareholders, which are able to use private benefits of control, start to prefer sources of financing that are less intense in their control over the debtor company. This situation leads to a positive relationship from then on, as expressed in Hypothesis 2:

> **Hypothesis 2:** The concentration of ownership in Brazilian firms has a positive quadratic (U-shaped) relationship with the acquisition of subsidized debt.

Another attribute of the ownership structure is the issuance of non-voting shares, which is associated with the possibility of using private benefits of control and, consequently, the expropriation of minority shareholders (Dyck & Zingales, 2004). Excessive voting rights (concentration of voting rights) in relation to cash flow rights (concentration of total shares) is seen in the literature as a mechanism that favors the expropriation of minority shareholders, since controlling shareholders can extract wealth from the firm through the use of private benefits of control (Claessens et al., 2002; Claessens & Fan, 2002; Jensen & Meckling, 1976). Excessive voting rights can guarantee control of the firm with less cash investment, and controlling shareholders become empowered and able to extract wealth from the firm, reaping all the benefits of this expropriation while sharing the costs with other shareholders (Claessens & Fan, 2002). In this context, excessive voting rights are seen as being able to express the degree to which holders of excessive voting power have an incentive to expropriate the wealth of the firm and minority shareholders (Claessens et al, 2002; Claessens & Fan, 2002; Cueto, 2013; La Porta et al., 1999).

The implications of excessive voting rights on access to debt remain controversial. On the one hand,

the greater risk of expropriation of the company's wealth can increase credit risk, which would impede access to debt and increase the cost of debt (Konraht et al., 2016). On the other hand, this reality may discourage investor interest in the company's shares, forcing the company to rely on debt and/or cash flow from retained earnings. In addition, excessive voting rights of a controlling shareholder also contribute to its entrenchment and fear of losing controlling power, which can be threatened by share issuance processes (Ganguli, 2013).

With respect to subsidized debt, controlling shareholders with excess voting rights may seek this form of financing to reduce the cost of debt (which is higher for other forms of debt). Reduced bank monitoring is another factor that may lead controlling shareholders with excess voting rights to prefer subsidized debt, as other forms of debt are subject to greater monitoring (Lin et al., 2013). Private bank debt is seen as an external corporate governance mechanism, given the monitoring power of banks over debtor firms (Nascimento et al., 2018). By opting for subsidized debt, controlling shareholders reduce unsubsidized bank debt and, consequently, bank monitoring. In this context, we propose the hypothesis that the excess voting rights of the first shareholder have a positive effect on the procurement of subsidized debt, considering that a controlling shareholder obtains the benefit of lower debt costs and avoids more intense monitoring, in addition to helping to reduce the need to resort to share issuance processes that could threaten its controlling power.

> **Hypothesis 3:** The excess voting rights of the company's main shareholder have a positive impact on the acquisition of subsidized debt.

3 Methodology

3.1 Sample

The sample consists of 1,387 annual observations of 147 companies listed on the B3 over the period 2010-2019. The year 2010 corresponds to the year in which information on companies' corporate governance practices started to be available in the CVM reference form, from which these data were collected individually. Companies with a minimum liquidity ratio of 0.1 were selected in order to have companies with greater visibility and presence in the market, and thus greater market sensitivity to corporate governance issues. Financial and ownership structure data were obtained from the Economática system. Data on subsidized debt were collected from the BNDES, which provides a list of credit transfers (Appendix A. Supplementary Data 1 - Descriptive Statistics).

3.2 Models and statistical methods

The econometric models in equations (1) and (2) are proposed to empirically contrast the hypotheses on the effect of corporate governance quality and ownership concentration on subsidized debt:

$$SUBDEBT_{i,t} = \beta_0 + \beta_1 IQGC_{i,t} + \beta_2 \text{OwnCon}_{i,t} + \beta_3 \text{OwnCon}_{i,t}^2 + \beta_4 ROE_{i,t} + \beta_5 Tang_{i,t} + \beta_6 Size_{i,t} + \beta_7 Sector_{i,t} + \beta_8 Year_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$SUBDEBT_{i,t} = \beta_0 + \beta_1 IQGC_{i,t} + \beta_2 \text{Exvot}_{i,t} + \left[\beta_3 \text{OwnCon}_{i,t} + \beta_4 \text{OwnCon}_{i,t}^2 \right] + \beta_5 ROE_{i,t} + \beta_6 Tang_{i,t} + \beta_7 Size_{i,t} + \beta_8 Sector_{i,t} + \beta_9 Year_{i,t} + \varepsilon_{i,t} \quad (2)$$

In equations (1) and (2), $SUBDEBT_{i,t}$ refers to the debt of company *i* in year *t*, specifically the subsidized debt, and is approximated by the ratio of the subsidized debt acquired by the firm in the year to total assets. In addition, models are also estimated that take into account the acquisition of subsidized debt in the year ($\text{Ln}(chance_{SUBCAP_{i,t}=1})$), which is a dichotomous variable that takes the value of 1 if firm *i* incurred subsidized debt in year *t* and 0 otherwise.

