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Readability and earnings management on the cost of equity

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1. Introduction

One of the elements that enhances the impression of company risk and, as a result, may increase the cost of capital is the informational asymmetry between various market participants. According to agency theory, the natural conflict of interests between the agent and the principal, where the former has access to knowledge and is accountable for making it available to the latter, is said to be the source of this asymmetry (Jensen and Meckling, 1976).

Accounting positions itself as a technique that makes it possible to lessen this asymmetry through the publication of financial statements to provide helpful information to various stakeholders. However, moral hazard might damage the accounting structure by creating increasingly complex reports without a good contract framework that permits the alignment of interests.

The relationship between accounting data and the cost of capital is one of the fundamental problems in accounting (Lambert *et al.*, 2007). However, this relationship is where the literature is divided. The impact of accrual quality in particular and the quality of accounting information generally on the cost of capital for researchers and professionals needs to be further examined (Core *et al.*, 2008).

The cost of information risk is seen with great suspicion in the literature (Mohanram and Rajgopal, 2009). Hughes *et al.* (2007) state that there is a widespread belief that risk premiums are entirely determined by exposure to systematic risk, or more specifically, by the product of betas and risk premiums over systematic risk factors, with idiosyncratic risks being disregarded because they can be completely eliminated by creating well-diversified portfolios. The quality of information is crucial for market efficiency, and the price of an asset reflects the quality of this information, according to Easley and O'Hara (2004), who cast doubt on this school of thought and call the topic intriguing. A theoretical study by Lambert *et al.* (2007) demonstrated how the quality of the information and disclosure of a firm affects its beta.

More information implies less uncertainty, and people are willing to pay more for certainty. Therefore, less ambiguity results in lower risk and a reduced required premium, as analyzed by Foster (2003) from the regulator's perspective. Furthermore, a former FASB member emphasizes that the effectiveness of the capital market depends on unbiased, trustworthy, and honest financial information that accurately represents the economic consequences of transactions. Arthur Levitt, the former chairman of the SEC, shares a similar viewpoint and asserts that higher-quality accounting information enhances investor trust and reduces the cost of capital (Levitt, 1998).

Despite the intuitive belief that the integrity of accounting information is crucial for the capital market, there is no widely accepted theory that demonstrates information risk cannot be diversified. Conversely, several recent empirical studies contradict the theoretical literature and indicate that accounting quality does matter for expected returns (Core *et al.*, 2008). As a result, there are two opposing theoretical viewpoints, and empirical research has not yet reached a consensus. For instance, Francis *et al.* (2005) concluded that accrual quality is a price risk factor, while Core *et al.* (2008), who replicated this study, questioned the findings.

Core *et al.* (2008) emphasize the need for further empirical research in various markets and circumstances to determine whether information risk is diversifiable. Lambert *et al.* (2012) suggest that the degree of competition in the capital market determines the relationship between information quality and capital costs. Mohanram and Rajgopal (2009) caution against representing information using various empirical variables, highlighting the ongoing debate and the need for additional research to address this issue.

Therefore, the aim of this study is to contribute to filling this gap in the literature by providing more empirical evidence. It also explores the characteristics of accounting data across a broader spectrum, including the comprehensibility of performance reports provided by corporations to the market. Rjiba *et al.* (2021) argue that the readability of annual reports affects the cost of equity only in the presence of imperfect competition. Hence, studying a developing capital market offers new insights to the discussion. Additionally, Cao *et al.* (2017) conducted a survey in 31 countries and concluded that institutional characteristics at the national level influence the relationship between information quality and the cost of capital.

Due to the information asymmetry resulting from managers hiding poor results and the uncertainty of estimates, which is reflected in investors' difficulty in understanding the outcomes, earnings management and readability can impact information risk. Therefore, the research issue at hand is whether earnings management and readability, as indicators of information quality, affect the cost of equity for Brazilian companies. The underlying premise is that firms with better accounting information in their reports will have lower equity capital costs.

The purpose of this study is to examine the influence of disclosed financial statements' quality, specifically in relation to earnings management and readability metrics of press releases, on the cost of equity for Brazilian companies.

This study contributes to the existing literature by providing additional empirical evidence and taking a new perspective on the impact of information quality on the cost of equity. It focuses on the readability of financial reports, specifically press releases that provide information on the financial performance of the company. By considering the interaction between earnings management and readability, the study captures the quality of information more comprehensively and addresses potential endogeneity issues that may have contributed to divergent results in previous research.

A distinguishing factor of this study is the evaluation of the readability level of an exclusive performance report, which does not adhere to standardized disclosure requirements set by regulatory bodies, even though disclosure is mandatory for companies classified as Novo Mercado in B3's corporate governance segment. This differs from studies by Rjiba *et al.* (2021), Athanasakou *et al.* (2020), and Ezat (2019), which assess readability within different contexts and disclosure structures.

