Revista Catarinense da CIÊNCIA CONTÁBIL

ISSN 2237-7662. Florianópolis, SC, v. 23. 1-17. e3528. 2024

https://doi.org/10.16930/2237-7662202435282

available at http://revista.crcsc.org.br

CORPORATE DEBT AND CRASH RISK IN THE BRAZILIAN STOCK MARKET

WESLEY CIRINO DOS SANTOS[1]
Federal University of Minas Gerais
https://orcid.org/0000-0003-3041-9825
wcsantos104@gmail.com

RENATA TUROLA TAKAMATSU
Federal University of Minas Gerais
https://orcid.org/0000-0003-4423-9024
rettakamatsu@gmail.com

GUSTAVO HENRIQUE DIAS SOUZA
Federal University of Minas Gerais
https://orcid.org/0000-0003-0441-8191
gustavohediso@gmail.com

ABSTRACT

This study aimed to analyze the relationship between the crash risk of Brazilian firms' stock prices and creditor monitoring through corporate debt maturity. Using a sample of non-financial companies with shares traded on the *Brasil, Bolsa, Balcão* (B3) stock exchange between 2010 and 2020. the data was examined through panel regressions estimated with clustered robust standard errors. Short-term debt maturity does not exhibit a statistically significant relationship with stock price crash risk. However, debt maturity diversification shows an inverse relationship with crash risk, indicating a reduction in this risk. Exploring the diversification of debt maturities may benefit both creditors and shareholders, underscoring its potential importance in corporate financial risk management strategies. Understanding crash risk while emphasizing the importance of debt maturity diversification helps safeguard creditors' interests and protect shareholder wealth. This study is the first to examine this relationship in the Brazilian context, offering valuable insights and implications for financial risk management.

Keywords: Debt Maturity. Stock Price Crash Risk. Financing Structure.

Edited in Portuguese and English. Original version in Portuguese.

Version of the Article presented at the 23rd USP International Conference in Accounting and the 20th USP Congress of Scientific Initiation in Accounting, from July 26 to 28, 2023.

[1] **Correspondence address:** Avenida Presidente Antônio Carlos, 6627 | Pampulha | 31270-901 | Belo Horizonte/MG | Brazil.

Received on 08/24/2024**. Revised** on 10/26/2024**. Accepted** on 11/25/2024 by Prof. Dr. Rogério João Lunkes (Editor-in-Chief**). Published** on 12/13/2024.

1 INTRODUCTION

A stock crash risk refers to an extreme collapse in equity value that causes a severe loss of wealth for stock investors - in other words, it represents a negative skewness in the individual stock returns of a firm (Callen & Fang, 2015a; Chen et al., 2001; Kim et al., 2014). In this context, active investors aiming to maximize short-term returns and holding a significant position in a stock that experiences a crash in its value may face substantial wealth losses.

Chen et al. (2001) and Jin and Myers (2006), in seminal studies, employed the conditional skewness of the distribution of firm-specific stock returns as a measure of "crash tendency" and found evidence that stock price crashes are caused by the disclosure of previously withheld bad news. Kim et al. (2011a) emphasize that this withholding of bad news by a manager leads to the firm's stock price being overvalued, thereby creating a bubble. Consequently, when the negative information reaches a tipping point - meaning managers can no longer withhold the bad news from the market - it is suddenly released to the capital markets, resulting in the bursting of the bubble and, consequently, a stock price crash (Hutton et al., 2009; Jin & Myers, 2006).

The literature in this area is still emerging, and studies focus on possible determinants of crash risk, such as the opacity of financial statements (Hutton et al., 2009), tax evasion (Kim et al., 2011b), earnings management (Cohen et al., 2014; Francis et al., 2014), corporate social responsibility (Kim et al., 2014; Zhang et al., 2016), accounting conservatism (Kim & Zhang, 2015), the adoption of international accounting standards (DeFond et al., 2015), incentives and political and economic uncertainty (Lee & Wang, 2017; Piotroski et al., 2015), and corporate governance mechanisms (Andreou et al., 2016). In light of this, Dang et al. (2018) clarify that despite the increase in research related to crash risk, studies investigating it in conjunction with a firm's financing policy remain scattered.

Moreover, the literature highlights the monitoring role of debt creditors over the firm—that is, the monitoring of accounting and financial information due to debt renewal (Dang et al., 2018). Short-term debt creditors, in particular, can protect their rights by requiring managers to provide information about the firms' financial condition and future investments when negotiating debt contract renewals. This distinct characteristic of short-term debt enhances information disclosure, restricts the likelihood of bad news being withheld, and therefore reduces stock price crash risk (Dang et al., 2018).

While it is possible that long-term debt holders can also exercise a monitoring function, especially through the use of debt covenants, the monitoring role of long-term debt tends to be less effective than that of short-term debt. This is because the covenants of long-term debts are renewed less frequently than those of short-term debts; thus, creditors are less inclined to examine and assess firms' performance in the short term (Hasan et al., 2020).

Given this context, the research question of this study is: What is the relationship between the stock price crash risk of Brazilian firms and creditor monitoring through corporate debt maturity? Therefore, the general objective of this work is to analyze how creditor monitoring, via corporate debt maturity, influences the stock price crash risk of firms with shares traded on the *Brasil, Bolsa, Balcão* (B3) stock exchange from 2010 to 2020.

Several characteristics distinguish the Brazilian market from others, reinforcing the need for new analyses, such as: (i) access to the capital market and terms for long-term financing, both of which are significantly smaller and more restricted than in developed markets, particularly in the case of the capital market, where Brazilian firms, on average, exhibit higher levels of indebtedness than U.S. firms, resulting in shorter financing terms compared to long-term contracts (Funchal & Monte-Mor, 2016); (ii) various differentiated sources and lines of financing, such as resources from the Brazilian Development Bank (BNDES), rural credit, and foreign currency lines (Bernardo et al., 2018); and (iii) high interest rates and a scarcity of long-term financing, which often lead firms to rely on internal funds whenever available (Albanez et al., 2012).

This study contributes to the literature by demonstrating that short-term debt maturity does not exhibit a statistically significant relationship with stock price crash risk in the Brazilian market. This finding contrasts with the literature that argues that short-term debt creditors play a more effective monitoring role in curbing managers' tendencies to withhold bad news. However, the findings of this study indicate that, while exclusively short-term debt does not have monitoring capability, debt maturity diversification reveals a strong inverse relationship with stock price crash risk. In other words, diversifying debt maturities helps reduce the risk of stock price crashes.