The IQGC is the corporate governance quality index that assesses the quality of corporate governance of companies on an annual basis, based on a recent proposal in Brazil (Brandão & Crisóstomo, 2015). The IQGC is based on the best corporate governance practices indicated in the literature, which are present in the recommendations of the Brazilian Securities and Exchange Commission (Comissão de Valores Mobiliários, 2002), the Brazilian Institute of Corporate Governance (Instituto Brasileiro de Governança Corporativa, 2015), and the Banco do Brasil Employee Pension Fund (Caixa de Previdência dos Funcionários do Banco do Brasil, 2012). The governance index measures the items that make it up both binarily and on a direct and continuous scale, unlike other studies that have only used binary variables. In addition, the governance practices considered in the IQGC are associated with different dimensions of governance. The use of an index is considered an advance over the use of only a few

specific practices, as the index is better suited to capturing the reality of the company's corporate governance system as a whole (Aguilera & Desender, 2012).

The governance practices considered for the IQGC relate to 7 (seven) axes or dimensions of corporate governance: board composition, board practices, share rights and share circulation, executive practices, ordinary general meeting, supervision and transparency (Brandão & Crisóstomo, 2015). Thus, the dimensions of governance represent different types of corporate governance practices, with a list of 28 practices considered here. As an alternative proxy for the quality of corporate governance, models are also estimated using the company's presence in the *Novo Mercado* (NM) segment of the B3, captured by a dichotomous variable, as an indication of better governance. If the company participated in the NM in that year, it was assigned a value of 1, otherwise it was assigned a value of 0.

Table 1 shows the list of corporate governance practices identified and measured to form the IQGC. This measurement was obtained by assigning dichotomous values, categorical integer values, and integer and real values. Each company's annual IQGC is obtained by dividing the sum of the points achieved by the company in each item by the total number of items analyzed (28), which results in a percentage in relation to the maximum possible score (Brandão & Crisóstomo, 2015). Thus, the higher the IQGC value, the better the quality of corporate governance.

OwnCon refers to the concentration of ownership, and $OwnCon^2$ is used to evaluate its quadratic effect. OwnCon is used in specific models to consider the proportion of voting capital held by the first (OwnCon1), the two largest (OwnCon2), and so on up to the five largest (OwnCon5) shareholders.

In the model of equation (2), Exvot measures the divergence between the proportion of voting shares, i.e., controlling power, and the proportion of shares in the company's total capital held by the main shareholder. This variable is a proxy for the entrenchment of the main shareholder, as proposed in the literature, considering that this shareholder has sufficient power to shape the company's power structure (Claessens et al, 2002; Claessens & Fan, 2002; Cueto, 2013; La Porta et al., 1999). The models in equations (1) and (2) include three additional control variables: profitability, which is approximated by ROE (return on equity); asset tangibility (Tang), which corresponds to the tangibility index of the firm's assets (fixed assets/total assets); and firm size (Size), which is approximated by the natural logarithm of the firm's total assets. In both models (equations 1 and 2), Sector and Year are dummy variables for the firm's sector and year, respectively. Table 2 summarizes the operationalization of the model variables.

There are a number of estimation methods for panel data (pooled, fixed effects, or random effects). The two main variables of interest here, corporate governance and ownership concentration, show little variation over time. This low longitudinal variation can lead to imprecise coefficients when estimating with fixed effects or first differences (Wooldridge, 2002; p. 286; §10.7.2). In addition, the presence of serial autocorrelation and heteroskedasticity of residuals was observed in ordinary least squares estimation, based on the Cumby-Huizinga and Breusch-Pagan tests, respectively. Because of these problems, the models are estimated by feasible generalized least squares (FGLS), which corrects for these problems of heteroskedasticity and autocorrelation of residuals found in the tests performed in ordinary least squares estimations (Beck & Katz, 1995; Wooldridge, 2002). The absence of multicollinearity was tested using the variance inflation factor (VIF) (Appendix A. Supplementary Data 2 - Model Tests; Appendix A. Supplementary Data 3 - FGLS MODELS). The models in equation (1) did not show multicollinearity problems (average VIF of less than 10). However, the picture is different for the models in equation (2), which include excess voting rights (Exvot), concentration of voting rights (OwnCon), and quadratic OwnCon, variables that are highly correlated. With respect to these three variables, we estimated three models corresponding to equation (2): (i) with Exvot only, (ii) with Exvot and OwnCon, and (iii) with Exvot, OwnCon, and quadratic OwnCon. The first two models showed no multicollinearity problems (VIF less than 10). On the other hand, the models with OwnCon squared showed multicollinearity (VIF greater than 2 for Exvot and greater than 10 for OwnCon and quadratic OwnCon). Therefore, the models with the quadratic voting rights concentration variable (model in equation 2) were not included in the study due to collinearity problems with Exvot.