The study recognizes the managerial discretion and decision-making power in shaping the content and format of press releases, as these documents are not explicitly governed by disclosure rules. This aligns with the observations of Huang *et al.* (2014) and Li (2011) regarding the qualitative presentation of quantitative information in press releases and potential avoidance of sensitive information. The study also acknowledges that investors may react differently to press releases compared to other parts of the annual report, as demonstrated by Davis and Tama-Sweet (2012), and that readability and financial performance may vary across different sections of the annual report, as found by Li (2008).

Another unique aspect of this study is the simultaneous assessment of the effects of readability and earnings management on the cost of equity, with both metrics included as variables of interest. This approach addresses the findings of Lo *et al.* (2017), who highlight the impact of earnings management on readability. Additionally, the study utilizes different readability metrics, specifically the Fog and Flesch indices, in contrast to Athanasakou *et al.* (2020) who focus on word count as a measure of simplicity. Efretuei and Hussainey (2023) argues that the Fog methodology for accounting research helps identify the obfuscation of narratives associated with earnings.

Considering the influence of the maturity of the capital market, this study highlights the importance of investigating a developing country like Brazil, which presents unique characteristics, including its large geographical size and higher risk-free rate compared to

developed countries. This provides valuable insights into the relationship between information quality, readability, and the cost of equity in a distinct market context.

The structure of this paper is as follows: Section 2 presents the theoretical background, including a review of existing literature and the formulation of study hypotheses. Section 3 describes the methodology employed in the empirical investigation. Section 4 presents the results of the analysis and discusses relevant findings from the literature. Finally, Section 5 presents the conclusions drawn from this study.

2. Theoretical framework

2.1 Information Risk and Cost of Capital

The literature in accounting and finance suggests that information risk can be viewed through two perspectives: information asymmetry and estimation risk/uncertainty parameter (Mohanram and Rajgopal, 2009). According to traditional asset pricing theory (Fama, 1970; Fama, 1991), information risk is idiosyncratic and therefore diversifiable, implying that it should not impact the cost of capital. However, Easley *et al.* (2002, 2010) and Easley and O'Hara (2004) have contributed to theoretical and empirical advancements in pricing information risk.

These works have influenced numerous empirical studies in finance and accounting, based on the premise that companies with greater private information and less public information, or higher PIN (a proxy used to measure informational asymmetry), would exhibit a higher cost of capital and consequently higher returns (Duarte and Young, 2009; Duarte *et al.*, 2008; Brown *et al.*, 2004; Brown and Hillegeist, 2007; Chen *et al.*, 2007; Pan and Poteshman, 2006; Ellul and Pagano, 2006; Hilary, 2006). Other studies have employed earnings quality measures to assess information risk (Francis *et al.*, 2004; 2005; Aboody *et al.*, 2005; Botosan *et al.*, 2004; Ecker *et al.*, 2006).

However, these studies have faced various considerations and criticisms. For instance, Mohanram and Rajgopal (2009) conducted a replication study of Easley *et al.* (2002) and found no evidence of an association between the PIN proxy and the cost of capital. This raises the question of whether information risk is truly priced or if the proxy used to measure information asymmetry fails to accurately capture the true information risk. Mohanram and Rajgopal (2009) caution that it is challenging to make definitive statements about the pricing of information risk, as it may represent different concepts for different researchers (such as estimation risk) and be measured by different variables. Hence, further empirical work on this topic is necessary to address this unresolved question.

In a theoretical study, Hughes *et al.* (2007) concluded that the specific information characteristics of a company have no influence on its expected returns. However, while information asymmetry may not impact the cost of capital in the cross-section, it does affect the risk premium factor at the aggregate market level. In theory, Clarkson and Thompson (1990) argue that estimation risk is fully diversifiable in large economies.

Lambert *et al.* (2007) aim to address some questions and provide a theoretical foundation for future empirical studies investigating the relationship between disclosure/quality of information and its impact on the cost of capital. The authors theoretically demonstrate that the quality of accounting information influences the cost of capital and propose that a company's beta factor is a function of its information or disclosure quality. Therefore, within the literature discussing the impact of information cost on the cost of capital, there is still disagreement as to whether this impact should be considered as an additional factor in the asset pricing model or if it is already captured by the company's beta (Core *et al.*, 2008).

Lambert *et al.* (2012) further contribute to the theoretical discussion on the topic by highlighting the importance of distinguishing between information asymmetry and information accuracy. They acknowledge that the effect of information asymmetry on the cost of capital depends on the nature of competition in the capital market. The authors demonstrate that in perfectly competitive markets, only the accuracy of investor information becomes relevant. Subsequently, Johnstone (2016) builds upon the theoretical work of Lambert *et al.* (2007) and argues that better information does not necessarily lead to a reduction in the cost of capital. It can instead expose a worse situation for the company, resulting in an increase in its risk. In a more recent study, Berger *et al.* (2018) provide empirical evidence demonstrating that information quality can indeed lower a company's cost of capital.

