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Effect of the Firm Life Cycle in the Relationship between Quality of Corporate Governance and Cost of Debt of Public Companies in Brazil

ABSTRACT

Objective: We investigate the effect of the life cycle stage on the relationship between the corporate governance quality and the cost of debt of public companies in Brazil.


Method: The corporate governance quality was measured using an index (CGI) composed of 9 items and the cost of debt was captured directly from the explanatory notes of the financial statements. The analysis included 49 non-financial companies included in the IBrX-100 between 2010 and 2019, with the help of panel data regressions.


Originality/Relevance: The study innovates by exploring the moderating effect of the life cycle stage of firms on the relationship between corporate governance and cost of debt, demonstrating that this association is more important in the Turbulence and Decline stages.


Results: The average cost of debt was 7.64% p.a., lower than the averages shown in previous studies in the Brazilian context, being more in line with market practices. The findings demonstrate that governance is more important in reducing the cost of debt for companies in the Turbulence and Decline stages, revealing that the company's life cycle matters for this relationship.

Theoretical/Methodological contributions: The study demonstrates that the cost of debt is not adequately represented by the aggregate of the item "Financial Expenses" in the company's financial statements, that the credit market tends to include governance in determining the cost of capital, and that the life cycle it is especially important for lowering the cost of debt for riskier companies in the Turbulence and Decline stages.

Keywords: Cost of Debt; Corporate Governance; Firm Life Cycle.

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1 INTRODUCTION

Discussions about corporate governance have as their main starting point the so-called “agency conflict”, derived from the separation between ownership and control of companies, especially when there is a misalignment of interests between shareholders and managers (Jensen & Meckling, 1976). This agency conflict, or conflict of interest, can be driven by changes in the ownership structure, especially when there is greater dispersion (or concentration) of ownership, or in its capital structure when the company chooses to finance its operations with more equity or with more third-party capital.

Changes in the capital structure affect the benefits, risks, and costs of the company’s different sources of capital, which is crucial for the interests of shareholders (principal) and managers (agents), given that the decision-making power of each of these parts is affected (Assunção *et al.*, 2017; Barros *et al.*, 2015). In this context, corporate governance practices are especially important, as they determine the company’s cost of capital (Einsweiller *et al.*, 2020).

Myers (2001) highlights that companies’ preference for debt (third-party capital) over the issuance of shares (equity), which, in the absence of financial difficulties, is justified by the lower cost and non-dilution of company control, for example. In emerging countries, where the stock market is less developed, this phenomenon is even more common. In Brazil, Ripamonti, and Kayo (2016) highlight that the existence of better corporate governance practices among firms does not mean a replacement of debt with equity, but rather that there is a complementarity effect between these two sources of capital. Therefore, in this context, debt continues to play a prominent role in financing corporate growth. This finding is the motivation for this study.

Research involving the relationship between corporate governance and the cost of debt reveals that the presence of good governance practices can generate a reduction in the cost of debt charges. For example, the credit market may recognize the use of corporate governance attributes as an impact factor in reducing default risk, favoring the occurrence of more opportune financing rates for companies (Barros *et al.*, 2015; Bhojraj & Sengupta, 2003). However, not only governance is a determining factor in the cost of debt, but also the life cycle stage of companies since the predictability and resilience of results of a mature company can be different from a company that is in the birth, for example.

The life cycle stage of a firm indicates whether it is in the process of greater (smaller) growth, with a greater (smaller) need for capital for investment. Its life cycle influences its organizational characteristics, impacts managers’ priorities, and even the adoption of corporate governance mechanisms (Dickinson, 2011; Habib & Hasan, 2019; Lester *et al.*, 2003). The identification of firms at different stages of the life cycle seeks to capture changes in factors such as strategic choices, access to financial resources, characteristics of market competitiveness, and the quality and relevance of the information provided by companies (Dickinson, 2011; Habib & Hasan, 2019).

Given this, Filatotchev *et al.* (2006) point to research opportunities that relate corporate governance to the life cycle of firms, arguing that changes in governance parameters may be associated with changes in the life cycle stage. From this perspective, there is evidence of an association between the life cycle and the corporate governance structure of firms, both theoretically (Habib & Hasan, 2019) and empirically (Li & Zhang, 2018; O’Connor, & Byrne, 2015). However, the literature presents a gap related to the association between the level of corporate governance of the company, the cost of its debt, and its life cycle stage.

In this sense, this study aims to investigate the effect of the life cycle stage on the relationship between the quality of corporate governance and the cost of debt of publicly held firms in Brazil. This study is timely due to the context of the changing scenario for granting credit in Brazil, especially in the fall in the basic interest rate, differing from previous studies by addressing the quality of governance, the cost of debt, and the stage of the firms' life cycle together.

This motivation converges with Konraht *et al.* (2016), who note that it is important to understand the factors that reflect the cost of debt, given the direct impact of this cost on the firms' value, affecting the investment decisions of market agents. In Brazil, this is even more relevant given the fact that debt is a complementary financing alternative, despite the development of the stock market. This research captures the cost of debt directly from the explanatory notes and financial statements, rather than the common use of financial expenses reported by companies (Barros *et al.*, 2015; Einsweiller *et al.*, 2020; Fonseca & Silveira, 2016; Moura *et al.*, 2020), which makes our results more robust. In Brazil, many companies recognize financial expenses amounts related to exchange variation and impairment.