2 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Debt is one of the primary means of capital acquisition for firms, leading to the development of numerous theoretical and empirical implications stemming from the work of Modigliani and Miller (1958) on the optimal level of a firm's capital structure and its consequences for financial decisions. However, according to Dang et al. (2018), many theoretical approaches and studies fail to address the monitoring capacity of debt creditors over the firm to understand the effect of monitoring on shareholder wealth through its impact on stock price crash risk.

In this context, although Miller and Modigliani (1961) propose that in a frictionless capital market, firms should be indifferent regarding their source of financing, subsequent literature argues that a higher proportion of debt reduces agency costs (Jensen & Meckling, 1976) and that the choice of debt maturity structure plays a crucial role in mitigating agency conflicts (Barclay & Smith, 1995; Guedes & Opler, 1996; Stohs & Mauer, 1996).

Building on this, with respect to short-term debt, Demirgüç-Kunt and Levine (2004) clarify that it can reduce agency costs by subjecting managers to constant monitoring by creditors, as short-term debt is frequently renewed. Moreover, later studies suggest that less transparent firms, in terms of information disclosure, put creditors at risk, forcing them to use short-term debt to mitigate informational asymmetry (Ortiz-Molina & Penas, 2008). In addition, the financial literature has identified other benefits associated with short-term debt maturity.

These benefits can be classified from different perspectives, with one of the distinct advantages of short-term debt for creditors being the provision of ex-post control rights, enabling effective monitoring of borrowers. Since debt contracts are considered incomplete, creditors generally lack control rights over all future contingencies within the initial contract terms. Consequently, Giannetti (2003) points out that short-term debt offers better protection to creditors, as it provides greater bargaining power, such as signaling the possibility of refinancing rejection when the short-term debt is renewed.

Thus, one of the primary benefits of short-term debt is its capacity to exercise a monitoring function over firms, thereby reducing agency conflicts and enhancing corporate disclosure. In this research field, previous studies show that short-term debt maturity subjects firms to more frequent and rigorous monitoring by creditors (Datta et al., 2005; Demirgüç-Kunt & Levine, 2004), thereby forcing the timely disclosure of information (Rajan & Winton, 1995). This process is reinforced as, in cases of short-term debt financing, creditors must assess the borrowing firm's credit quality, particularly during debt renegotiation and renewal processes.

This characteristic of short-term debt offers a significant advantage compared to long-term debt creditors, who can also play a monitoring role. Rajan and Winton (1995) argue that short-term debt provides creditors with greater flexibility, particularly regarding the frequency of debt renewals, which allows for more frequent monitoring of the borrowing firm's performance information. Consequently, long-term debt holders face higher credit risks due to less frequent contract reviews, offering greater opportunities for firms' management to engage in behaviors that lead to the accumulation of bad news (Hasan et al., 2020).

Moreover, it is important to consider that the heterogeneity of corporate debt structure can be relevant to firms' corporate governance by influencing managerial behavior and reducing

asymmetry and agency costs. Jadiyappa et al. (2020) argue that a diversified composition of debt maturities and types can promote effective creditor monitoring, contributing to the reduction of risks associated with stock price crashes. This diversity in sources and maturities could, therefore, generate a disciplining effect, positively influencing firm value by mitigating crash risk (Jadiyappa et al., 2020).

In the Brazilian context, Rocca et al. (2019) analyzed the composition of corporate financing sources and found that, in 2018. most firms combined different financing types, including bank loans, access to capital markets, and directed credit lines, aiming to diversify their capital structure and strengthen monitoring by market participants.

Building on this, Dang et al. (2018), in a pioneering study, presented evidence in the U.S. context that short-term debt plays an effective discretionary monitoring role over managers, restricting them from withholding bad news. This, in turn, prevents significant losses in investor wealth, as the monitoring associated with short-term debt is negatively related to stock price crash risk. In other words, the authors assert, complementing earlier literature, that short-term debt plays a fundamental monitoring role in firms, preventing managers from accumulating bad news to the point of triggering a collapse and subsequent stock price crash.

Studies linking external creditors and stock price crash risk remain nascent. To address this gap, Dang et al. (2018) examined the relationship between debt maturity structure and stock price crash risk in the United States. Complementing their work, Hasan et al. (2020) extended this research to assess whether these relationships hold in a different context where debt structure and capital market characteristics differ significantly from those in the U.S. They examined whether an opaque informational environment could help explain the observed relationships. Their findings indicated that, in the Australian stock market, stock price crash risk is positively and significantly associated with long-term debt maturity (Hasan et al., 2020). Furthermore, this positive association was more pronounced in firms operating in more opaque informational environments.

Building on prior studies, Elsayed (2021) evaluated the relationship between debt and crash risk from different perspectives: (i) Bank credit ratio, (ii) Trade credit ratio, and (iii) Net trade credit ratio. The author found that the Bank credit ratio did not exhibit a significant relationship with different measures of crash risk. Meanwhile, there was strong evidence that firms with high trade credit ratios showed a significant negative relationship with crash risk. Additionally, the Bank credit ratio had a highly negative and significant impact on all measures of crash risk. For the Egyptian market, the author provided evidence of how the nature of debt can influence crash risk.

Canbaloglu et al. (2022) also analyzed the relationship between debt maturity structure and stock price crash risk, focusing on the Istanbul Stock Exchange. Their findings indicated, conversely, that an increase in long-term debt could reduce the risk of stock price crashes. This was attributed to the idea that more efficient corporate management practices, involving the issuance of longer-term debt, could reduce the informational asymmetry that leads to stock price crash risk. Accordingly, the authors highlighted that the advantages of long-term financing include the potential to prevent stock price crashes, as such firms may exhibit greater transparency and more efficient internal monitoring.

Similarly, Haider et al. (2024) examine the impact of debt maturity structure on the stock price crash risk of Asian companies, with results indicating that firms with high long-term debt have a lower risk of stock price crashes. Consequently, the authors argue that increasing access to long-term loans reduces stock price crashes and agency problems resulting from information asymmetries.

Thus, it is evident that research in this field highlights the role of debt as a monitoring mechanism. It is expected that the nature of corporate debt contracts, particularly the maturity terms of these contracts, can serve as managerial incentive mechanisms to conceal or withhold bad news for an extended period, thereby influencing stock price crash risk. Specifically, Dang et al.

(2018) argue that the stringent monitoring associated with short-term debt compels firms to disclose relevant and reliable information, likely exceeding the disclosure required by contractual clauses. It is important to note that short-term debt is expected to provide managers with fewer opportunities to withhold adverse information, thereby facilitating the timely and regular reflection of such information in stock prices (Hasan et al., 2020). Based on these foundations, the hypothesis of this research is derived.

Hypothesis 1: Firms with a capital structure characterized by a higher proportion of short-term debt are negatively associated with stock price crash risk.