In the specific context of using earnings quality as a proxy for information quality, Francis *et al.* (2005) investigate whether the quality of accruals influences the cost of capital and conclude that information risk is a price risk factor that significantly affects the cost of capital. However, Core *et al.* (2008) replicate the study by Francis *et al.* (2005) and challenge their findings, as they did not find consistent evidence that accrual quality serves as a price risk factor. Cohen (2008) reaches a similar conclusion by observing a negative association between risk and the quality of financial reports. Strobl (2013) suggests that despite diversification, earnings management can increase a company's cost of capital. Arora and Chauhan (2022) analyzed the impact of financial statement readability on earnings management in Indian companies from 2007 to 2019. They found that companies that practice earnings management have less readable financial reports, even after controlling for firm-specific characteristics. This makes the reports more difficult to understand. Paul and Sharma (2023) investigated several alternative obscuration strategies, based on a sample of management discussion and analysis (MD&A) disclosures of US. The results indicated that managers use different methods to obscure information, not just increasing the complexity of disclosures.

Regarding the relationship between information quality, readability of financial reports, and the cost of capital, recent academic studies have emerged. Rjiba *et al.* (2021), analyzing US companies from 1995 to 2017, find that higher textual complexity in the 10-K is associated with higher equity financing costs in situations of imperfect competition. In other words, this relationship depends on the level of competition in the capital market. Athanasakou *et al.* (2020) examine UK annual report disclosures from 2003 to 2014 and discover a non-linear U-shaped association between report narratives and firms' cost of equity. Ezat (2019) investigates the Egyptian capital market from 2013 to 2015 and finds no evidence that the readability of management reports impacts the weighted average cost of capital (WACC). Mousa *et al.* (2022) investigated the impact of annual report narrative quantity and readability on the cost of capital using machine learning techniques. The results indicated that the readability of narratives has a negligible impact, while greater narrative disclosure is associated with a lower cost of capital, varying across countries and levels of corporate profitability. Dalwai *et al.* (2023) examined the impact of managerial ability and readability of the auditor's report on the cost of debt and corporate liquidity in industrial companies listed in Oman. Results show that managerial ability reduces debt costs and increases liquidity, while less readable audit reports lead to higher debt costs and reduced liquidity.

The central research hypothesis proposed is as follows:

H1: Companies that provide reports with higher-quality accounting information have a lower cost of equity.

This hypothesis suggests that there is a negative relationship between the quality of accounting information disclosed by companies and their cost of equity. In other words, if

companies improve the quality of their accounting information, it is expected to lead to a reduction in their cost of equity.

This hypothesis aligns with the notion that higher-quality accounting information reduces information risk and improves the transparency and reliability of financial statements. As a result, investors perceive such companies as less risky and, therefore, require a lower return on their investment, leading to a lower cost of equity.

It is important to note that this hypothesis is specific to the context of the study and the variables being considered. The study would need to provide a clear operationalization of "higher-quality accounting information" and "cost of equity" to test the hypothesis empirically.

3. Methodology

In this research, the Modified Jones model, developed by Dechow *et al.* (1995), is employed to capture the effect of earnings management practices on financial statements. The model helps assess the extent of earnings management and its potential impact on accounting information quality.

To measure the readability of the press releases, the Fog and Flesch Index models are utilized. The Fog Index, developed by Gunning (1952), and the Flesch Index, developed by Flesch (1948), are widely used metrics to gauge the complexity and readability of texts. In this study, the readability index was calculated using an algorithm available in the Anaconda Manager library, which is implemented in the Python programming language.

The press releases used in the analysis were obtained from the CVM (Comissão de Valores Mobiliários) website, which is the regulatory body for securities in Brazil. It's important to note that the Fog and Flesch Index models were originally developed to assess the readability of texts written in English. Although adaptations of these models exist for other languages, including Portuguese, the decision was made in this study to use the original models to maintain comparability with international findings. However, it should be acknowledged that there may be grammatical and lexical differences between Portuguese and English that are not fully captured by adaptations of the models.

The sample for this research comprises companies listed on B3 (Brasil, Bolsa, Balcão), the Brazilian stock exchange, with the exception of the banking and insurance sectors. The period of analysis spans from 2011 to 2020. It is worth noting that the year 2007 marked the beginning of a gradual transition from Brazilian accounting standards to international standards (IFRS), which concluded in 2010 with the full adoption of IFRS (CPC 37). Therefore, the exclusion of the year 2010 is justified as press releases during that period could have been more focused on explaining the impacts of the new regulations rather than reflecting the company's performance.

To maximize the sample size and avoid loss of observations, missing data were excluded based on the variables required for each specific proxy used at the time. The exclusion of observations was done as necessary, resulting in five different samples used in the econometric models throughout the study. Table 1 provides further details on the inclusion/exclusion criteria for each variable.

By implementing these methodologies and data collection procedures, the study aims to provide robust empirical evidence regarding the relationship between earnings management, readability of press releases, and the cost of equity for the selected sample of Brazilian companies.