The main findings of this study demonstrate that the average cost of debt of the firms analyzed ranged from 8.03% in 2010 to 6.44% in 2019, with an overall average of 7.64%, percentages that are closer to market practices of Brazilian credit, than Barros *et al.* (2015), Einsweiller *et al.* (2020), Fonseca and Silveira (2016) and Moura *et al.* (2020), which report average debt costs of 26%, 20%, 36%, and 46%, respectively. Furthermore, we note that corporate governance measured by a quality index was not a determining factor in reducing this cost of debt. The life cycle stage, on the other hand, was only decisive for the relationship between governance and debt in the Turbulence and Decline stages.

The main contributions of this study refer to the robustness of the average cost of debt identified, as well as its resistance to variation in the corporate governance quality index estimated for firms, which suggests that the credit market *already* tends to impute level minimum governance for firms when defining the cost of debt. Above all, our findings demonstrate that for firms with a life cycle in Turbulence or Decline, the market tends to be more rigid in demanding better quality of governance, which translates into a lower cost of debt.

This study is divided into five parts, containing, in addition to this introduction, the literature review in the second section, the methodological aspects in the third, the presentation of results in the fourth, and, in the fifth and last, the conclusions and contributions of the study.

2 LITERATURE REVIEW

2.1 Corporative Governance

Corporate governance comprises mechanisms capable of offering to monitor in an environment characterized by agency problems, in the sense of reducing agency conflicts between principal and agent. In their classic study, Jensen and Meckling (1976) address the separation of ownership and control, as well as conflicts of interest and the repercussions of this on the value of firms. In stock markets like the Brazilian one, corporate governance practices can even be used as a means of legitimization by firms, as pointed out by Miranda, Melo, and Martins (2021).

Corporate governance mechanisms can be either internal controls or external to the organizational environment (Aguilera *et al.*, 2015). Examples of internal mechanisms are the board of directors, executive remuneration, and ownership concentration, while external

mechanisms have a greater variety, among which the control exercised by the capital market stands out (Aguilera *et al.*, 2015, Assunção *et al.*, 2017). As corporate governance is a system made up of governance bodies, the quality of the country's information environment is also important for its determination, as well as there is an intrinsic relationship between governance and the quality of the company's information, which tends to reduce the information risk and, consequently, the company's cost of capital (Martins & Barros, 2021).

Thus, corporate governance is made up of bodies responsible for guiding, supporting, and monitoring management, which have a set of rules to align the interests of shareholders and managers and maximize the performance of organizations (IBGC, 2015). As Aman and Nguyen (2013) note, a greater distinction between management and monitoring responsibilities, through the presence of independent directors, can improve managerial responsibility. Therefore, good governance encourages the selection of decisions that maximize the firm's value. Thus, it is expected that the adoption of corporate governance mechanisms will mitigate the risks for investors. Thus, with lower risks, there is greater trust on the part of creditors and, thus, access to financing at a lower cost and in greater volume (Aman & Nguyen, 2013).

The relationship of corporate governance with firms' performance and cost of capital elements is not a new element, with a diversity of evidence in the previous literature (Bhojraj & Senguta, 2003; Bradley & Chen, 2011; Bradley & Chen, 2015; Chen, 2012; Fields *et al.*, 2012; Ghouma *et al.*, 2018; Moura *et al.*, 2020). However, little is known about this relationship considering the effective cost of debt in an emerging country in a recent period of fall in the basic interest rate, as well as in the face of different stages of the life cycle, especially regarding companies in stages of Turbulence and Decline.

The idea that the adoption of corporate governance mechanisms can affect the cost of debt is supported by the accounting literature, which argues that the credit market attaches relevance to such mechanisms (Aman & Nguyen, 2013; Barros *et al.*, 2015; Fields *et al.* 2012; Fonseca & Silveira, 2016; Ghouma *et al.*, 2018; Konraht *et al.*, 2016; Moura *et al.*, 2020). It is possible to expect that the reduction in agency risks, because of the adoption of governance mechanisms, will lead to a reduction in the cost of debt, given the negative influence on the spreads of borrowings.

However, this relationship is not linear, and this cannot be assumed as a rule, especially in markets where there is evidence that the growth of the stock market is not a natural substitute for the credit market, as noted by Ripamonti and Kayo (2016). These authors note that in Brazil there is evidence of a complementary relationship between these markets. Going further, we should consider that third-party capital tends to be less costly compared to equity (Barros *et al.*, 2015; Konraht *et al.*, 2016).

2.2 Cost of Debt

The cost of debt is commonly measured as the ratio between financial expenses and onerous liabilities of companies, that is, obligations arising from loans, financing, and debentures (Barros *et al.*, 2015; Einsweiller *et al.*, 2020; Fonseca & Silveira, 2016; Nardi & Nakao, 2009). Both in the academic and professional fields, the cost of debt can also be called the cost of debt, the cost of third-party capital, or the cost of third-party financing (Barros *et al.*, 2015).

For Liedong and Rajwani (2017), the remuneration of third-party capital is defined as the remuneration of external lenders, which is normally remunerated in the form of interest expense. Thus, the cost of debt is the cost that the firm incurs in borrowing financing from creditors or other debt providers (Einsweiller *et al.*, 2020). Since, in their daily operations,

firms need resources to carry out their projects or investments, they resort to financing sources via their own and third-party resources, both of which entail associated costs (Barros *et al.*, 2015).

The selection of financing alternatives by managers occurs through analysis of the available possibilities that present themselves as being less costly, to carry out the implementation of their investment projects. Generally, third-party capital represents a lower cost than equity because it represents less risk (Einsweiller *et al.*, 2020). In addition, understanding the factors that determine the cost of corporate debt is especially important for companies themselves, as they tend to prefer debt capture (third-party capital) to equity issuance (equity) since the debt has a lower cost and does not dilute the control of the company (Myers, 2001).