3 METHODOLOGY

3.1 Sample

The research sample consists of Brazilian firms listed on *Brasil, Bolsa, Balcão* (B3) that disclosed information between 2010 and 2020. totaling 1.270 observations. Sample definitions and exclusions were performed in accordance with the studies by Habib et al. (2018) and Hasan et al. (2020). The following observations were excluded: (1) Missing values for the dependent variable in the models or observations from firms with insufficient stock return data to calculate the stock price crash risk variables; (2) Absence of data for independent and control variables; (3) Negative book equity; (4) Operations in the financial and/or other sectors, due to the specific accounting treatment of these sectors and the regulations to which they are subject. The data was collected from the *Economática* database and the Reference Forms of the companies under study.

3.2 Stock Price Crash Risk Construct

To capture stock price crash risk, two different proxies were used: (i) Negative Coefficient of Skewness and (ii) Down-to-Up Volatility. These proxies are based on firm-specific information, estimated through the residuals of the expanded market model (Chen et al., 2001). This empirical estimation ensures that stock price crash risk captures firm-specific factors rather than merely broad market movements, as conducted in prior literature (Canbaloglu et al., 2022; Dang et al., 2018; Haider et al., 2024; Hasan et al., 2020). Specifically, to estimate the construct described within the Brazilian context, the expanded market model in Equation 1 was applied, which explains the firm's weekly specific return using two lagged and two forward returns:

$$r_{(j,\tau)} = a_j + \beta_{(1.j)}\, r_{(m,\tau-2)} + \beta_{(2.j)}\, r_{(m,\tau-1)} + \beta_{(3.j)}\, r_{(m,\tau)} + \beta_{(4.j)}\, r_{(m,\tau+1)} + \beta_{(5.j)}\, r_{(m,\tau+2)} + \varepsilon_{(j,\tau)} \quad (1)$$

Where:
$r_{j,\tau}$ the weekly return of firm jj at time τ;
$r_{m,\tau}$ the weekly market return τ.

Following Dimson (1979), lead and lag terms were included to correct for the effect of non-synchronous trading. This effect occurs when time series are collected with data recording intervals that do not correspond to the actual intervals during which the data were generated. Thus, the importance of addressing non-synchronous trading lies in its potential to bias the moments and comoments of an asset's returns, causing spurious autocorrelation due to the lack of synchronization. This, in turn, creates a false impression of return predictability, even when the actual returns are statistically independent (Beteto & Bergmann, 2007).

Thus, crash events and positive jumps are defined based on the firm-specific return. For this purpose, Habib et al. (2018) present the firm-specific return for stock j in week τ ($w_{j,\tau} = \ln(1 + e_{j,\tau})$) measured by the natural logarithm of one plus the residual return from Equation 1.

Once the measure for calculating firm-specific returns is defined, the constructs for defining stock price crash risk are presented (CRASHRISK).

Negative Coefficient of Skewness

The first measure of stock price crash risk is based on the negative conditional skewness of firm-specific returns, referred to as the Negative Coefficient of Skewness (NCSKEW). This measure captures the skewness of the return distribution and is widely used in the literature (Habib et al., 2018). Skewness is calculated for firm j over fiscal year *t* by taking the negative of the third moment of the firm-specific returns for each year and normalizing it by the cube of the standard deviation of the firm-specific returns. A stock with high skewness represents a return distribution that is highly left-skewed, indicating a high probability of a stock price crash (Chen et al., 2001; Kim et al., 2011a, 2011b). Specifically, for each firm jjj in year τ\tauτ, NCSKEW is calculated as shown in Equation 2.

$$NCSKEW_{j,\tau} = \frac{-\left[n(n-1)^{\frac{3}{2}}\sum w_{j,\tau}^{3}\right]}{[(n-1)(n-2)\left(\sum w_{j,\tau}^{3}\right)^{\frac{3}{2}}} \quad (2)$$

Where:

$w_{j,\tau}$ the firm-specific return, as previously defined;

n the number of returns in fiscal year *t*.

It is worth noting that normalizing the third moment by the cube of the standard deviation allows for comparisons between assets with different variances. The addition of the negative sign to the third moment is intended to conventionally interpret increases in NCSKEW as indicative of stocks more prone to crashes—i.e., having a more negatively skewed distribution where a higher value corresponds to a greater crash risk (Habib et al., 2018).

Down-to-Up Volatility

The second measure of crash risk is the Down-to-Up Volatility (DUVOL) measure of crash probability, which, like NCSKEW, assesses skewness but does not involve third moments and is therefore less influenced by extreme events.

This measure indicates that, for each firm *j* over a fiscal year τ, the firm-specific returns are divided into two groups: “down” returns, when the returns are below the period's mean, and “up” returns, when the returns are above the period's mean. The standard deviation of the firm-specific returns is calculated separately for each of these two groups. Thus, DUVOL is obtained from the natural logarithm of the ratio of the standard deviation during "down" periods to the standard deviation during "up" periods, as shown in Equation 3.

$$DUVOL_{j,\tau} = log\left(\frac{(n_u - 1)\sum DownW_{j,\tau}^{2}}{(n_d - 1)\sum UpW_{j,\tau}^{2}}\right) \quad (3)$$

Where:

n_u e n_d representam o número de dias em que os retornos foram acima da média do período e dos dias em que estes foram abaixo da média, respectivamente.

For each firm *j* over year *t*, the firm-specific returns are separated into "down" (up) periods when the returns are below (above) the period's mean.

Thus, the firm-specific standard deviation of returns was calculated separately for each of the two groups. Consequently, DUVOL is the natural logarithm of the ratio of the standard deviation during "down" periods to the standard deviation during "up" periods. Chen et al. (2001) suggest that a high DUVOL indicates a more left-skewed distribution - i.e., a higher value of this

measure corresponds to greater negative skewness. This is because the numerator, representing deviations in "down" periods, shows larger values than the deviations in "up" periods (denominator). Chen et al. (2001) and Dang et al. (2018) clarify that DUVOL is less likely to be affected by the number of extreme returns, as it does not involve third moments.

3.3 Debt Maturity Construct

Following previous studies on debt maturity (Brockman et al., 2010; Datta et al., 2005; Harford et al., 2014; Johnson, 2003), the primary construct for debt maturity is the proportion of total debt maturing in three years or less (Short-term – ST3), as shown in Equation 4.

$$ST3 = \frac{dlc + dd2 + dd3}{dlc + dltt} \quad (4)$$

Where:

dlc : debt in current liabilities;

$dd2$ and $dd3$: debt maturing in two and three years, respectively;

$dltt$: debt in non-current liabilities.