Table 1 – Sample composition

	Companies	**Comments**
Companies with active registration with the CVM	384	4,224

Financial Institution	-29	-319
Insurers	-8	-88
Over-the-counter listed companies	-17	-187
Missing Control variable values	-51	-936
Sample used in the calculation of discretionary accruals	279	2,694
Missing readability (no press release or file reading problem)	-121	-1,361
Missing values control variables	-15	-229
readability model	143	1,104
Missing values control variables	-5	-27
Sample used in the CAPM, Idiosyncratic and IndEP model	138	1,077
Missing values variable Beta	-3	-67
Sample used in the model with Beta dependent variable	135	1010
Missing values variable Ke	-76	-615
Sample used in the model with dependent variable Ke	59	395

3.1 Models

There are several ways to measure the cost of equity capital, and there is no consensus in the literature on which would be the best way. For all metrics, there are criticisms and negative points to be highlighted. Basically, these models can be divided into two types: ex-post, using future returns realized as predictors; and ex-ante, using analysts' estimates of the future results of companies.

The use of ex-ante costs provides evidence of economic relationships that can be hidden by the noise of realized returns, as these are more susceptible to capturing external shocks (Lee *et al.*, 2009; Lee *et al.*, 2021; Bekaert and Harvey, 2000; Hail and Leuz, 2006). On the other hand, Hou *et al.* (2012) argue that the ex-ante model suffers from problems related to analysts' optimism and a lack of coverage of forecasts for smaller companies with financial difficulties; in addition, it can suffer from measurement errors caused by bias and the slowness of analysts' forecasts (Rjiba *et al.*, 2021). Due to this lack of consensus and the negative points pointed out in the literature, this study measures the cost of equity in both ways.

Initially, this research uses the stock return metric based on the Fama-French three-factor model (Cohen, 2008), with the inclusion of the two variables of interest for information quality. This association between the company's return and accounting information attributes was also used by other authors as a model for verifying the pricing of information risk by the capital market (Francis *et al.*, 2005; Core *et al.*, 2008; Easley *et al.*, 2002; Mohanram and Rajgopal, 2009). Therefore, to verify whether there is pricing of the risk of accounting information quality by the market, the following model was initially used:

$$\mathrm{R}_{i,t} - \mathrm{R}_{f,t} = \beta_0 + \beta_1\left(\mathrm{R}_{mkt,t} - \mathrm{R}_{f,t}\right) + \beta_2\mathrm{SMB}_t + \beta_3\mathrm{HML}_t + \beta_4\mathrm{Read}_{i,t} + \beta_5 GR_{i,t} + \varepsilon_{i,t} \qquad (01)$$

Subsequently, following the work of Liu and Wysocki (2017), Moura *et al.* (2016), and Nardi *et al.* (2009), we sought to analyze the impact of readability on market risk, represented by the beta variable, and on idiosyncratic risk, represented by the standard deviation of the error of the regression of the Capital Asset Model Pricing Model (CAPM). This would be another way of verifying the sensitivity of the attributes of the quality of accounting information on the cost of equity:

$$\mathrm{Idiossinc}_{i,t} = \beta_0 + \beta_1\mathrm{Read}_{i,t} + \beta_2 GR_{i,t} + \sum \beta_{j,i,t}\, Controls_{j,i,t} + \varepsilon_{i,t} \qquad (02)$$

$$\text{Beta}_{i,t} = \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 GR_{i,t} + \sum \beta_{j,i,t} Controls_{j,i,t} + \varepsilon_{i,t} \quad (03)$$

Based on the studies by Liu and Wysocki (2017), Liu *et al.* (2002), and Ezat (2019), a third test was carried out using the earnings per share/price per share ratio as a cost of equity metric:

$$\text{IndEP}_{i,t} = \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 GR_{i,t} + \sum \beta_{j,i,t} Controls_{j,i,t} + \varepsilon_{i,t} \quad (04)$$

The IndEP variable was calculated in each year t by the difference between the earnings per share/price per share ratio of each company i and the respective index of the sector where the company operates. The sector index is calculated by the median value of the ratios of the companies that compose it ($\text{E/P}_{i,t} - median\ \text{E/P}_{i,t}$).

Finally, following the work of Mishra and O'Brien (2005), a proxy was used ex-ante as a metric of the cost of equity.

$$\text{Ke}_{i,t} = \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 GR_{i,t} + \sum \beta_{j,i,t} Controls_{j,i,t} + \varepsilon_{i,t} \quad (05)$$

The Ke variable is obtained by applying the Residual Income Valuation (RIV) model proposed by Ohlson (1995):

$$\text{P}_{i0} = B_0 + \frac{(NI_{i1} - Ke_i B_{i0})}{(1+Ke_i)} + \frac{(NI_{i2} - Ke_i B_{i1})}{(1+Ke_i)^2} + \cdots + \frac{(NI_{i5} - Ke_i B_{i4})}{(1+Ke_i)^5} + \frac{(NI_{i5} - Ke_i B_{i4})(1+g)}{(1+Ke_i)^5 (Ke_i - g)} \quad (06)$$

where P_{i0} is the current price per share of company i; K_{ei} is the cost of equity; B_{it} is the expected book value per share for time t; NI_{it} is the expected earnings per share for time t; and g is the expected long-term growth rate.