The models with subsidized debt (SUBCAP) as the dependent variable are estimated using the binary logit method with White's robust correction to adjust the beta coefficients (correction and treatment of heteroskedasticity and autocorrelation) (Gujarati & Porter,

Table 1
Corporate governance practices that make up the IQGC

Dimension	Practice	Operationalizing the practice
Share rights and circulation	p1	Ordinary shares / total shares
	p2	(i) Companies with ordinary shares only: full (1.0); restricted (0.5); no rights (0.0); (ii) Companies with ordinary and preference shares: average score for each class of share; (iii) Companies with ordinary shares only: tag along of ordinary shares.
	3 subpractices	
	p3	Companies with both ordinary and preference shares: average tag along for each class of share
	p4	Free float. Outstanding shares / total shares
Ordinary general meeting	p5	Mechanisms for including shareholder proposals on the agenda: Yes (0.25); No (0.00)
	4 subpractices	Online transmission of the ordinary general meeting: Yes (0.25); No (0.00)
		Minimum notice period of 30 days for the ordinary general meeting: Yes (0.25); No (0.00)
		Provision of means of communication between the company and shareholders on the agenda of the ordinary general meeting via the internet: Yes (0.25); No (0.00)
Board of Directors	p6	Tenure of the Board of Directors (BoD): Up to 2 years (1.00); More than 2 years (0.00)
	p7	The Board of Directors does not receive part of its remuneration linked to short-term objectives: Yes (1.00); No (0.00)
	p8	Existence of an audit and/or remuneration and/or governance and/or similar committee: Yes (1.00); No (0.00)
	p9	Are there formal mechanisms for evaluating the BoD and/or its members? Yes (1.00); No (0.00)
	p10	Does the BoD consist of 5 to 11 effective members? Yes (1.00); No (0.00)
Board composition	p11	No. of outside board members / total board members
	p12	No. of independent board members / total board members
	p13	Separation of the roles of Chairman and CEO: Yes (1); No (0)
	p14	No. of minority board members / total board members
	p15	No. of women on the board / total board members
	p16	The board member has no substitute members: Yes (1); No (0)
Executive Board	p17	Tenure of the Executive Board: Up to 2 years (1.00); More than 2 years (0.00)
	p18	The Executive Board receives part of its remuneration linked to the company's results: Yes (1); No (0)
	p19	The Executive Board receives part of its remuneration based on shares: Yes (1); No (0)
	p20	There are formal mechanisms for evaluating the Executive Board and/or its members: Yes (1); No (0)
	p21	No. of women on the Executive Board / total executive directors
Supervision	p22	Supervisory board in place: Yes (1); No (0)
	p23	No. of minority members / total members on the supervisory board
	p24	Audit committee in place: Yes (1); No (0)
	p25	No. of independent members / total members on the audit committee
Transparency	p26	The company has a code of conduct and publishes it: Yes (0.20); No (0.00)
		The company discloses relevant factors: Yes (0.20); No (0.00)
	5 subpractices	The company discloses information on related parties: Yes (0.20); No (0.00)
		The company has a share trading policy and discloses it: Yes (0.20); No (0.00)
		The company has a risk management policy and discloses it: Yes (0.20); No (0.00)
	p27	The company publishes a sustainability report or similar on its website: Yes (0.50); No (0.00)
	3 subpractices	The company discloses non-accounting performance indicators: Yes (0.25); No (0.00)
		The company discloses forecasts of its future performance: Yes (0.25); No (0.00)
	p28	The company's articles of association include an arbitration clause to resolve disputes between shareholders and between shareholders and the issuer: Yes (1.00); No (0.00)

Source: Prepared by the authors, adapted from Brandão and Crisóstomo (2015).

2011) (Appendix A. Supplementary Data 4 - LOGIT MODELS). To assess the quadratic relationship between ownership concentration and debt, the *utest* command was used in Stata14® (Appendix A. Supplementary Data 5 - Data 1), with the null hypothesis of an inverted U-shaped relationship and the alternative hypothesis of a U-shaped relationship (Lind & Mehlum, 2010). Multicollinearity problems between Exvot, OwnCon, and quadratic OwnCon also occurred for the logit models in equation (2).

Table 2
Variables that make up the econometric models

Variable name	Operationalization	Source
SUBDEBT	$\left(\frac{\text{Subsidized Debt Acquired}_{i,\,t}}{\text{Total Assets}_{i,\,t}}\right)$	BNDES
SUBCAP	Dummy: 1 if it acquired subsidized debt during the year; 0 if it did not acquire subsidized debt during the year	
IQGC	Index indicating the quality of corporate governance. The value ranges from 0 to 1 (28 practices, 7 dimensions).	RF sent to the CVM
NM	Dummy: 1 if it participates in the NM; 0 if it does not participate in the NM	Economática®
OwnCon	Total votes held by the main shareholder (from the 1st largest ("OwnCon1") to the 5 largest ("OwnCon5")	
OwnCon^2	Square of the total votes held by the main (1st to 5th largest) shareholders	
Exvot	$Voting\ rights\ of\ the\ main\ shareholder_{i,t} - Main\ shareholder's\ rights\ to\ cash\ flow_{i,t}$	
ROE	$\frac{\text{Net Income}}{\text{Net Equity}_{i,\,t}}$	
Tang	$\frac{\text{Fixed Assets}_{i,\,t}}{\text{Total Assets}_{i,\,t}}$	
Size	Natural logarithm of the firm's total assets	

Source: Prepared by the authors (2024).

4 Results and discussion

4.1 Descriptive analysis

Table 3 shows that the sectoral distribution of the firms is quite broad, which is important for this study. The number of credit allocations per sector, as well as the average number of subsidized debt allocations per economic sector, shows that practically all sectors of activity in Brazil have been covered by this financing, which seems interesting from the point of view of a policy to promote economic development.