To expand the literature, Weighted Global Maturity (WGM) was considered as an alternative measure of debt maturity, given the differences in the institutional environment of the Brazilian market and the heterogeneity of firms trading their shares. WGM was defined according to the four levels of Loans and Financing indicated in the Reference Form (FRE) submitted to the Securities and Exchange Commission of Brazil (CVM), as follows: (i) debts maturing in less than one year (D1); (ii) debts maturing between one and three years (D2); (iii) debts maturing between three and five years (D3); and (iv) debts maturing in more than five years (D4) (Garcia Junior et al., 2018). The weights account for less mature to more mature debts. Furthermore, to capture the size effect, the natural logarithm of each firm's assets was used. Equation 5 presents the operationalization of the maturity construct.

$$MGP_{j,t} = ln\left[\frac{\left(D1_{j,t} * 0.5\right) + \left(D2_{j,t} * 2\right) + \left(D3_{j,t} * 4\right) + \left(D4_{j,t} * 10\right)}{Total\ Debt_{j,t}} * Total\ Assets_{j,t}\right] \quad (5)$$

3.4 Empirical Model

To examine the association between debt maturity and stock price crashes, the estimation was conducted using Equation 6:

$$\begin{aligned} CrashRisk_{j,t} = {} & \beta_0 + \beta_1 ST_{j,t-1} + \beta_2 DTURN_{j,t-1} + \beta_2 SIGMA_{j,t-1} + \beta_4 RET_{j,t-1} \\ & + \beta_5 SIZE_{j,t-1} + \beta_6 MB_{j,t-1} + \beta_7 LEV_{j,t-1} + \beta_8 ROA_{j,t-1} + \beta_9 BETA_{j,t-1} \\ & + \beta_{10} EPU_{j,t-1} + \beta_{11} ACCD_{j,t-1} + \beta_{12} NCSKEW_{j,t-1} + \varepsilon_{j,t} \end{aligned} \quad (6)$$

Where:

CrashRisk is represented by NCSKEW and DUVOL, and ST is the primary independent variable of the model, representing debt maturity.

It is noteworthy that a one-year lag was applied to the independent variables to examine whether debt maturity in year *t-1* can predict crash risk in year*t*; ii) all continuous variables were winsorized at the 1% and 99% percentiles to mitigate the undesirable influence of outliers; iii) control variables were also lagged by one period*t-1*; and iv) the models were controlled for industry (INDDUMMIESINDDUMMIESINDDUMMIES) and year (YEARDUMMIES).

In Figure 1. an overview of the characteristics considered as explanatory variables in the study is presented, highlighting the expected relationship between the proxies and stock price crash

risk, except for the variables related to debt maturity, the explanatory variable of interest, which has already been discussed earlier.

Figure 1
Explanatory Variables of the Study

Proxy	Conceptual Variable	Description	Previous Studies	Expected Sign
DTURN	Turnover	Volume of shares traded relative to the total number of shares outstanding	Chen et al. (2001); Dang et al. (2018); Hasan et al. (2020)	+
SIGMA	Stock Volatility	Standard deviation of weekly stock price returns	Chen et al. (2001); Dang et al. (2018); Hasan et al. (2020)	+
RET	Return	Continuous weekly stock price return	Chen et al. (2001); Dang et al. (2018); Harvey e Siddique (2000); Hasan et al. (2020)	+
BETA	Beta	Traditional beta from the Capital Asset Pricing Model (CAPM)	Dang et al. (2018); Hasan et al. (2020)	+
MB	Market-to-Book	Market-to-book ratio	Chen et al. (2001); Dang et al. (2018); Harvey e Siddique (2000); Hasan et al. (2020)	+
SIZE	Size	Natural logarithm of the firm's market value	Chen et al. (2001); Dang et al. (2018); Hasan et al. (2020); Hutton et al. (2009)	+
LEV	Leverage	Total debt-to-total assets ratio	Dang et al. (2018); Hasan et al. (2020); Hutton et al. (2009); Kim et al. (2011b)	-
ROA	Profitability	Return on assets	Callen e Fang (2015b); Dang et al. (2018); Hasan et al. (2020); Kim e Zhang (2015)	-
ACCD	Opacity	Discretionary accruals based on the model by Kothari, Leone, and Wasley (2005)	Chen et al. (2001); Dang et al. (2018); Hasan et al. (2020); Hutton et al. (2009)	+
EPU	Economic Policy Uncertainty	Weighted average of the monthly data from the Baker et al. (2016) indicator for each year	Lee e Wang (2017); Luo e Zhang (2020); Piotroski et al. (2015)	+

Thus, based on the variables and the proposed regression model, panel data regressions were employed, verifying the suitability of the data for the types of approaches commonly used, as outlined by Wooldridge (2011) and Gujarati and Porter (2011): Ordinary Least Squares (POLS), Fixed Effects Model (FEM), and Random Effects Model (REM). To select the most appropriate estimator for the regression, specific tests were applied to determine the most suitable model: the Chow test, which compares POLS versus FEM; the Breusch-Pagan test, to decide between POLS and REM; and finally, the Hausman test, which evaluates whether REM is more appropriate than FEM. Additionally, the variance inflation factor (VIF) was analyzed to observe the absence of multicollinearity, the Shapiro-Francia test was applied to assess potential normality issues, the Wooldridge test was used to check for serial autocorrelation, and the Modified Wald test was conducted to verify heteroscedasticity in the regression models. These tests were applied following the guidelines provided by Wooldridge (2011). Finally, after confirming the type of model, if heteroscedasticity and/or autocorrelation issues were identified, the use of traditional approaches was deemed infeasible, necessitating an alternative approach. In such cases, a regression model with Clustered Robust Standard Errors was employed

.

4 PRESENTATION AND ANALYSIS OF RESULTS

Table 1 reports the descriptive statistics for the variables used in the study's empirical model.