Based on Mishra and O'Brien (2005) and Claus and Thomas (2001), the equation variables are defined as follows: NI_{i1} and NI_{i2} are analyst forecasts obtained from the Refinitiv database. NI_{i3}, NI_{i4} and NI_{i5} are forecast using the predicted earnings growth rate for the first 2 years. The B_{it} is predicted using the following assumption: $B_{it} = B_{it-1} + NI_{it} - D_{it}$, where D_{it} is equal to 50% of L_{it} which is destined as dividends, but D_{it} will always be equal to zero so that L_{it} shows a negative value. The long-term growth rate was also taken directly from the Refinitiv base.

In general, companies with a high level of earnings management are expected to present more complex reports (Lo *et al.*, 2017). However, other factors can be decisive in making the disclosure less readable (Li, 2008). Aiming to verify how the cost of equity could be influenced by the interaction between these two aspects of accounting information, two dummy variables were included in the models described above: one for intercept (DFOGxDGR) and the other for inclination (FOGxDGR).

The readability variable of interest was calculated by applying the Fog metric to the reports presented for each company year.

$$Fog\ index = 0{,}4 \times \left(\frac{\text{Total words}}{\text{Total sentences}} + \frac{\text{Total complex words}}{\text{Total words}} \right) \quad (07)$$

Basically, the index is formed by the average size of the sentences and the size of the words that make up the text. In addition, it defines a complex vocabulary as one with 3 or more syllables, ignoring common suffixes (for example, as, ed, ing) and not taking into account proper nouns, very familiar words, and compound words. According to Li (2008), the relationship between the Fog index and readability is: Fog ≥ 18 means that the text is illegible; 14-18 (hard); 12–14 (ideal); 10-12 (acceptable); and 8-10 (infant).

The other explanatory variable, Earnings Management (GR), was calculated using discretionary accruals, following the Modified Jones model:

$$\frac{AccT_{i,t}}{A_{i,t-1}} = \alpha\left(\frac{1}{A_{i,t-1}}\right) + \beta_1\left(\frac{\Delta Rev_{i,t}-\Delta CR_{i,t}}{A_{i,t-1}}\right) + \beta_2\left(\frac{PPE_{i,t}+Intang_{i,t}}{A_{i,t-1}}\right) + \varepsilon_{i,t} \quad (08)$$

$$AccT_{i,t} = NI_{i,t} - OCF_{i,t} \quad (09)$$

where $AccT_{i,t}$ are the total accruals of company i in period t; $A_{i,t-1}$ total assets; $\Delta Rev_{i,t}$change in net revenues; $\Delta CR_{i,t}$ variation in accounts receivable; $PPE_{i,t}$ net fixed assets; $Intang_{i,t}$ net intangible assets; $\varepsilon_{i,t}$ regression error term; $NI_{i,t}$ net income for the year; $OCF_{i,t}$ operating cash flow.

The coefficients were estimated based on regressions by year and sector. The residuals of these regressions constitute the discretionary accruals and can be measured by the difference between the total accruals and the estimated total accruals for each observation.

Control variables were selected based on previous research investigations (Rjiba *et al.*, 2021; Athanasakou *et al*., 2020; Liu and Wysocki, 2017; Ezat, 2019) and are defined in Table 2.

Table 2 – Definition of variables.

Variables	Acronym	Variable Type	Expected Signal	Mathematical Definition
Stock risk premium	R_i-R_f	Dependent	NA	Monthly Return on Equity - Monthly risk-free rate. The monthly return of each company is calculated from March to May of t+1 to make it possible to capture the information disclosed in the press release and avoid possible distortions brought about by the disclosures of the 1st quarter of t+1. Rf is measured by the Selic in force in the 1st quarter of t+1.
Systemic Risk	Beta	Dependent	NA	Cov (Ri,Rmkt)/Var(Rmkt). Calculated by the monthly return of the last 5 years from t+1.
Idiosyncratic Risk	Idiosyncratic	Dependent	NA	Standard deviation of the CAPM model regression error.
Earnings/price ratio	IndEP	Dependent	NA	(Earnings per share/price of the company) - (median EPS/Price of the sector). Discard observations with negative values. Profit at the end of the year t. Earnings per share is the average of quotations between the months of March and May.
Cost of equity ex-ante	k_e	Dependent	NA	Application of the Residual Income Valuation (RIV) model proposed by Ohlson (1995).
Market premium	R_{mkt}-R_f	Control	+	Ibovespa monthly return - Monthly risk-free rate. The monthly return is calculated from March to May of t+1. Rf is measured by the Selic in force in the 1st quarter of t+1.
Size premium	SMB	Control	+	Each year, companies are divided into 2 groups (small and big) according to their market value (average share price between March and May). The median serves as the cutoff point for the division. SMB will be the average return difference between the two groups at t+1.