In Brazil, an additional element that makes this discussion relevant is the evidence that the existence of better corporate governance practices does not necessarily mean a replacement of debt with the use of equity capital by companies (stock issuance). As Ripamonti and Kayo (2016) point out, in the Brazilian market there is a complementarity effect between these two sources of capital since the increase in the quality of governance reduces the cost of debt and can make this source of capital more accessible.

Regarding the characteristics that influence the cost of debt, some studies report that good corporate governance practices can contribute to reducing this cost (Aman & Nguyen, 2013; Barros *et al.*, 2015; Ghouma *et al.*, 2018; Moura *et al.*, 2020; Ripamonti & Kayo, 2016). There is also evidence in the international literature relating the structure and strategy characteristics of firms to their life cycle, which can affect both the cost of equity (Habib *et al.*, 2019) and the cost of debt (Habib & Hasan, 2019), increasing or reducing these costs, depending on the life cycle stage in which the company is, reflecting its levels of risk and uncertainty.

2.3 Life Cycle Stages

We can see that companies go through a series of distinct phases as they develop and grow, which can be expressed in terms of life cycle stages. These stages will depend on the set of strategies, structures, problems, and processes that are faced by companies during a specific period, whose reflexes are variations both in internal and external factors (Dickinson, 2011).

The accounting literature reports some proxies to measure the life cycle of firms. Through an analysis based on economic theory, Dickinson (2011) proposes a classification methodology based on the firm's cash flows, which provides a relevant understanding of its performance and resource allocation. This classification is composed of five stages: Birth (Introduction), Growth, Maturity, Turbulence (Shake-Out), and Decline.

Dickinson's (2011) methodology considers that firms do not necessarily follow a linear behavior in their development. That is, they do not move inexorably from one stage to another (Lester *et al.*, 2003). The most appropriate would be for firms to seek to recycle between the Growth and Maturity stages, which are marked by maximized profits and presumably lower risks than the other stages - Birth, Turbulence, and Decline - (Dickinson *et al.*, 2018).

The firms' characteristics are associated with their life cycle stages and can be observed from their financial reports (Dickinson, 2011). For example, companies in the Birth, Turbulence, and/or Decline stages tend to have a higher risk profile, higher levels of operational uncertainty, and less clear strategic objectives. Therefore, life cycle stages are associated with factors such as financial policies (Habib & Hasan, 2019), capital structure

(Victor *et al.*, 2018; Habib & Hasan, 2019), financing costs (Habib & Hasan, 2019), and corporate governance mechanisms (Filatotchev *et al.*, 2006; Habib & Hasan, 2019; Li & Zang, 2018; O'Connor & Byrne, 2015). This reinforces the logical argument of this study.

Firms in more stable stages (e.g., Maturity) produce better quality information and, consequently, have a lower cost of capital due to less uncertainty about their operations (Habib *et al.*, 2019). That is, when the company has a higher quality of information throughout its life cycle, this factor leads to a reduction in information asymmetry between the entity and the interested parties, which tends to translate into a lower cost of capital (Habib *et al.*, 2019). In this sense, a higher level of disclosure can negatively impact firms' cost of debt (Lima, 2009).

From the evidence highlighted, it is evident that there is an association between the quality of corporate governance and the cost of debt, but little is known how this association varies according to the life cycle stage of the companies, with the latter revealing a condition of development and growth and not necessarily the age of the company. Thus, it may exert a moderating effect on the first highlighted relationship. Therefore, this research raises the discussion about the possibility that firms in more unstable and risky life cycle stages have an association between corporate governance and the cost of debt in different magnitudes than other firms.

2.4 Hypothesis Development

Regarding the firms' characteristics at different stages of the life cycle, firms that are in the Birth stage are expected to have the purpose of establishing themselves in the market, so there is greater demand for financing and greater uncertainty about their operations (Lima *et al.*, 2015). For them to be able to remain in the market and be able to grow, it is essential that at this stage firms carry out large volumes of investments, thus using external resources from loans and financing to cover the negative results in operating activities for some time (Dickinson, 2011; Ribeiro *et al.*, 2018; Victor *et al.*, 2018).

With this in mind, and considering the characteristics of uncertainty experienced at this stage of the life cycle, the first research hypothesis is presented:

H₁ – In the Birth life cycle stage, the negative effect of the quality of corporate governance on the cost of debt is more pronounced than in the Growth and Maturity stages.

The Growth stage is marked by a large increase in production and sales volume. At this stage, a greater volume of investment in technology is also necessary for differentiating its products and services, thus causing consumption of cash in investment activities and the continuous need to raise external resources (Dickinson, 2011; Lima *et al.*, 2015).

In the Growth stage, uncertainties tend to be smaller than in the Birth stage, however, the company still has a higher expected value in more distant future cash flows (Vasconcelos & Martins, 2019). Since in the Growth stage uncertainties are smaller and firms show greater growth in their cash flows, the following hypothesis is considered:

H₂ – In the Growth life cycle stage, the negative effect of the quality of corporate governance on the cost of debt is less pronounced than in the Birth stage.

In the Maturity stage, the company's strategic objectives are aimed at maximizing profit margins and increasing profitability, especially by reducing costs and expenses (Lima *et al.*, 2015). At this stage, there is still a need for investments, however, in a smaller volume than in the Birth and Growth stages (Dickinson, 2011; Victor *et al.*, 2018). Furthermore, a considerable part of the investments is already financed by the firm's profits (reinvestment).

In Maturity, the firm tends to operate in a more diversified way and there is a maximization of its value resulting from reductions in the cost of capital and risk (Lima *et al.*,

2015), especially because firms at this stage are considered less risky and, therefore, they tend to have a lower cost of capital (Dickinson *et al.*, 2018). Thus, the third research hypothesis of this study assumes that:

H₃ – In the Maturity life cycle stage, the negative effect of the quality of corporate governance on the cost of debt is less pronounced than in all other stages.