Table 1
Descriptive Statistics of Study Variables

Variables	Mean	Standard Deviation	p25	Median	p75	CV	Min	Max
$NCSKEW_t$	2.94	13.95	-15.72	10.15	15.78	4.75	-15.88	15.88
$DUVOL_t$	0.06	0.68	-0.25	0.04	0.35	12.06	-2.42	2.55
$ST3_{t-1}$	0.72	0.24	0.54	0.78	0.94	0.33	0.12	1.00
WGM_{t-1}	15.84	2.12	14.47	15.73	17.22	0.13	10.83	21.39
$DTURN_{t-1}$	0.67	1.15	0.00	0.15	0.94	1.71	0.00	6.86
$SIGMA_{t-1}$	1.12	0.35	0.95	1.05	1.16	0.31	0.45	2.85
RET_{t-1}	0.00	0.00	-0.00	0.00	0.00	11.93	-0.04	0.06
MB_{t-1}	2.14	2.35	0.78	1.36	2.60	1.10	0.15	16.34
$SIZE_{t-1}$	14.35	1.95	12.85	14.53	15.74	0.14	9.94	19.32
LEV_{t-1}	0.55	0.19	0.43	0.56	0.68	0.35	0.10	0.96
ROA_{t-1}	0.04	0.07	0.01	0.04	0.08	1.85	-0.24	0.23
$ACCD_{t-1}$	0.01	0.09	-0.03	0.01	0.05	7.91	-0.26	0.35
$BETA_{t-1}$	1.03	1.13	0.25	0.99	1.67	1.10	-1.97	4.91
$NCSKEW_{t-1}$	2.46	13.98	-15.72	8.40	15.78	5.68	-15.88	15.88
EPU_t	590.24	259.50	389.82	460.74	735.90	0.44	319.40	1175.62

Notes. NCSKEW: *negative coefficient of skewness*. DUVOL: *down-to-up volatility*. ST: *short-term* represents debt maturing in 3 years. WGM: refers to Weighted Global Maturity. DTURN: *turnover*. SIGMA: volatility. RET: return MB: *market-to-book*. SIZE: size. LEV: leverage. ROA: Return on Assets. ACCD: opacity. BETA: market beta. EPU: reflects Economic Policy Uncertainty.

The mean values for NCSKEW and DUVOL, proxies used to measure crash risk, are 2.94. with a minimum of -15.88 and a maximum of 15.88. and 0.06. with a minimum of -2.42 and a maximum of 2.55. respectively. These observed means are higher than those reported in previous studies. Research by Kim et al. (2011a, 2011b), Andreou et al. (2016), Callen and Fang (2015a), Habib et al. (2018), and Dang et al. (2018) found lower average values compared to this study. This result suggests that the crash risk profile is relatively higher for the Brazilian firms studied, possibly reflecting institutional and/or market-specific characteristics.

Regarding the NCSKEW proxy, it is important to note that positive values represent negative skewness. Thus, the findings indicate convergence regarding market behavior, showing the Brazilian market's sensitivity to extreme events and, consequently, to crash movements. Furthermore, although the DUVOL proxy is less sensitive to extreme events, a high value also indicates greater negative skewness. Therefore, the slightly higher DUVOL values compared to previous studies reinforce the findings related to NCSKEW.

Table 2 presents the regression results relating crash risk to short-term debt and control variables. The t-statistics are shown below the coefficients and are based on Clustered Robust Standard Errors, corrected for heteroscedasticity and clustered at the firm level.

Table 2

Relationship Between Debt Maturity and Crash Risk

	Expected Sign	NCSKEW (1)	DUVOL (2)	NCSKEW (3)	DUVOL (4)
$ST3_{t-1}$	-	0.03	0.14		
		3.32	0.13		
WGM_{t-1}	-			**-1.21*****	**-0.07*****
				0.48	0.03
$DTURN_{t-1}$	+	1.29	0.05**	**-0.77*****	-0.01
		0.93	0.03	0.29	0.01
$SIGMA_{t-1}$	+	-1.17	**-0.22****	**-1.80*****	-0.05
		1.13	0.13	0.72	0.09
RET_{t-1}	+	-0.12	-0.04	-0.45	-0.01
		1.06	0.08	0.56	0.07
$SIZE_{t-1}$	+	**8.59*****	**0.41*****	**1.51*****	**0.08*****
		1.36	0.06	0.57	0.03
MB_{t-1}	+	0.39	**0.03****	0.20	0.00
		0.37	0.02	0.25	0.01
ROA_{t-1}	+/-	**-17.87****	**-0.99****	**-14.08****	**-0.93*****
		11.00	0.45	7.64	0.37
$NCSKEW_{t-1}$	+	0.00	0.00	0.01	0.00
		0.03	0.00	0.03	0.00
LEV_{t-1}	-	6.5	0.37	**4.17***	**0.23****
		6.96	0.26	2.48	0.12
EPU_t	+	0.00	**0.00****	**0.01****	0.00
		0.01	0.00	0.01	0.00
$BETA_{t-1}$	+	-0.7	-0.01	-0.28	**-0.03***
		0.61	0.02	0.39	0.02
$ACCD_{t-1}$	+	4.13	-0.15	3.92	-0.01
		5.44	0.26	4.56	0.22
YEAR FE		Yes	Yes	Yes	Yes
INDUSTRY FE		Yes	Yes	Yes	Yes
Constante		**-123.47*****	**-5.97*****	-4.86	-0.02
		19.65	0.82	4.36	0.3
N		1.270	1.270	1.270	1.270
r2		0.16	0.16	0.1	0.08
F		9.31	8.94	9.15	5.64

Notes. Where ***, **, and * the significance of the coefficients is indicated at the 1%, 5%, and 10% levels, respectively. NCSKEW**:** Negative Coefficient of Skewness. DUVOL**:** Down-to-Up Volatility. ST**:** Short-term debt maturing in 3 years. WGM**:** Weighted Global Maturity. DTURN**:** Turnover. SIGMA**:** Volatility. RET**:** Return. MB**:** Market-to-Book. SIZE**:** Size. LEV**:** Leverage. ROA**:** Return on Assets. ACCD**:** Opacity. BETA**:** Market Beta. EPU**:** Economic Policy Uncertainty.

It is clarified that, in columns (1) and (2), the two crash measures, NCSKEW and DUVOL, are regressed on short-term debt (ST3) and control variables, including fixed effects for year and sector. Based on this, it is observed that short-term debt maturing in up to three (3) years does not have a significant relationship with the different measures of crash risk (NCSKEW and DUVOL). This finding suggests that firms with higher short-term debt do not experience lower crash risk in period t+1t+1. This result contradicts the findings of Dang et al. (2018), refuting the conjecture that debt maturing in up to three (3) years serves as an effective monitoring mechanism for Brazilian firms. Consequently, as reported by Hutton et al. (2009), this scenario allows managers to accumulate bad news, thereby increasing the likelihood of a collapse in firm stock prices, which, by definition, is considered a crash.

The results for the control variables are generally consistent with previous studies. Regarding market-related variables, the coefficients for turnover (DTURN) and stock return volatility (SIGMA) were significant in at least one model. Stock turnover (DTURN) aligns with

the findings in the literature, showing a positive relationship in model (3). This result is consistent with the indications of Chen et al. (2001) and Dang et al. (2018), who suggest that stocks with higher trading volumes are more likely to experience future crashes. On the other hand, volatility (SIGMA) shows a contrary relationship to what was expected in models (2) and (3). In other words, stocks with less volatile returns are more prone to crash risk.