Book to Market premium	HML	Control	+	In each year, companies are divided into 2 groups high and low according to their Book / Market value ratio (Book of 12/31 t and market value being the average price quoted between March and May). Companies positioned in the range of 30% of the highest index value represent the High group. Those with an index in the lower 30% range are considered low. HML will be the difference in the average return between the two groups of companies.
Readability (Read)	fog	Interest	+	Fog Index = 0.4 x (Total Words/Total Sentences + Total Complex Words/Total Words) The higher, the lower the readability
Earnings Management Dummy	GR	Interest	+	Residuals of the Modified Jones model, with estimates of different coefficients by sector and by year. H2: 1, if GR > median. H3: 1, if GR > 0
Dummy of intercept	DFOGxDGR	Interest	+	*Dummy* DFOG = 1, if Fog > median *Dummy* DGR = 1, if GR > median DFOGxDGR is the interaction of the 2 *dummies*
Tilt Dummy	FOGxDGR	Interest	+	GR dummy times the Fog variable
Leverage	Lev	Control	+	Onerous Liabilities / PL
Asset Return	ROA	Control	-	Net Income $_{t}$ / Total Assets $_{t-1}$
Size	Size	Control	-	natural log (number of shares x share value), at the end of year t
Market to book	MTB	Control	-	Enterprise Value / A, at the end of year t
Company age	Age	Control	-	Number of years since going public
Profit Volatility	VolNI	Control	+	Standard deviation of Net Income return for the previous 5 years

Note: NA is “not applicable”

4. Results and discussion

Initially, Table 3 presents the descriptive statistics. The variables were winsorized at 1% and are presented in relation to the maximum number of observations collected, which is why the Beta and Ke variables have fewer observations than the others. due to missing values in the collection of these two variables, the econometric models that use them have fewer observations.

Table 3 – Descriptive statistics of the variables.

variable	No	mean	p50	SD	CV	mine	max
RiRf	1077	-2.00	-3.00	25.80	-12.90	-63.76	89.01
Beta	1010	0.74	0.70	0.44	0.59	-0.17	1.98
ke	395	0.22	0.18	0.20	0.88	0.004	1.37
IndEP	1073	-6.44	1.01	38.14	-5.92	-290.73	12.71
FOG	1077	23.64	18.75	17.38	0.74	13.29	119.88
GR	1077	0.06	0.04	0.06	0.98	0.00	0.29
RmktRf	1077	-1.72	-0.52	14.40	-8.37	-37.87	12.22
SMB	1077	20.09	-0.76	61.85	3.08	-13.86	195.02
HML	1077	-41.74	2.55	133.12	-3.19	-421.95	21.41
Lev	1077	02.33	31.48	18.35	0.56	0.00	82.44
ROA	1077	2.03	3.71	10.49	5.16	-49.04	19.65

Size	1077	11.15	15.30	1.78	0.12	10.56	19.42
MTB_w	1077	1.07	0.80	0.82	0.77	0.12	4.61
Age	1077	19.38	15.24	8.75	0.45	3.69	35.57
VolNI	1077	3.44	1.05	7.59	2.21	0.06	49.38

In capturing the practice of earnings management (GR variable), the estimation of the coefficients for calculating discretionary accruals was carried out through regressions by year and sector since companies from different sectors have different incentives for the practice of management. Therefore, the looping process by year and sector is more accurate as it takes into account the differences in the characteristics of the sectors where the companies are inserted in the calculation of the estimation of discretionary accruals.

The average and median fog values reported by Li (2008) were slightly higher than 19 for the annual report as a whole and around 18 for the MD&A (management discussion and analysis) section, a value similar to that reported by Lo *et al.* (2017) for the same section. Despite the average fog shown in Table 3 being 23.64, the median index is 18.75. However, regardless of using the mean or median in the analysis, it is worth highlighting the difficulty of reading the press releases released by Brazilian companies. Indices below 18 are considered ineligible by Li (2008).

Regarding the cost of equity measured by the RIV model, an average cost of 22% and a median of 18% were found. This result may seem high, but it is worth noting that the average Selic rate for the same period was 9.73%, with a minimum of 2% and a maximum of 14.25%. Therefore, it can be seen that the required average risk premium was around 11%.

Table 4 presents Pearson's correlation matrix at a significance level of 5%. There is a significant correlation between the level of earnings management and the beta of the companies. However, regarding readability, no relevant association is found with the equity cost metrics used in this research.

A significant association can be seen between the Ke variable and the Market Premium and Beta variables, according to the theoretical basis of the CAPM model developed by Sharpe (1964) and Lintner (1965).

Table 4 - Pearson correlation matrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
RiRf	(1)	1.00												
RmktRf	(2)	0.54*	1.00											
Beta	(3)	-0.16*	-0.23*	1.00										
ke	(4)	0.00	0.10*	0.10*	1.00									
IndEP	(5)	0.11*	0.07*	-0.02	-0.05	1.00								
FOG	(6)	0.01	0.00	0.06	-0.01	0.05	1.00							
GR	(7)	0.02	-0.01	0.07*	-0.01	-0.19	0.06	1.00						
Lev	(8)	-0.03	-0.03	0.09*	0.13*	-0.21*	-0.04	0.08*	1.00					
ROA	(9)	0.10*	-0.03	-0.09*	-0.17*	0.37*	0.06	-0.37*	-0.26*	1.00				
Size	(10)	-0.06	-0.11*	0.19*	-0.08	0.34*	0.12*	-0.24*	-0.07*	0.44*	1.00			
MTB	(11)	-0.11*	-0.13*	-0.07*	-0.18*	0.11*	0.13*	-0.02	-0.18*	0.36*	0.39*	1.00		
Age	(12)	0.04	0.04	0.09*	0.07	0.08*	-0.06	-0.11*	-0.11*	0.11*	0.25*	-0.04	1.00	
VolNI	(13)	-0.03	-0.03	0.07*	0.03	-0.05	0.05	0.02	-0.07*	-0.11*	-0.09*	-0.10*	-0.02	1.00