Table 4 shows the number of annual fundraising operations and the amount of subsidized loans granted by the BNDES each year. During the period analyzed, the BNDES granted an annual average of 15 loans to listed companies. In 2016, there was a sharp decrease of 72.22% in the number of loans granted and 36.97% in the amount granted. It is worth noting that the number of loans granted this year remains low, which contrasts with the amount of funds lent, which increased significantly in 2018 and 2019. These figures indicate a high amount of credit to a small number of companies, which amounted to only three companies in 2019. This change in the behavior of the BNDES regarding the provision of subsidized credit coincides with the political break in Brazil in 2016 (P. P. Z. Bastos, 2017), which may indicate that this political change may have affected the bank's credit policy. Regarding this political approach, the literature has suggested the possibility of favoring firms that support groups that come to power (Carvalho, 2014; Claessens, Feijen, & Laeven, 2008; Lazzarini, Musacchio, Bandeira-de-Mello, & Marcon, 2015).

Table 5 shows the descriptive values of the variables in the models. It is worth commenting on the low mean subsidized debt of the listed companies, which is also due to the fact that many companies do not have this type of financing, as can be seen from the low median. However, it is interesting to note the high dispersion. The concentration of ownership is indicative of the high degree of concentration observed in Brazil, as already documented (Brandão & Crisóstomo, 2015).

4.2 Econometric analysis

Tables 6 and 7 show the estimates of the models in equations (1) and (2). Table 6 shows the estimation of the models using feasible generalized least squares (FGLS) with the firm's debt as the dependent variable. The models in Table 7 are logit estimations with a dichotomous

Table 3
Sector distribution of firms with average subsidized debt and number of allocations received

Sector	No. obs.	%	No. firms	Av. subs. debt	N allocations	% allocations
Food, beverages, agribusiness, and fishing	100	7.21	11	0.0262	18	12.00
Paper, cellulose, wood, chemicals, oil, and gas	126	9.08	13	0.0559	37	24.67
Mining and non-metallic minerals	37	2.67	4	0.0082	4	2.67
Electronics, software, and data	66	4.76	7	0.0275	4	2.67
Steel and metallurgy	86	6.20	9	0.0250	12	8.00
Textiles	69	4.97	7	0.0072	5	3.33
Construction	129	9.30	14	0.0000	0	0.00
Energy	157	11.32	16	0.0092	7	4.67
Telecommunications	27	1.95	3	0.0194	3	2.00
Transportation services	110	7.93	12	0.0108	8	5.33
Vehicles and industrial machinery	86	6.20	9	0.0058	8	5.33
Commerce	122	8.80	13	0.0468	22	14.67
Water, sewage, and other systems	30	2.16	3	0.0704	14	9.33
Other services	197	14.20	21	0.0015	3	2.00
Other industries	45	3.24	5	0.0210	5	3.33
	1387		147		150	100.00

Table 4
Number and amount of BNDES credit allocations

Year	No. credit allocations	Annual variation in no. allocations	Amount allocated[&]	Annual variation in amount allocated
2010	20	-	14,120,915.95	-
2011	21	5.00%	21,618,790.49	53.10%
2012	25	19.05%	54,338,378.99	150.935%
2013	24	-4.00%	27,658,907.11	-49.01%
2014	21	-12.50%	41,573,688.41	50.31%
2015	18	-14.29%	15,530,347.49	-62.64%
2016	5	-72.22%	9,789,403.42	-36.97%
2017	7	40.00%	4,695,099.57	-52.04%
2018	6	-14.29%	14,001,963.18	198.23%
2019	3	-50.00%	22,996,262.42	64.24%
Total	150		226,233,460.85	
Mean	15.00		22,623,346.09	
St. Dev.	8.67		15,161,379.37	
Coef. Var.	0.58		0.67	

[&]: Amount of credit granted in subsidized capital per year, expressed in thousands of dollars.

dependent variable indicating whether or not the firm obtained subsidized financing in the year.

The results indicate that corporate governance does not seem to contribute to the acquisition of subsidized debt, contrary to the expectation of a positive effect of governance on subsidized debt (Hypothesis 1). This result is robust to the two proxies for corporate governance quality, the index (IQGC) (Table 6, Panel A), and presence in the Novo Mercado segment (NM dummy) (Table 6, Panel B). This result indicates that companies' efforts to raise the quality standards of their corporate governance system do not seem to be a relevant factor in the creditor evaluation process for the granting of subsidized credit in Brazil. Despite the importance of the company's corporate governance system, which has been proposed as an element capable of mitigating agency conflicts and making the company more committed to honoring its contracts with creditors and other stakeholders, the government agent

Table 5
Descriptive statistics

Variable	Mean	Median	SD	CV	Min	Max
SUBDEBT	0.0196	0.0000	0.0767	3.9155	0.0000	0.5265
IQGC	0.6049	0.6026	0.1015	0.1678	0.0000	0.8810
OwnCon1	0.4178	0.4029	0.2310	0.5530	0.0014	1.0000
OwnCon 2	0.5426	0.5470	0.2314	0.4265	0.0014	1.0000
OwnCon 3	0.5992	0.6088	0.2210	0.3689	0.0014	1.0000
OwnCon 4	0.6309	0.6408	0.2122	0.3364	0.0014	1.0000
OwnCon 5	0.6481	0.6610	0.2030	0.3178	0.0014	1.0000
Exvot	0.0684	0.0000	0.1424	2.0811	-0.0506	0.6498
ROE	0.0762	0.0901	0.1585	2.0800	-0.3494	0.3478
Tang	0.1252	0.0340	0.1674	1.3366	0.0000	0.6900
Size	14.2385	14.1005	1.4573	0.1024	9.3085	19.4508