The last two stages pointed out by Dickinson (2011) are Turbulence and Decline, stages in which firms face the greatest difficulties in terms of cash flows and operational continuity. The Turbulence phase is characterized by structural transformations with the purpose of the firm returning to the growth of its cash flows (Lester *et al.*, 2003).

Dickinson (2011) did not find consolidated literature in economic theory regarding the characteristics explicitly related to cash flows at this stage. Thus, the classification is carried out residually when there are positive or negative results for all activities, or even in cases where only the funding flows are negative (Costa *et al.*, 2017).

The Decline stage is marked by a more conservative behavior on the part of firms than in the other stages. This is a critical step for the firm's survival, as its continuity is at greater risk (Costa *et al.*, 2017). Companies at this stage tend to sell part of their assets to reduce their indebtedness and keep their operating cash flows positive, as they tend to report higher volumes of expenses and losses when they accumulate negative results (Ribeiro *et al.*, 2018).

Due to these characteristics, firms in Decline tend to bear higher debt costs. Therefore, the adoption of corporate governance mechanisms can lead to a reduction in such costs. Thus, the fourth and last hypothesis of this study expects that:

H₄ – In the Turbulence and Decline life cycle stages, the negative effect of the quality of corporate governance on the cost of debt is more pronounced than in all other stages.

3 METHOD

The research universe comprises publicly traded companies listed on B3 (Brasil, Bolsa, Balcão), and the sample consists of firms that were part of the IBrX100 index during the period from 2010 to 2019. The choice for this sample is motivated by the fact that these firms have the most traded shares and, in a way, have greater representation in the Brazilian capital market.

Following the perspectives of previous studies (Lima *et al.*, 2015; Assunção *et al.*, 2017), firms in the financial sector were excluded because they have specific accounting regulations and a different capital structure from other companies. After this procedure, 77 firms remained in the sample. Furthermore, the necessary data were collected in the Economática database, in the Reference Forms (RF), in the Financial Statements (FS), and firm's Explanatory Notes (EN) available on the websites of the firms and B3.

The initial analysis of the cost of debt was carried out by the ratio between the firm's financial expenses and onerous liabilities, according to previous studies (Barros *et al.*, 2015; Einsweiller *et al.*, 2020; Konraht *et al.*, 2016). However, similarly to Konraht *et al.* (2016), we observed that a considerable portion of the sample had a very different cost of debt compared to the average practiced by the market. Thus, we decided to analyze the content of the explanatory notes, focusing on the elements of financial expenses that were part of the metric for calculating the onerous liability.

Due to the unavailability of data or the non-segregation of information on the cost of debt, even in the explanatory notes of financial expenses, other companies were also removed from the sample, leaving the final sample of 49 firms, which gave rise to a balanced panel with 490 observations. To identify the firm's life cycle stages, Dickinson's (2011) model was used, which is composed of 5 stages, and is based on the behavior of operating, investment,

and financing cash flows. This allows for a more parsimonious classification, the methodology of which is presented in Table 1, Panel A.

Table 1

Classification of the firm’s life cycle stages and distribution of stages in the sample

Panel A – Classification Methodology according to the Dickinson Model			
Life Cycle Stage / Cash Flow	Operational	Investment	Financing
Introduction (Birth)	–	–	+
Growth	+	–	+
Maturity	+	–	–
Turbulence (<i>Shake-Out</i>)	+	+	+
	–	–	–
	+	+	–
Decline	–	+	+
	–	+	–

Panel B – Sample Distribution by Life Cycle Stages		
Life Cycle Stage	Frequency	Relative Frequency
Birth	25	5.10%
Growth	154	31.43%
Maturity	271	55.31%
Turbulence	35	7.14%
Decline	5	1.02%
Total	490	100.00%

Note. + and – represent the cash flow signs of each of the activities presented in the firms’ Cash Flow Statements.

Source: adapted from Dickinson (2011).

Based on Panel A in Table 1, which presents the classification of the firm’s life cycle stages, Panel B presents the frequency distribution of the firm-year observations that constituted the analyzed sample of the study. It is possible to observe that few observations were in the Decline stage, therefore, in the data analysis this stage was analyzed together with the Turbulence stage.

Given the objective of investigating the relationship between the quality of corporate governance and the cost of debt, given the role of governance in mitigating risks and reducing these costs, it was decided to measure the quality of governance by adapting the Corporate Governance Index (CGI) proposed by Assunção *et al.* (2017). The use of this metric is justified because it is already a validated indicator, as it is a current model and encompasses important perspectives on the quality of corporate governance, from which those that had a possible relationship with the cost of debt were identified.

Table 2 shows the dimensions and indicators of corporate governance used in the calculation of the CGI developed by Assunção *et al.* (2017), whose adaptation for use in the present study occurred through the removal of some items, which had no direct relationship with the cost of debt.

Following the method of Assunção *et al.* (2017) to determine the CGI, the value “1” is assigned when the good governance practice recommendation is adopted and the value “0” for cases of non-compliance, considered as indicative of the adoption of good governance practice governance the disclosures made by the companies in the collection sources listed in Table 2. As in Assunção *et al.* (2017), it is noted that there is no situation in which any of the items present in the CGI are not applicable. Thus, the CGI of each company is obtained by the ratio between the score obtained by the company and the maximum possible value, which in this study was 9 points.