Read and GR were initially included in the Fama-French three-factor model. This inclusion seeks to verify the possible influence of the quality of accounting information on stock returns. This would be a first indication for later testing its effect directly on the cost of equity.

The results are shown in column 1 of Table 5, where it can be seen that only the variables originally proposed in the model are statistically significant. This result rules out the possibility of an association between the quality of accounting information and stock returns.

In an attempt to better capture the interaction of earnings management and readability metrics, two dummy variables were included in the model: one for the intercept (DFOGxDGR) and one for inclination (FOGxDGR). In the results presented in column 2, again, only the control variables of the Fama-French three-factor model are significant.

The use of the intercept dummy seeks to verify whether companies with higher levels of discretionary accruals and reports that are more difficult to read respond to a higher cost of equity. The slope dummy tries to capture how much the practice of earnings management influences the relationship between readability and the cost of equity.

With a lack of evidence of the influence of the quality of accounting information on stock returns, we sought to analyze the association of information quality with companies' idiosyncratic risk. The results are presented in column 3, where it can be observed that the higher the level of earnings management practice by the company (regardless of the direction since the GR variable is in absolute values), the greater its specific risk tends to be. Again, the two dummy variables (column 4) were included, but the results remain the same.

An idiosyncratic risk is identified, but this fact is not observed for the report readability metric. With this, it can be inferred that earnings management influences the specific risk of the company, but because this risk is diversifiable, management ends up not affecting the cost of equity, which would be determined only by the three factors of Fama-French.

Seeking to corroborate these findings, three other proxies were used in an attempt to measure the cost of equity. The first of them, referring to equation 4, has its results presented in columns 5 and 6 of Table 5, where the results of the variables of interest again do not show statistical significance, both with and without the inclusion of dummies. The dependent variable IndEP has the advantage of being simple to obtain, avoiding many observation losses as occurs with the other two used (Beta and Ke). On the other hand, it has the disadvantage of disregarding the company's future flows as well as its result in perpetuity, being very sensitive to the present result obtained by the company.

Table 5 - Panel Data Results

Variables	(1) Ri-Rf	(2) Ri-Rf	(3) idiosyncratic	(4) idiosyncratic	(5) IndEP	(6) IndEP
DFOGxDGR		-1,218		-2,192		3009
		(1937)		(2,106)		(2,805)
FOGxDGR		-0.0227		-0.0414		0.0207
		(0.0674)		(0.0715)		(0.0952)
FOG	0.00940	0.0379	0.00603	0.0562	0.0206	-0.0195
	(0.0377)	(0.0608)	(0.0411)	(0.0647)	(0.0547)	(0.0862)
GR	8,611	14.24	39.29***	50.38***	5,945	-4,322
	(11.12)	(13.30)	(13.22)	(15.59)	(17.59)	(20.76)
Rmkt-Rf	0.787***	0.786***				
	(0.0503)	(0.0505)				
SMB	0.445***	0.445***				
	(0.0540)	(0.0541)				
HML	0.200***	0.200***				
	(0.0246)	(0.0246)				
Lev			-0.197***	-0.196***	-0.617***	-0.616***
			(0.0757)	(0.0759)	(0.101)	(0.101)
ROA			0.683***	0.696***	-0.567***	-0.579***
			(0.101)	(0.101)	(0.134)	(0.135)

Size			-9,233***	-9,167***	26.75***	26.70***
			(1,383)	(1,385)	(1,840)	(1843)
MTB			-2,421	-2,726	-13.59***	-13.27***
			(1833)	(1841)	(2,438)	(2,450)
VolNI			0.0388	0.0378	-0.0442	-0.0446
			(0.104)	(0.104)	(0.139)	(0.139)
Constant	-2,078	-2,461	140.8***	139.7***	-366.9***	-366.4***
	(1,330)	(1,565)	(20.46)	(20.56)	(27.22)	(27.37)
Number	1,077	1,077	1,077	1,077	1,073	1,073
R-squared			0.091	0.094	0.273	0.275
Number of companies	138	138	138	138	138	138

(1) $R_{i,t} - R_{f,t} = \beta_0 + \beta_1(R_{mkt,t} - R_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 Read_{i,t} + \beta_5 GR_{i,t} + \beta_6 DFOGxDGR_{i,t} + \beta_7 FOGxDGR_{i,t} + \varepsilon_{i,t}$