Note: 1387 annual observations.

that grants subsidized credit does not seem to consider corporate governance as relevant. In fact, the quality of corporate governance has no positive effect on subsidized debt (Table 6) or on the likelihood of procuring or acquiring subsidized debt (Table 7).

There are factors that may contribute to the fact that the quality of corporate governance does not influence the receipt of subsidized financing. Companies with a better corporate governance system may be able to raise funds more easily by issuing shares. Similarly, these firms may be able to obtain private credit more easily and on better terms than firms with poorer governance. It may also be the case that firms with better governance prioritize the use of cash flow to finance themselves, even as an additional governance tool, as suggested in the literature (Jensen, 1986; López-Iturriaga & Crisóstomo, 2010). This almost irrelevance of the quality of the corporate governance system for the acquisition of subsidized debt may also be supported by the presence of another determinant that is very relevant for the acquisition of subsidized debt. As proposed in this paper, it is possible that the ownership structure plays an important role in this process. Indeed, the results indicate that ownership concentration seems to play an important role in this type of debt. It can also be seen that the availability of company assets (Tang) to use as collateral is also important. This availability of assets, together with the size of the firm (Size), is an important factor in increasing the likelihood that the firm will be able to obtain subsidized credit (Table 7).

Ownership concentration, as proposed, seems to be a factor capable of affecting the subsidized debt of Brazilian companies. The results indicate a U-shaped quadratic relationship between ownership concentration (OwnCon) and subsidized debt (SubDebt), as proposed (Hypothesis 2). The U-shaped relationship (utest) indicates that, up to a certain level, ownership concentration is indeed detrimental in attracting subsidized financing (Table 6, Panels A and B, Models 1, 2, 3, 4, 5). At a low level of ownership concentration, there are more empowered managers who are interested in subsidized debt because of its lower cost and more lenient creditor monitoring than that observed for private debt (Lin et al., 2013). As the level of ownership concentration increases, this additional external monitoring may be of interest to shareholders, who view this external monitoring, which is more intense in private bank debt, as an important corporate governance tool that contributes to limiting the free cash flow available to the manager (Jensen, 1986). However, when the level of concentration of voting power becomes very high, very powerful shareholders with the ability to reap private benefits of control begin to have no interest in instruments of control over themselves, which increases their interest in subsidized debt. In addition to the issue of monitoring, these large shareholders are also able to align the interests of shareholders and managers and are not very interested in issuing shares, which are processes that could pose a threat to their power of control over the company. Thus, with this high degree of concentration, this effect is reversed and the company begins to seek more subsidized financing. This means that at higher levels of ownership concentration, the alignment of interests achieved through active monitoring actually favors debt, along with weaker bank monitoring and the

Table 6
FGLS models for subsidized debt

	Panel A							Panel B						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IQGC	-0.022	-0.023	-0.022	-0.024	-0.024	-0.017	-0.014							
NM dummy								-0.007	-0.007	-0.006	-0.007	-0.007	-0.003	-0.003
Exvot						0.040 **	0.035 *						0.037 *	0.032
OC1	-0.058 *						0.005	-0.057 *						0.007
OC1_2	0.077 **							0.074 **						
OC2		-0.094 **							-0.089 **					
OC2_2		0.093 ***							0.087 **					
OC3			-0.107 **							-0.101 **				
OC3_2			0.098 ***							0.091 **				
OC4				-0.108 **							-0.099 **			
OC4_2				0.094 **							0.085 **			
OC5					-0.095 *							-0.084 *	*	
OC5_2					0.082 **							0.071 *	*	
ROE	-0.005	-0.004	-0.004	-0.004	-0.004	-0.005	-0.005	-0.006	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Tang	0.032 **	0.032 **	0.033 **	0.034 ***	0.035 ***	0.032 **	0.032 **	0.031 **	0.031 **	0.032 **	0.033 **	0.034 ***	0.032 **	0.032 **
Size	0.003 *	0.003	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Const.	-0.005	0.014	0.020	0.024	0.019	-0.006	-0.011	0.001	0.017	0.023	0.025	0.021	-0.007	-0.012
No. obs.	1.387	1.387	1.387	1.387	1.387	1.387	1.387	1.387	1.387	1.387	1.387	1.387	1.387	1.387
No. firms	147	147	147	147	147	147	147	147	147	147	147	147	147	147
chi2	140.2 ***	140.6 ***	140.5 ***	138.9 ***	137.1 ***	137.98 ***	138.2 ***	141.2 ***	141.1 ***	140.8 ***	139.2 ***	137.4 ***	138.1 ***	138.1 ***
Utest (t)	1.73 **	2.41 ***	2.46 ***	2.3 **	1.94 **	**		1.72 **	2.31 **	2.32 **	2.03 **	1.65 **	**	
Extreme point	0.379	0.504	0.545	0.573	0.576			0.386	0.512	0.552	0.583	0.587		

* indicates significance at 10%; ** indicates significance at 5%; *** indicates significance at 1%. Note: Models with year and sector dummy variables. Feasible generalized least squares (FGLS) estimates that are robust to heteroskedasticity.