Table 2
Corporate Governance Index proposed by Assunção et al. (2017)

Dimension	Item analyzed	Data source
Information access and content	The firm makes the Annual Report of previous years available on its website.	Firm's website
	The firm reports operational and/or economic-financial projections.	Item 11.1 of the RF
Board of Directors	The positions of Chairman of the Board of Directors and CEO are held by different people.	Item 12.6/8 of the RF
	The Board of Directors is composed of 5 (five) to 11 (eleven) members.	Items 12.1 and 12.6/8 of the RF
	The Board of Directors is composed of at least 50% of independent directors.	Item 12.6/8 of the RF
	The term of office of the Board of Directors does not exceed 2 (two) years and is unified.	Items 12.1 and 12.6/8 of the RF
Other Corporate Governance Bodies and Agents	The firm has an Audit Committee.	Item 12.7 of the RF
	The firm has other advisory committees.	Item 12.7 of the RF
	The firm's Supervisory Board is permanent.	Item 12.1 of the RF

Source: adapted from Assunção et al. (2017).

Table 3
Metrics for calculating the research variables

Dependent Variable	Description	Metric	Theoretical basis	Data source
<i>Kd</i>	Cost of Debt	$\frac{\text{Financial expenses reported}_t}{\text{Average onerous liabilities}}$	Barros et al. (2015); Einsweiler et al. (2020); Konraht et al. (2016)	Firm's FS and EN
Independent Variables	Description	Metric	Theoretical basis	Data source
<i>CGI</i>	Corporate Governance Quality Index	Calculated based on the dimensions and items shown in Table 2	Adapted from Assunção et al. (2017)	B3's website
<i>D_CYCLE</i>	A representative variable of the Life Cycle Stage under analysis	Dummy that corresponds to the Life Cycle Stage (Birth, Growth, Maturity or Turbulence and Decline), which assumes the value 1 for firms in the Stage under analysis in the model and 0 for the others	Dickinson (2011)	Economática
Control Variables	Description	Metric	Theoretical basis	Data source
<i>SIZE</i>	Firm's Size	Natural Logarithm of Total Assets	Barros et al. (2015); Einsweiler et al. (2020)	Economática
<i>ROA</i>	Return on Total Assets	$\frac{EBIT}{\text{Total Assets}}$	Barros et al. (2015)	
<i>TANG</i>	Tangibility	$\frac{\text{Tangible assets}}{\text{Total Assets}}$	Nardi and Nakao (2009)	
<i>INDEBT</i>	Indebtedness	$\frac{\text{Onerous Liability}}{\text{Total Assets}}$	Barros et al. (2015); Einsweiler et al. (2020)	

Having defined the way of measuring the quality of corporate governance, based on the evidence pointed out in previous studies, Table 3 presents the variables used in the econometric models.

Considering the purpose of the study and based on the variables shown in Table 3, the statistical model presented in Equation 1 was proposed, through a multivariate analysis using multiple linear regression with panel data. It is noteworthy that the model is divided into four equations since the variable *D_CYCLE* is replaced in each equation by the dummies representing the stages of the life cycle pointed out in the research hypotheses.

Furthermore, the proposed model is made up of three variables of interest, with an interaction variable to capture the life cycle effect, one that indicates the quality of corporate governance, one that captures the cost of debt, and five other variables of control, according to Equation 1.

As observed in Equation 1, a control for the period is added through the variable *YEAR_t*, since changes in the macroeconomic scenario over the years can significantly affect the cost of financing companies. A control for the period is added through the variable since changes in the macroeconomic scenario over the years can significantly affect the cost of financing companies.

$$Kd_{it} = \beta_0 + \beta_1CGI_{it} + \beta_2D_CYCLE_{it} + \beta_3CGI_{it} * D_CYCLE_{it} + \beta_4SIZE + \beta_5INDEBT_{it} + \beta_6ROA_{it} + \beta_7TANG_{it} + \beta_8D_YEAR_t + \varepsilon_{it} \quad (1)$$

Finally, robustness tests of the models were performed, such as the Breusch-Pagan, Chow's F and Hausman tests to identify the panel treatment that provides the most consistent estimator for the proposed model. Considering a significance level of 5%, the tests indicate the use of random effects. Furthermore, outlier correction techniques for quantitative variables were applied with winsorization at the 2% level, in addition to the models being estimated with robust standard errors for heteroscedasticity.

4 FINDINGS

This section presents descriptive statistics on the cost of debt and the corporate governance index, as well as the results of the econometric analysis used to test the hypotheses raised in the study.

We observe in Table 4 that the average cost of debt decreased from 8.03% in 2010 to 6.44% in 2019. In median terms, we can observe a reduction in the cost of debt over the years. The minimum and maximum indicators increased from, respectively, 4.03% and 12.79% in 2010 to 3.55% and 9.95% in 2019. This variation in the cost of debt over the years reinforces the need for control per year in econometric models, following the procedure carried out by Fonseca and Silveira (2016).

Regarding the average cost of debt observed in the study (7.64%), it is noteworthy that it differs considerably from the averages observed in previous studies, which ranged between 20% and 46% (Barros *et al.* 2015; Einsweiller *et al.*, 2020; Fonseca & Silveira, 2016; Moura *et al.*, 2020). Remarkably, these averages are not in line with the practice of the Brazilian market in the period investigated, which revolves around the Selic or CDI rates plus a premium. For this reason, in this study, greater rigor was applied in the calculation of the cost of debt, with a detailed analysis of the firms' reports, instead of a simple calculation based on financial expenses. Therefore, we believe that this average of 7.64% is more believable.