Regarding firm-specific variables, the coefficient for the market-to-book ratio (MB) is significantly positive in model (2), consistent with the findings of Harvey and Siddique (2000) and Chen et al. (2001). Dang et al. (2018) suggest that a high market-to-book ratio signals a market price "bubble," making this variable likely associated with higher crash risk. The results also show that the coefficients for firm size (SIZE) and economic policy uncertainty (model 2) are positive and align with evidence documented in previous studies (e.g., Chen et al. (2001), Hutton et al. (2009), Dang et al. (2018), and Luo and Zhang (2020)). These findings strongly support the argument that crash risk increases with firm size and economic policy uncertainty in the country.

Lastly, a negative association was found for profitability (ROA), corroborating the findings of Callen and Fang (2015b), Cheng et al. (2020), Dang et al. (2018), Elsayed (2021), Hasan et al. (2020), Kim et al. (2014), and Wang (2017).

Moreover, as documented by Andreou et al. (2016), the lagged values of the dependent variable ($NCSKEW_{t-1}$) were not statistically significant, indicating a low probability that the same firm will experience consecutive crashes over the years. The authors add that the non-significance of this lagged variable reduces the likelihood that the results reflect reverse causality.

Overall, short-term debt maturing within three (3) years (ST3) does not have a statistically significant impact on either measure of crash risk, NCSKEW or DUVOL. Consequently, the hypothesis that "firms with a capital structure characterized by a higher proportion of short-term debt are negatively associated with stock price crash risk" is rejected.

While the initial approach focused on assessing the relationship between short-term debt maturity and crash risk an extensively studied topic in prior research the expansion of the study to evaluate the Brazilian institutional context, using Weighted Global Maturity (WGM) as a proxy, highlights a different scenario for the analyzed Brazilian firms. Debt is not a homogeneous funding source; it is associated with factors such as the nature of the debt itself and the incentives for its acquisition, which vary depending on the context, maturity (short or long term), and provider (banks or the market).

In this context, the results shown in Table 2, columns (3) and (4), reveal a significant negative relationship between WGM and both measures of crash risk (NCSKEW and DUVOL). These results indicate that firms with non-homogeneous debt characteristics, particularly in terms of maturity diversification (short or long term), are less likely to experience future stock price crashes. This finding suggests that as firms diversify their debt maturities, creditor monitoring may become more effective, thereby restricting managers from delaying bad news and reducing the probability of future stock price crashes.

To further explore this relationship, it is essential to understand that debt maturity is tied to various characteristics, with the provider (banks or the market) being a key determinant. For instance, Moreira and Brito (2006) clarify that firm size is a decisive factor in choosing the provider, as smaller firms tend to opt for bank loans, which have lower fixed costs and shorter maturities compared to capital market funding. Similarly, Tarantin Junior and Valle (2015) show that resources from capital markets and subsidized funds are of longer maturity and typically accessed by larger firms. Additionally, a study by the Capital Markets Study Center of the *Fundação Instituto de Pesquisas Econômicas* (CEMEC-FIPE) indicates that the larger the firm, the greater its access to different financing sources. Large firms are predominantly financed by external sources and corporate bonds from the capital markets, respectively (Rocca et al., 2019).

In summary, Jadiyappa et al. (2020) argue for the significant role of debt structure heterogeneity in firm value, which may be related to a potential reduction in agency costs, playing

a crucial role in mitigating the future probability of crash risk. This is because a heterogeneous structure enables more effective monitoring by the firm's stakeholders, which can have a disciplining impact on the firm's activities (Eça & Albanez, 2022). These findings align with the results observed, indicating that a financing structure with diversified maturity is associated with fewer crashes in t+1. Rocca et al. (2019) reported that in 2018, regarding debt structure heterogeneity, 88.42% of firms used bank loans (unrestricted funds), 59.46% accessed capital markets, 54.44% benefited from BNDES credit lines, 46.72% utilized external sources, and 45.95% relied on directed banking resources.

Regarding the control variables for models (3) and (4) in Table 2, special attention is given to the leverage variable (LEV), which shows a statistically significant and positive relationship. This finding contrasts with those of Hutton et al. (2009) and Dang et al. (2018), who reported a negative relationship. Thus, leverage is associated with higher crash risk, as less stable firms that are more prone to bankruptcy are more likely to take on high levels of debt. Additionally, as previously discussed and documented by Andreou et al. (2016), the lagged values of the dependent variable ($NCSKEW_{t-1}$) were not statistically significant in explaining crash risk in t+1. indicating a low probability that the same firm will experience consecutive crashes over the years.

Overall, debt maturity diversification shows a statistically significant and negative impact, as expected, on each measure of crash risk. In this sense, although the study's hypothesis (H1) is rejected, the findings contribute to the literature by suggesting that, in economies like Brazil, debt maturity diversification can provide more effective monitoring to mitigate crash risk in future periods.

5 CONCLUSIONS

This study provided novel evidence of a negative relationship between debt usage and the probability of stock price crash risk. The results were subjected to alternative measures for both debt maturity and crash risk. The findings were not consistent with the research hypothesis that short-term debt plays an effective role in monitoring managerial behavior related to withholding bad news from the market, as it did not show a statistically significant relationship in mitigating stock price crash risk.

However, using an alternative measure Weighted Global Maturity (WGM) it was possible to identify that the diversification of debt maturity structure has a statistically significant negative relationship with stock price crash risk. This implies that, unlike exclusively short-term debt, which has high turnover and shorter terms that hinder continuous monitoring, a diversified debt structure strengthens oversight and control over managerial actions, thereby reducing future crash risk. Thus, it is added to the literature that exclusively short-term debt does not serve as an effective monitoring tool. These findings highlight the characteristics of the Brazilian market, where credit sourcing is heterogeneous. While most firms rely on bank credit, the market is expanding to other financing sources. These results underscore the importance of Weighted Global Maturity, as these credit lines are tied to varying maturities, with bank debt typically associated with short-term financing.

For the crash risk literature, the results provide evidence that corporate financing policy, supported by diversified debt maturity, significantly influences returns with negative skewness. Therefore, the findings demonstrate how firms can benefit from heterogeneous debt maturity due to its mitigating effect on agency costs, leading to reduced market-perceived risk and a lower probability of stock price crashes. This supports the notion that monitoring by multiple market agents can serve as an effective mechanism.

Together, these findings contribute to a better understanding of how debt financing can enhance corporate governance and reduce agency costs. The study suggests that debt enables creditors to restrict managerial misconduct, which is mutually beneficial in generating shareholder value by reducing stock price crash risk. Finally, these findings provide relevant implications for

equity investors seeking to predict and avoid stock price crash risk based on information about firms' financing policies.