Table 7
Logit models (panel) for the acquisition of subsidized debt

	Panel A							Panel B						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IQGC	-2.048	-2.286	-2.167	-2.214	-2.280	-1.957	-1.959							
NM dummy								-0.552	-0.708	-0.680	-0.700	-0.704	0.632	-0.630
Exvot						-0.219	-0.216						-0.926	-0.946
OC1	-2.320						-0.003	-2.506						0.026
OC1_2	2.228							2.266						
OC2		-3.918							-4.196					
OC2_2		2.877							2.833					
OC3			-5.637							-5.805				
OC3_2			4.110							3.968				
OC4				-5.679							-5.655			
OC4_2				3.926							3.601			
OC5					-4.207							-3.966		
OC5_2					2.707							2.220		
ROE	0.274	0.285	0.258	0.246	0.246	0.265	0.266	0.128	0.121	0.098	0.079	0.073	-0.129	0.128
Tang	2.981 ***	2.933 ***	2.934 ***	2.970 ***	3.015 ***	3.052 ***	3.052 ***	2.927 ***	2.872 ***	2.874 ***	2.916 ***	2.965 ***	3.031 ***	3.034 ***
Size	0.634 ***	0.625 ***	0.619 ***	0.617 ***	0.618 ***	0.624 ***	0.624 ***	0.576 ***	0.554 ***	0.552 ***	0.547 ***	0.545 ***	0.568 ***	0.569 ***
Const.	-10.339 ***	-9.358 ***	-8.747 ***	-8.567 ***	-8.955 ***	-10.761 ***	-10.769 ***	-10.028 ***	-8.764 ***	-8.163 ***	-7.989 ***	-8.441 ***	-10.437 **	-10.458 ***
No. obs.	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387
No. firms.	147	147	147	147	147	147	147	147	147	147	147	147	147	147
Wald chi2	84.17 ***	84.35 ***	84.04 ***	83.98 ***	83.96 ***	84.14 ***	84.14 ***	84.47 ***	84.69 ***	84.33 ***	84.27 ***	84.33 ***	84.48 ***	84.49 ***

** indicates significance at 5%; *** indicates significance at 1%. Note: Logit models for panel data with year and sector dummy variables.

fear of loss of power by large shareholders, which limits the issuance of shares.

These results, in the sense that more concentrated ownership seems to increase the level of debt, are somewhat consistent with the proposition that the high concentration of power in the hands of the main shareholder can motivate entrenchment and favor subsidized debt as proposed (Hypothesis 3), for the possible reasons mentioned: controlling shareholders avoid share issuance processes that could ultimately threaten their controlling power; difficulty in issuing shares due to fear of expropriation by external investors (Crisóstomo & Pinheiro, 2015; Ganguli, 2013). The results indicate a certain positive effect of entrenchment on the acquisition of subsidized debt (Table 6, Panel A, Models 6 and 7, Panel B, Model 6). In these models, excess power appears with a positive effect in the models with the two proxies for corporate governance (Table 6, Panel A and B, Model 6).

Additional results, presented in Table 7, refer to logit estimations aimed at evaluating the firm characteristics that have the potential to increase the likelihood of the firm obtaining subsidized financing. There is no evidence that corporate governance is able to increase this possibility, either using the corporate governance index (IQGC) or presence in the Novo Mercado segment as a proxy (NM dummy). Similarly to corporate governance, ownership concentration also shows no evidence of influencing the likelihood of obtaining subsidized credit, either by the degree of concentration of voting capital in the hands of the first to the five largest shareholders (Table 7, Panels A and B, Models 1, 2, 3, 4, 5) or by the excess voting power (controlling power) of the main shareholder (Table 7, Panels A and B, Models 6 and 7). It should be noted, however, that ownership concentration has been shown to affect the amount of subsidized financing raised, as mentioned above (Table 6).

It is worth noting that larger companies (Size) are more likely to obtain subsidized financing. This finding may be due to the greater availability of guarantees by larger firms, as well as the lower risk of bankruptcy of these firms, which contributes to leverage in general (Titman & Wessels, 1988), and should be similar with respect to obtaining subsidized debt. Larger companies also tend to have more available cash flow and diversity in their operations, which reduces the likelihood of default (Khan et al., 2021), which may also be favorable for acquiring subsidized debt (Tarantin Junior & Valle, 2015; Titman and Wessels, 1988). Larger firms also tend to have a longer history of being valued by the market, which makes them more able to access debt with longer maturities, such as subsidized debt, and to have access to more diversified sources of financing, thus having a heterogeneous debt structure (Povoa & Nakamura, 2014; Tarantin Junior & Valle, 2015; Titman and Wessels, 1988). On the other hand, we can also consider the possibility that larger firms have the ability to establish political connections, whether through campaign financing or by placing influential people on the firm's board of directors, which may interfere with the firm's relationship with governments, as suggested in the literature (Carvalho, 2014; Claessens et al., 2008; Lazzarini et al., 2015; Silva, Kayo, & Martelanc, 2020).