Table 4
Descriptive statistics of the Cost of Debt and the Corporate Governance Index

Year	Cost of Debt – Kd					Corporate Governance Index – CGI				
	Mean	Standard Deviation	Median	Min.	Max.	Mean	Standard Deviation	Median	Min.	Max.
2010	8.03%	2.46%	7.95%	4.03%	12.79%	58.27%	16.28%	55.55%	11.11%	88.88%
2011	8.07%	2.65%	7.50%	3.46%	12.73%	58.27%	16.59%	55.55%	11.11%	88.88%
2012	7.23%	1.80%	6.98%	3.46%	10.60%	60.99%	15.89%	66.66%	11.11%	88.88%
2013	7.23%	1.80%	6.97%	3.46%	11.76%	61.67%	15.55%	66.66%	11.11%	88.88%
2014	7.95%	2.33%	8.06%	3.46%	12.79%	62.13%	14.85%	66.66%	11.11%	88.88%
2015	8.40%	2.75%	8.42%	3.46%	12.79%	63.03%	15.11%	66.66%	11.11%	88.88%
2016	8.55%	2.59%	8.28%	3.46%	12.79%	63.23%	15.41%	66.66%	11.11%	88.88%
2017	7.69%	1.84%	7.51%	3.46%	11.76%	63.94%	15.47%	66.66%	11.11%	88.88%
2018	6.84%	1.28%	6.82%	3.54%	9.43%	66.21%	16.34%	66.66%	11.11%	88.88%
2019	6.44%	1.52%	6.30%	3.55%	9.95%	67.12%	16.66%	66.66%	11.11%	88.88%
Total	7.64%	2.24%	7.28%	3.46%	12.79%	62.49%	15.92%	66.66%	11.11%	88.88%

Regarding the corporate governance proxy (CGI), the measure showed low dispersion observed in the standard deviation, minimum and maximum indicators. It is noticed that there was an increase on average from 58.27% in 2010 to 67.12% in 2019, which indicates that, on average, firms show an improvement in their corporate governance attributes during this period, considering the mechanisms analyzed according to Table 4. The proxy adopted for the CGI had an average index (62.49%) higher than that used in the study by Barros *et al.* (2015), which was 47.50%. However, it is important to consider that these studies have a different number of items analyzed.

Table 5 shows the descriptive statistics of the cost of debt and the CGI of firms for each stage of the life cycle in the period from 2010 to 2019. Note that in the life cycle stages considered riskier (Birth, Turbulence and Decline), on average, firms had a higher cost of debt compared to the Growth and Maturity stages. This finding converges with the observations of Dickinson *et al.* (2018) on the risks at these stages, which seems to be well captured by the credit market in Brazil.

Therefore, as they are subject to a higher average cost of debt due to their higher risk characteristics, it is possible to expect that in the Birth, Turbulence, and Decline stages a greater adoption of corporate governance mechanisms will be seen by creditors as a greater factor. relevance in determining the cost of debt. This converges with the motivation of this study, giving greater support to the research hypotheses raised.

Table 5
Cost of Debt and Corporate Governance Index by Life Cycle Stage

Life Cycle Stage / Kd	Mean	Standard Deviation	Median	Min.	Max.
Birth	8.64%	2.81%	8.56%	3.46%	12.79%
Growth	7.35%	2.09%	6.83%	3.46%	12.79%
Maturity	7.62%	2.23%	7.27%	3.46%	12.79%
Turbulence	8.12%	2.13%	7.75%	4.66%	12.47%
Decline	9.86%	1.97%	10.04%	7.76%	11.99%
Life Cycle Stage / CGI	Mean	Standard Deviation	Median	Min.	Max.
Birth	63.11%	11.43%	66.66%	33.33%	77.77%
Growth	62.12%	18.03%	66.66%	11.11%	88.88%
Maturity	62.44%	15.38%	66.66%	11.11%	88.88%
Turbulence	64.44%	13.68%	66.66%	44.44%	88.88%
Decline	60.00%	12.66%	55.55%	44.44%	77.77%

Regarding the CGI, we observed that the highest corporate governance indicators were for firms that were in the Birth, Maturity, and Turbulence stages, with average indicators of

63.11%, 62.44%, and 64.44%, respectively. This can be explained by the greater concern of these companies with their legitimacy in the capital market, as observed by Miranda, Melo, and Martins (2021). However, all stages have very close mean and median values. We also observed that the Growth and Maturity stages showed greater variation in the minimum values of 11.11% and maximum 88.88% and that the Growth stage indicated a greater standard deviation (18.03%).

Table 6 shows the descriptive statistics of the quantitative variables that made up the econometric models. It is noteworthy that the measures of dispersion and central tendency presented refer to aggregated information for the period 2010 to 2019. We noted that the average CGI of the sample was 0.62, suggesting that, on average, firms had 62% of the corporate governance mechanisms investigated. When compared to the study by Assunção *et al.* (2017), there is an evolution from that average of 46% observed by the authors. However, we cannot rule out that this difference is explained by differences in the sample and the period analyzed. In a simpler analysis, the differences in means suggest that there was an improvement in the quality of governance in this period.

Table 6

Descriptive statistics of quantitative and independent variables

Independent Variables	Mean	Standard Deviation	Median	Min.	Max.
CGI	0.62	0.15	0.66	0.11	0.88
SIZE	16.78	1.06	16.75	14.68	20.07
INDEBT	0.34	0.15	0.33	0.05	0.69
ROA	0.08	0.04	0.07	-0.02	0.19
TANG	0.29	0.22	0.28	0.00	0.80

As for the indebtedness percentage and the level of the tangibility of the firms, these indicators present a very high amplitude, suggesting that the indebtedness and tangibility levels of the companies vary a lot. That is, the analyzed sample ranges from companies with low debt and with little participation of fixed assets in the invested equity, to companies with high participation of onerous liabilities and expressive percentages of fixed assets.