Nevertheless, the analyses presented carry significant limitations that should be considered when interpreting the results. The first limitation concerns the generalizability of the findings given an intentionally selected sample, which is heterogeneous in nature. A second potential limitation relates to the constructs used for both crash risk and debt maturity, even though conventional models from the literature were employed. These models aim to simplify reality and are, therefore, not capable of synthesizing the universe of factors that these phenomena economically represent. Thus, the results are bounded by the models used to address the research problem.

Additionally, it is worth noting that using debt maturity measures weighted by corporate debt may present limitations concerning firm size. These could be weighted by alternative measures, such as total assets, to provide additional insights into the observed results. Finally, it is evident that the study focused on explaining debt maturity without delving into an analysis of creditor types and debt types. To address this, other determinant variables, such as one capturing the degree of debt diversification, would be necessary.

REFERENCES

Albanez, T., Valle, M. R. D., & Corrar, L. J. (2012). Fatores institucionais e assimetria informacional: influência na estrutura de capital de firmas brasileiras. *Revista de Administração Mackenzie*, *13*, 76-105. https://doi.org/10.1590/S1678-69712012000200004

Andreou, P. C., Antoniou C., J., Horton, & Louca, C. (2016). Corporate governance and firm-specific stock price crashes. *European Financial Management*, *22*, 916-956. https://doi.org/10.1111/eufm.12084

Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, *131*(4), 1593-1636. https://doi.org/10.1093/qje/qjw024

Barclay, M. J., & Smith, C. W. (1995). The behavior of individual investors. *The Journal of Finance*, *50*(2), 609-631. https://doi.org/10.1111/j.1540-6261.1995.tb04797.x

Bernardo, C. J., Albanez, T., & Securato, J. R. (2018). Macroeconomic and institutional factors, debt composition and capital structure of latin american companies. *Brazilian Business Review*, *15*, 152-174. https://doi.org/10.15728/bbr.2018.15.2.4

Beteto, D. L., & Bergmann, D. L. (2007). Análise dos efeitos de não-sincronia de negociação no mercado de capitais brasileiro. *Brazilian Business Review*, *4*(1), 26-39. https://doi.org/10.15728/bbr.2007.4.1.2

Brockman, P., Martin, X., & Unlu, E. (2010). Executive compensation and the maturity structure of corporate debt. *Journal of Finance*, *65*(3), 1123-1161. https://doi.org/10.1111/j.1540-6261.2010.01563.x

Callen, J. L., & Fang, X. (2015a). Religion and stock price crash risk. *Journal of Financial and Quantitative Analysis*, *50*(1-2), 169-195. https://doi.org/10.1017/S0022109015000046

Callen, J. L., & Fang, X. (2015b). Short interest and stock price crash risk. *Journal of Banking and Finance*, *60*, 181-194. https://doi.org/10.1016/j.jbankfin.2015.08.009

Canbaloglu, B., Alp, O. S., & Gurgun, G. (2022). Debt maturity structure and stock price crash risk: The case of Turkiye. *Borsa Istanbul Review, 22*(5), 985-991. https://doi.org/10.1016/j.bir.2022.07.005

Chen, J., Hong, H., & Stein, J. (2001). Forecasting crashes: trading volume, past returns, and conditional skewness in stock prices. *Journal of Financial Economics, 61*(3), 345-381. https://doi.org/10.1016/S0304-405X(01)00066-6

Cheng, C. A., Li, S., & Zhang, E. X. (2020). Operating cash flow opacity and stock price crash risk. *Journal of Accounting and Public Policy, 39*(3), 106-717. https://doi.org/10.1016/j.jaccpubpol.2020.106717

Cohen, L. J., Cornett, M. M., Marcus, A. J., & Tehranian., H. (2014). Bank earnings management and tail risk during the financial crisis. *Journal of Money, Credit and Banking*, *46*, 171-197. https://doi.org/10.1111/jmcb.12101

Dang, V. A., Lee, E., Liu, Y., & Zeng, C. (2018). Corporate debt maturity and stock price crash risk. *European Financial Management*, *24*(3), 451-484. https://doi.org/10.1111/eufm.12134

Datta, S., Iskandar-Datta, M., & Raman, K. (2005). Managerial stock ownership and the maturity structure of corporate debt. *Journal of Finance, 60*(5), 2333-2350. https://doi.org/10.1111/j.1540-6261.2005.00800.x

DeFond, M. L., Hung, M., & Li, S. (2015). Does mandatory IFRS adoption affect crash risk? *The Accounting Review*, *90*, 265-299. https://doi.org/10.2308/accr-50859

Demirgüç-Kunt, A., & Levine, R. (2004). *Financial structure and economic growth: A cross-country comparison of banks, markets, and development*. MIT press.

Dimson, E. (1979). Risk measurement when shares are subject to infrequent trading. *Journal of Financial Economics*, *7*(2), 197-226. https://doi.org/10.1016/0304-405X(79)90013-8

Eça, J. P. A., & Albanez, T. (2022). A heterogeneidade da estrutura de dívida reduz o custo de capital?. *Revista Contabilidade & Finanças, 33*(90), e1428. https://doi.org/10.1590/1808-057x20211428.en

Elsayed, M. S. H. (2021). The impact of debt structure on future stock price crash risk: evidence from Egypt. *Alexandria Journal of Accounting Research*, *5*(1), 668-714.

Francis, J. R., Pinnuck, M. L., & Watanabe, O. (2014). Auditor style and financial statement comparability. *The Accounting Review*, *89*, 605-633. https://doi.org/10.2308/accr-50642

Funchal, B., & Monte-Mor, D. S. (2016). Corporate governance and credit access in Brazil: The sarbanes-oxley act as a natural experiment. *Corporate Governance: An International Review*, *24*(5), 528-547. https://doi.org/10.1111/corg.12151

Garcia Junior, D., Clemente, A., Souza, A., & Soares, R. O. (2018). A relação entre independência do conselho de administração e maturidade da dívida em empresas com ações listadas na BMFBovespa. *Pensamento & Realidade*, *33*(2), 01-22.

Giannetti, M. (2003). Do better institutions mitigate agency problems? Evidence from corporate finance choices. *Journal of Financial and Quantitative Analysis*, *38*, 185-212. https://doi.org/10.2307/4126769

Guedes, J., & Opler, T. (1996). The determinants of the maturity of corporate debt issues'. *Journal of Finance, 51*(5), 1809-1833. https://doi.org/10.1111/j.1540-6261.1996.tb05227.x

Gujarati, D. N., & Porter, D. C. (2011). *Econometria básica*. AMGH.