The degree of tangibility of the firm's assets (Tang) also appears as an element capable of increasing the likelihood of obtaining subsidized financing, consistent with the argument that firms with more assets to serve as collateral are more likely to obtain subsidized credit. In a way, this availability of assets is very close to the size of the firm.

4.3 Discussion of results

As suggested by capital structure theories, firms seek an optimal capital structure that balances the benefits of debt with its costs (Myers, 2001, 2003). In this context, theories have proposed financial factors as determinants of debt (trade-off and pecking order theories), and these were soon joined by other proposals that pointed to agency conflicts and costs and information asymmetry as also relevant to a firm's capital structure (Harris & Raviv, 1991). The treatment of specific components of debt is a topic that has not yet been widely studied (Colla, Ippolito, & Li, 2013; Póvoa & Nakamura, 2015; Rauh & Sufi, 2010), and subsidized financing is an important element, especially in developing markets with political and economic instability and high interest rates, as is the case in Brazil (Crisóstomo, López-Iturriaga, & Vallelado, 2014; Pellicani, Kalatzis, & Aldrighi, 2019).

Subsidized debt has the important attraction of lower cost, which is a relevant factor in the choice of financing source, as pointed out by the pecking order theory, in addition to the tax advantage of debt indicated by the trade-off theory (Myers, 2003) and the softer external monitoring by the lender (Lin et al., 2013). These factors may contribute to the interest of firms, particularly managers and/or shareholders, in this form of financing.

From an agency theory perspective, it is important to assess whether agency conflicts and costs interfere with subsidized debt, as has already been observed for debt as a whole (Crisóstomo & Pinheiro, 2015). The results of this research indicate that, indeed, agency issues, especially those related to the ownership structure, may specifically interfere with the level of subsidized debt of Brazilian firms.

Concentration of ownership has the virtue of contributing to the alignment of interests between the owners and the management of a company, reducing agency conflicts and improving communication with the credit market (Chirinko & Schaller, 1995; Friend & Lang, 1988; Goergen & Renneboog, 2001), which, according to the results of this research, can occur in Brazil. This alignment is achieved through the active monitoring of the company's management by controlling shareholders, who assume this role because they have the incentive and ability to do so (substitution effect) and can favor the acquisition of debt, whether bank or subsidized. In addition to this issue, large shareholders tend to want to minimize external control over the company they control and are able to take advantage of the private benefits of control. In this sense, subsidized debt usually involves less monitoring of the firm (Lin et al., 2013). This softer monitoring is also interesting for empowered managers in firms with low ownership concentration, who will also be more interested in acquiring subsidized debt. Thus, the firm's interest in subsidized debt is greater at very low and very high levels of ownership concentration. At high ownership dispersion, as voting power concentration increases, shareholders may prefer the use of private bank debt, which acts as an effective corporate governance mechanism, either by reducing free cash flow (Jensen, 1986) or by increasing monitoring by the creditor agent (Lin et al., 2013).

The entrenchment argument in Brazil also helps explain the use of subsidized debt. Controlling shareholders tend to defend their controlling power through entrenchment against threats to this power, such as the issuance of new shares, and thus prioritize debt (Bokpin & Arko, 2009; Ganguli, 2013), whether bank or subsidized, with subsidized debt being more interesting due to the less intense monitoring by the creditor (Lin et al., 2013), which serves the interests of large shareholders.

Two other results of the study support the argument that the entrenchment of controlling shareholders, and the consequent higher risk of expropriation, is associated with the acquisition of subsidized debt. On the one hand, the quality of the firm's corporate governance, which is considered capable of reducing agency conflicts, does not favor the acquisition of subsidized debt, in line with a previous result in Brazil that found a negative effect of governance (Pinheiro et al., 2017). In this sense, Silveira et al. (2008) argue that in countries with still developing capital markets, such as Brazil, investors may undervalue firms with a better corporate governance structure, leaving these firms to seek debt as their main source of financing, making corporate governance less relevant for the acquisition of debt. On the other hand, excessive voting rights of the largest shareholder, which is considered to be an attribute of the ownership structure that encourages expropriation, was positively associated with the acquisition of subsidized debt. This finding corroborates the literature suggesting that entrenched controllers prefer subsidized debt to other external sources of financing, either to avoid reducing their power through the issuance of shares (Ganguli, 2013) or to escape the intense monitoring that private bank debt entails (Lin et al., 2013).

4.4 Sensitivity analysis and additional results

As mentioned above, alternative models were estimated in order to obtain robust results and also to allow the evaluation of other elements. In this sense, all the models presented were estimated in some alternative versions, confirming the results shown. First, all the models (Tables 6 and 7) were estimated using ROA (net income/total assets) as an alternative proxy for profitability (Appendix A. Supplementary Data 6 - FGLS MODELS - ROA-NI). The results are robust to the two proxies for profitability, ROE and ROA. As mentioned above, alternative models were estimated that take into account the excess voting power of the main shareholder (Exvot) (Tables 6 and 7, Panels A and B, Models 6) (Appendix A. Supplementary Data 7 - FGLS-LOGIT MODELS - EXVOT). These alternative models have the Exvot variable as the only attribute of the ownership structure and showed a positive effect of the main shareholder's excess voting power on subsidized debt. In the models assessing the impact on the possibility of obtaining a credit transfer, excess voting power, like the other attributes of the ownership structure, showed no impact.