Table 7 presents the results of the models proposed to test the research hypotheses (H₁, H₂, H₃, and H₄). The Wald test shows that, in general, the four models have consistent results, considering a significance level of 1%. The general explanatory power (R²) of models 1, 2, 3, and 4 were, respectively, 11.83%, 12.91%, 11.63%, and 13.35%. This suggests that the variables that make up the model have the power to explain the variations observed in the cost of debt.

However, regarding the effect of governance on the cost of debt according to the life cycle of firms, for the first three models that deal with the stages of Birth, Growth, and Maturity, the coefficients of the variables of interest (CGI_{it} ; D_CYCLE_{it} ; $CGI_{it} * D_CYCLE_{it}$) did not show values statistically different from zero. Thus, it is not possible to affirm that, in these stages, the quality of corporate governance negatively affects the cost of debt, whether to a greater or lesser extent.

Considering that for models 1, 2, and 3 the results obtained were not statistically significant for the interaction variable $CGI_{it} * D_CYCLE_{it}$, research hypotheses 1, 2, and 3 cannot be confirmed. Therefore, based on the results presented, it is not possible to state that, in the period analyzed, the quality of corporate governance of companies in the Birth, Growth, and Maturity stages have distinct effects on the cost of debt. It is inferred that creditors do not consider that a higher level of corporate governance is an important factor in reducing the cost of debt for these companies.

Table 7

Panel Regression Models with Random Effects and Robust Standard Errors

Kd_{it}	Model 1	Model 2	Model 3	Model 4
	(Birth)	(Growth)	(Maturity)	(Turbulence and Decline)
	Coefficient β			
	(Robust Standard Error)			
CGI_{it}	0.0086 (0.0128)	0.0031 (0.0136)	0.0122 (0.0143)	0.0139 (0.0134)
D_CYCLE_{it}	-0.0097 (0.0124)	-0.0131 (0.0070)	0.0044 (0.0062)	0.0397** (0.0165)
$CGI_{it} * D_CYCLE_{it}$	0.0156 (0.0206)	0.0184 (0.0102)	-0.0062 (0.0096)	-0.0575** (0.0257)
$SIZE_{it}$	-0.0043*** (0.0020)	-0.0043** (0.0020)	-0.0044*** (0.0020)	-0.0040 (0.0021)
$INDEBT_{it}$	-0.0066 (0.0137)	-0.0045 (0.0142)	-0.0068 (0.0141)	-0.0062 (0.0142)
ROA_{it}	0.0458 (0.0266)	0.0455 (0.0278)	0.0454 (0.0276)	0.0493 (0.0279)
$TANG_{it}$	0.0001 (0.0075)	0.0009 (0.0071)	0.0001 (0.0071)	0.0008 (0.0072)
Constant	0.1438*** (0.0317)	0.1475*** (0.0327)	0.1423*** (0.0330)	0.1354*** (0.0330)
Year Dummies	Yes			
Observations	490	490	490	490
Prob (Wald chi2)	0.0000	0.0000	0.000	0.0000
R-square	11.83%	12.92%	11.63	13.35%

Notes. Results regarding the general model proposed in Equation 1 of the Methodology:

$$Kd_{it} = \beta_0 + \beta_1 CGI_{it} + \beta_2 D_CYCLE_{it} + \beta_3 CGI_{it} * D_CYCLE_{it} + \beta_4 SIZE_{it} + \beta_5 INDEBT_{it} + \beta_6 ROA_{it} + \beta_7 TANG_{it} + \beta_8 D_YEAR_t + \varepsilon_{it}$$

Kd_{it} = proxy for the cost of debt;

CGI_{it} = Corporate Governance Quality Index;

D_CYCLE_{it} = dummy variable that indicates the stage of the Life Cycle analyzed in each of the models;

$CGI_{it} * D_CYCLE_{it}$ = interaction variable between the CGI and the stage of the Life Cycle experienced;

$SIZE_{it}$ = control variable that indicates the size of the firm;

ROA_{it} = control variable that indicates the Return on Total Assets;

$INDEBT_{it}$ = control variable that indicates the level of indebtedness;

$TANG_{it}$ = control variable that indicates the Tangibility level;

D_YEAR = control variable that indicates the year;

ε_{it} = error term of the model.

Variables were winsorized at the 2% and 98% percentiles, and the coefficients were estimated based on robust standard errors for heteroscedasticity.

*** and ** represent a significance of 1% and 5% respectively.

Regarding the control variables, we observe that only the size of the company and some of the years (2012, 2013, 2018, and 2019) showed significant coefficients and a negative relationship with the cost of debt. The year 2016 also had a significant coefficient, but it was positively related to the cost of debt. That year Brazil faced a presidential impeachment, which made the financial market more volatile. Thus, it is observed that the macroeconomic factors of certain periods affect the cost of debt.

The relationship between firm size and cost of debt is in line with the evidence presented in previous studies (Barros et al., 2015; Einsweiller et al., 2020; Fonseca & Silveira, 2016; Konraht et al., 2016; Moura et al. 2020; Nardi & Nakao, 2009;). Furthermore, the Return on Total Assets (ROA) and Tangibility variables were also not significant in the

study by Konraht *et al.* (2016), however, unlike the work mentioned, in the present study, the indebtedness variable did not present a significant coefficient.

For Model 4, among the variables of interest in the study, only the variable CGI_{it} (analyzed in isolation) did not present a coefficient statistically different from zero. The dummy variable D_CYCLE_{it} , a representative in this model of the Turbulence and Decline stages, showed a positive and significant relationship (5% significance level) with the cost of debt (Kd_{it}). That is, the fact that the company is in the Turbulence or Decline stages increases the cost of third-party capital, supporting the idea that such stages reflect greater risk and uncertainty and that this is reflected in a more cost of debt high.