Habib, A., Hasan, M. M., & Jiang, H. (2018). Stock price crash risk: review of the empirical literature. *Accounting and Finance*, *58*, 211-251. https://doi.org/10.1111/acfi.12278

Haider, M. J., Ahmad, M., & Wu, Q. (2024). The role of debt maturity in stock price crash risk: a comparison of developing and developed Asian economies. *Journal of Asian Business and Economic Studies*, *31*(4), 307-321. https://doi.org/10.1108/JABES-06-2023-0198

Harford, J., Klasa, S., & Maxwell, W. (2014). Refinancing risk and cash holdings'. *Journal of Finance*, *69*(3), 975-1012. https://doi.org/10.1111/jofi.12133

Harvey, C. R., & Siddique, A. (2000). Conditional skewness in asset pricing tests. *The Journal of finance*, *55*(3), 1263-1295. https://doi.org/10.1111/0022-1082.00247

Hasan, M., Rahman, D., Taylor, G., & Oliver, B. (2020). Crash risk and debt maturity: evidence from australia. *International Journal of Managerial Finance*, *17*(3), 377-400. https://doi.org/10.1108/IJMF-12-2019-0467

Hutton, A. P., Marcus, A. J., & Tehranian, H. (2009). Opaque financial reports, r2, and crash risk. *Journal of Financial Economics*, *94*, 67-86. https://doi.org/10.1016/j.jfineco.2008.10.003

Jadiyappa, N., Hickman, L. E., Jyothi, P., Vunyale, N., & Sireesha, B. (2020). Does debt diversification impact firm value? evidence from India. *International Review of Economics & Finance*, *67*, 362-377. https://doi.org/10.1016/j.iref.2020.02.002

Jensen, M., & Meckling, W. (1976). Theory of the firm: managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics*, *3*(4), 305-360. https://doi.org/10.1016/0304-405X(76)90026-X

Jin, L., & Myers, C. S. (2006). R2, around the world: New theory and new tests. *Journal of Financial Economics*, *79*(2), 257-292. https://doi.org/10.1016/j.jfineco.2004.11.003

Johnson, S. A. (2003). Debt maturity and the effects of growth opportunities and liquidity risk on leverage. *Review of Financial Studies*, *16*(2), 209-236. https://doi.org/10.1093/rfs/16.1.0209

Kim, J. B., & Zhang, L. (2015). Accounting conservatism and stock price crash risk: firm-level evidence. *Contemporary Accounting Research*, *33*, 412-441. https://doi.org/10.1111/1911-3846.12112

Kim, J. B., Li, Y., & Zhang, L. (2011a). CFO versus CEO: Equity incentives and crashes. *Journal of Financial Economics, 101*(3), 713-730. https://doi.org/10.1016/j.jfineco.2011.03.013

Kim, J. B., Li, Y., & Zhang, L. (2011b). Corporate tax avoidance and stock price crash risk: Firm-level analysis. *Journal of Financial Economics*, *100*(3), 639-662. https://doi.org/10.1016/j.jfineco.2010.07.007

Kim, Y., Li, H., & Li, S. (2014). Corporate social responsibility and stock price crash risk. *Journal of Banking and Finance*, *43*(6), 1-13. https://doi.org/10.1016/j.jbankfin.2014.02.013

Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. *Journal of Accounting and Economics*, *39*(1), 163-197. https://doi.org/10.1016/j.jacceco.2004.11.002

Lee, W., & Wang, L. (2017). Do political connections affect stock price crash risk? Firm-level evidence from China. *Review of Quantitative Finance and Accounting*, *48*, 643-676. https://doi.org/10.1007/s11156-016-0563-3

Luo, Y., & Zhang, C. (2020). Economic policy uncertainty and stock price crash risk. *Research in International Business and Finance, 51*, 101112. https://doi.org/10.1016/j.ribaf.2019.101112

Miller, M. H., & Modigliani, F. (1961). Dividend policy, growth, and the valuation of shares. the *Journal of Business*, *34*(4), 411-433. https://www.jstor.org/stable/2351143

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, *48*(3), 261-297. https://www.jstor.org/stable/1809766

Moreira, M. L. M., & Brito, R. D. (2006). Fatores determinantes da duração da dívida corporativa no Brasil. *Revista de Economia e Administração*, *5*(4).

Ortiz-Molina, H., & Penas, M. F. (2008). Lending to small businesses: The role of loan maturity in addressing information problems. *Small Business Economics, 30*(4), 361-383. https://doi.org/10.1007/s11187-007-9053-2

Piotroski, J. D., Wong, T. J., & Zhang, T. (2015). Political incentives to suppress negative information: evidence from chinese listed firms. *Journal of Accounting Research*, *53*, 405-459. https://doi.org/10.1111/1475-679X.12071

Rajan, R., & Winton, A. (1995). Covenants and collateral as incentives to monitor. *Journal of Finance*, *50*(4), 1113-1146. https://doi.org/10.1111/j.1540-6261.1995.tb04052.x

Rocca, C. A., Santos Junior, L. M., Brito, M., & Fumagalli, F. (2019). Como as empresas abertas se financiam. *Centro de Estudos de Mercado de Capitais*.

Stohs, M. H., & Mauer, D. C. (1996). The determinants of corporate debt maturity structure. *Journal of Business*, 279-312. https://www.jstor.org/stable/2353370

Tarantin Junior, W., & Valle, M. R. d. (2015). Estrutura de capital: o papel das fontes de financiamento nas quais companhias abertas brasileiras se baseiam. *Revista Contabilidade & Finanças*, *26*(69), 331-344. https://doi.org/10.1590/1808-057x201512130

Wang, J. (2017). Commercial credit financing and stock price crash risk-from the perspective of debt governance effect. *International Journal of Business and Social Science*, *8*(9), 149-156.

Wooldridge, J. M. (2011). *Introdução à econometria: uma abordagem moderna*. Pioneira Thomson Learning.

Zhang, M., Xie, L., & Xu, H. (2016). Corporate philanthropy and stock price crash risk: evidence from china. *Journal of Business Ethics, 139*, 595-617. https://doi.org/10.1007/s10551-015-2647-8.

CONFLICT OF INTERESTS

The authors declare no conflicts of interest regarding this submitted work.

AUTHOR CONTRIBUTIONS

Roles	1º author	2ª author	3º author
Conceptualization	♦	♦	
Data Curation	♦		♦
Formal Analysis	♦	♦	♦
Funding Acquisition	♦		
Investigation	♦		
Methodology	♦	♦	♦
Project Administration	♦	♦	
Resources	♦	♦	♦
Software	♦	♦	♦
Supervision		♦	
Validation	♦	♦	♦
Visualization	♦		♦
Writing – Original Draft	♦	♦	♦
Writing – Review & Editing	♦	♦	♦