Alternative models were estimated taking into account the company's risk, calculated by the standard deviation of the company's stock returns, as this attribute

of the company is also often considered as an element that can affect the company's debt capacity (Appendix A. Supplementary Data 8 - Data 2; Appendix A. Supplementary Data 9 - FGLS - RISK MODELS; Appendix A. Supplementary Data 10 - LOGIT MODELS - RISK). A limitation of this attribute is that the level of risk is not available for companies that are less frequently traded on the stock exchange. In the case of our research, this leads to a significant reduction in the number of annual observations of companies that obtained subsidized loans from 150 to 118, reducing the sample from 1387 annual observations to 1207. Despite this loss of observations, the descriptive analysis of the evolution of credit allocations is qualitatively the same. The results of the model estimations for the sample with the risk attribute are qualitatively the same, indicating a tendency towards a U-shaped relationship between the level of ownership concentration and the level of subsidized debt, despite the loss of significance of concentration of ownership in the hands of the main shareholder. Similarly, the results also indicate the insensitivity of the propensity to acquire subsidized funds to the degree of ownership concentration. Finally, it is worth mentioning the finding that firm risk does indeed have a negative effect on subsidized debt.

5 Conclusions

The determinants of subsidized debt in Brazil were analyzed, focusing on corporate governance and ownership concentration, which are elements that have been more studied in relation to private debt. The peculiarity of this financing instrument, with more favorable conditions, makes it attractive to companies, notably because of its lower cost of capital. This study responds to the demand in the literature to study debt instruments individually. The results show that subsidized debt is insensitive to the quality of corporate governance and has a positive quadratic relationship (U-shape) with ownership concentration.

The finding of insensitivity of subsidized credit to corporate governance contradicts the expectation proposed in Hypothesis 1, which is based on the argument that a higher quality corporate governance system tends to improve the firm's relationship with external investors, both equity investors and creditors, thus facilitating access to external credit, whether subsidized or not. However, some factors may explain this insensitivity of subsidized credit to corporate governance. It could be that the Brazilian State, as a financier, still does not take sufficient account of companies' efforts to improve corporate governance. Another possible explanation is that companies with better corporate governance may have easier access to private (non-subsidized) credit on attractive terms, with bargaining advantages that go beyond just the interest rate factor. Firms with this better bargaining power may choose not to go through the more bureaucratic processes of obtaining subsidized credit from the State, which in turn also gives the firm more exposure to the State and the market. It could also be that corporate governance facilitates the issuance of shares that have a more robust set of governance practices.

The positive quadratic relationship (U-shaped) with ownership concentration is in line with expectations. In fact, in Brazil there may be maximization of the benefits of debt (trade-off), which in the case of subsidized debt has the attraction of a more favorable cost and grace period, especially in companies with a higher concentration of ownership, which may be favored by the alignment of interests between owners and management, as well as seeking more debt to avoid issuing shares that may represent a threat to their power, in addition to being a sign of greater difficulty in issuing shares due to the expropriation effect. Another motivating factor for the use of subsidized debt is less intensive monitoring by the State as financier, which is in the interest of large shareholders. In firms with low ownership concentration, this interest in less intense monitoring becomes desirable for managers who prefer to avoid intense monitoring by creditors, which can constrain their actions. According to this argument, as ownership concentration increases, debt becomes an additional instrument for shareholders to control management actions, both by reducing free cash flow and by effectively monitoring the company's management.

We consider the paper's contribution to be the more detailed analysis of an important debt instrument used in Brazil: subsidized debt. We believe that the paper helps fill the research gap on specific debt instruments by providing evidence on the impact of agency conflicts in this form of financing.

As a suggestion for future research, there could be further evaluation of the effect of specific corporate governance practices or indices associated with sets of practices in certain dimensions of governance. The nature of the main shareholders could also be considered in order to assess the peculiarities of concentration, as there is evidence that certain types of shareholders can interfere

in company policies. Finally, it seems appropriate to extend the research to non-listed companies, despite the additional difficulties in obtaining data from them. It would also be enriching to carry out similar work on the activities of all development banks in the country.

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Supplementary Material

Supplementary material accompanies this paper.

Appendix A. Supplementary Data

Appendix A. Supplementary Data 1 - Descriptive Statistics

Appendix A. Supplementary Data 2 - Model Tests

Appendix A. Supplementary Data 3 - FGLS MODELS

Appendix A. Supplementary Data 4 - LOGIT MODELS

Appendix A. Supplementary Data 5 - Data 1

Appendix A. Supplementary Data 6 - FGLS MODELS - ROA-NI

Appendix A. Supplementary Data 7 - FGLS-LOGIT MODELS – EXVOT

Appendix A. Supplementary Data 8 - Data 2

Appendix A. Supplementary Data 9 - FGLS - RISK MODELS

Appendix A. Supplementary Data 10 - LOGIT MODELS – RISK

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