However, these life cycle stages moderate the relationship between the Corporate Governance Index and the cost of debt ($CGI_{it} * D_CYCLE_{it}$), that is, there is a negative and significant moderating effect, ratifying the fourth hypothesis (H4) of this study. That is, the findings demonstrate that in the Turbulence and Decline stages, a higher Corporate Governance Index effectively translates into a lower cost of debt. Therefore, the firm's life cycle (Turbulence and Decline) exerts a moderating effect on the relationship between the quality of corporate governance and the cost of debt. This finding complements the evidence by Miranda, Melo, and Martins (2021), demonstrating that for riskier companies, corporate governance may not only have an element of legitimacy but also represent a reduction in their cost of capital (at least that from third parties).

5 CONCLUSIONS

This study investigated the effect of the life cycle stage on the relationship between the quality of corporate governance and the cost of debt of publicly traded companies in Brazil. Their findings showed that the quality of corporate governance did not show a significant relationship with the cost of debt of the companies analyzed in three of the five life cycle stages analyzed. Although creditors are expected to attach relevance to such mechanisms, during the period analyzed this was not a determining factor in the cost of debt for companies that are not in the life cycle stages that represent a greater risk for the investor. Thus, it is possible that, on average, creditors already expect a certain level of corporate governance from companies, and do not attribute an additional discount to this factor due to its increase.

However, we note that the quality of governance is perceived as relevant in determining a lower cost of debt for companies in more complicated phases of their life cycle, such as Turbulence and Decline. It is noteworthy, however, that the present study used different metrics in the construction of the proxy for governance and that it was not limited to analyzing the simple listing in the special corporate governance segments of B3. In addition, the cost of debt also followed a pattern of greater robustness, facts that may explain part of the differences found in previous studies. However, this delivers greater robustness to these findings.

The firms' cost of debt was estimated by analyzing the financial expense elements that were effectively related to the cost of the onerous liability in the firms' explanatory notes. The average cost of 7.64% is more believable than previously reported averages that exceeded two decimal places. The weakness of the previous studies is found precisely in the content of the "Financial Expenses" item, which in Brazil encompasses more than passive interest, but also elements such as exchange variation and impairment losses on company assets.

Regarding the average cost of debt between the stages of the life cycle, it is noted that companies in stages considered riskier (Birth, Turbulence and Decline) have an average cost higher than the stages (Growth and Maturity), which is quite reasonable and confirms the logical meaning of this analysis. We also observe that, in the Brazilian market, the

macroeconomic factors characteristic of each period influences the cost of third-party capital, since some years had significant coefficients, increasing, or reducing the cost of debt raised by companies.

About the hypotheses raised in the research on the moderating effect of the stages of the life cycle of firms concerning corporate governance and the cost of debt of firms, the findings of this analysis confirm only the fourth hypothesis (H4), the most relevant of governance in the Turbulence and Decline stages. The other hypotheses were not confirmed since the variables of interest were not statistically significant.

Thus, the evidence presented in this study contributes to the understanding of the relationship between governance and the cost of debt at different stages of the life cycle, especially in the stages of Turbulence and Decline, complementing previous evidence that saw the negative relationship between governance and cost, but they didn't consider the life cycle. Furthermore, it demonstrates that corporate governance is not only a legitimizing factor but that it is also seen by the market as indispensable for riskier companies, which reduces their cost of capital and tends to increase the firm's value.

Despite its relevant findings, this study has some limitations that deserve to be highlighted, since a non-probabilistic approach was chosen in determining the sample and that some companies did not have the necessary detailed information to calculate the cost of debt. However, such elements do not invalidate the study findings. Furthermore, we suggest that the proposed relationship about the life cycle moderating effect on the relationship between corporate governance and the cost of debt is also explored in a more developed capital market context.

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Efeito do Ciclo de Vida na Relação entre Qualidade da Governança Corporativa e Custo da Dívida das Empresas Abertas no Brasil

RESUMO

Objetivo: Investigar o efeito do estágio de ciclo de vida na relação entre a qualidade da governança corporativa e o custo da dívida das empresas abertas no Brasil.

Método: A qualidade da governança corporativa foi medida por meio de um índice (CGI) composto por 9 itens e o custo da dívida foi capturado diretamente das notas explicativas das demonstrações financeiras. A análise contou com 49 empresas não financeiras integrantes do IBrX-100 entre os anos de 2010 e 2019, com auxílio de regressões com dados em painel.

Originalidade/Relevância: O estudo inova ao explorar o efeito moderador do estágio do ciclo de vida das firmas na relação entre governança corporativa e custo da dívida, demonstrando que essa associação é mais importante nos estágios de Turbulência e Declínio.

Resultados: O custo médio da dívida foi de 7,64% a.a., inferior às médias evidenciadas em estudos anteriores no contexto brasileiro, estando mais alinhado às práticas do mercado. Os achados demonstram que a governança é mais importante para a redução do custo da dívida de empresas nos estágios de Turbulência e Declínio, revelando que efetivamente o ciclo de vida da empresa importa para essa relação.

Contribuições teóricas/metodológicas: O estudo demonstra que o custo da dívida não é representado adequadamente pelo agregado da rubrica “Despesas Financeiras” das demonstrações financeiras da empresa, que o mercado de crédito tende a incluir a governança na determinação do custo do capital e que o ciclo de vida é especialmente importante para a redução do custo da dívida de empresas mais arriscadas, nos estágios de Turbulência e de Declínio.

Palavras-chave: Custo da Dívida; Governança Corporativa; Ciclo de Vida da Firma.

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