Random effect panel data. Hausman Test - H0 (Betas EF=EA) was not rejected

(2) $R_{i,t} - R_{f,t} = \beta_0 + \beta_1(R_{mkt,t} - R_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 Read_{i,t} + \beta_5 GR_{i,t} + \beta_6 DFOGxDGR_{i,t} + \beta_7 FOGxDGR_{i,t} + \varepsilon_{i,t}$

Random effect panel data. Hausman Test - H0 (Betas EF=EA) was not rejected

(3) $Idiossinc_{i,t} = \beta_0 + \beta_1 Read_{i,t} + \beta_2 GR_{i,t} + \beta_3 DFOGxDGR_{i,t} + \beta_4 FOGxDGR_{i,t} + \sum \beta_{j,i,t} Controles_{j,i,t} + \varepsilon_{i,t}$

Fixed effect panel data with year dummies

(4) $Idiossinc_{i,t} = \beta_0 + \beta_1 Read_{i,t} + \beta_2 GR_{i,t} + \beta_3 DFOGxDGR_{i,t} + \beta_4 FOGxDGR_{i,t} + \sum \beta_{j,i,t} Controles_{j,i,t} + \varepsilon_{i,t}$

Fixed effect panel data with year dummies

(5) $IndEP_{i,t} = \beta_0 + \beta_1 Read_{i,t} + \beta_2 GR_{i,t} + \beta_3 DFOGxDGR_{i,t} + \beta_4 FOGxDGR_{i,t} + \sum \beta_{j,i,t} Controles_{j,i,t} + \varepsilon_{i,t}$

Fixed effect panel data with year dummies

(6) $IndEP_{i,t} = \beta_0 + \beta_1 Read_{i,t} + \beta_2 GR_{i,t} + \beta_3 DFOGxDGR_{i,t} + \beta_4 FOGxDGR_{i,t} + \sum \beta_{j,i,t} Controles_{j,i,t} + \varepsilon_{i,t}$

Fixed effect panel data with year dummies

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Within the literature that argues that the cost of information impacts the cost of capital, there is divergence on how this impact would be: an additional factor to the asset pricing model or captured by the company's beta (Core *et al.*, 2008). In this sense, as verified by the results reported in columns 1 and 2 of Table 4, there is no evidence in this research that it would be with the inclusion of an additional factor. To do so, it is necessary to verify the quality of accounting information captured by the company's beta. The results are presented in columns 1 (without the inclusion of interaction dummies) and 2 (with the inclusion of interaction dummies) of Table 5, where again the information quality metrics do not present a statistically significant association with the cost of equity, this time measured by the Beta variable, following the studies by Liu and Wysocki (2017), Moura *et al.* (2016), and Nardi *et al.* (2009).

All cost of equity proxies used so far are ex-post metrics. The lack of data referring to analysts' forecasts makes it difficult to use ex-ante proxies. Following the work of Mishra and O'Brien (2005), the Ke variable is an ex-ante measure obtained through the application of the RIV model to earnings and growth rates projected by analysts. Many observations are lost in the process due to the lack of coverage of forecasts for many companies, but it reinforces the reliability of the results found.

Columns 3 and 4 of Table 5 represent the result of the regression of Equation 5. One can see a repetition of the findings obtained with the other metrics, namely, that there is no evidence of an association between the quality of accounting information and the cost of equity capital of companies.

In order to corroborate the findings, the regression process of Equation 5 was repeated using a dynamic model estimated by the Systemic Generalized Moments Method (GMM), aiming to mitigate possible existing endogeneity problems. The observed results were maintained, and it was not possible to diagnose any association between the variables of interest and the dependent variable, as can be seen in columns 5 and 6 of Table 5.

It is worth mentioning that whenever possible, the panel regression model with random effects was used in order not to lose efficiency in the models. To ensure consistency, the

adequacy of the random model was verified using the Hausman test, and when it was not possible to use it without bias, the fixed effects model with year dummies was used

Table 6 - Result of Panel Data and GMM

Variables	(1) Beta	(2) Beta	(3) ke	(4) ke	(5) ke	(6) ke
DFOGxDGR		0.0545		-0.0469		-0.00805
		(0.0356)		(0.0322)		(0.0703)
FOGxDGR		0.000677		0.00121		0.000788
		(0.00119)		(0.00117)		(0.00255)
FOG	0.000657	-0.000300	0.000710	3.56e-05	-0.000674	-0.000944
	(0.000677)	(0.00107)	(0.000610)	(0.00112)	(0.000893)	(0.00190)
GR	0.0256	-0.206	-0.264	-0.293	-0.824	-0.699
	(0.229)	(0.270)	(0.229)	(0.269)	(0.765)	(0.621)
Alav	0.00274**	0.00273**	0.00302*	0.00288*	0.00261	0.000726
	(0.00130)	(0.00130)	(0.00155)	(0.00155)	(0.00351)	(0.00334)
ROA	-0.00184	-0.00206	-0.000413	-0.000450	0.0158*	0.0155*
	(0.00173)	(0.00174)	(0.00310)	(0.00310)	(0.00928)	(0.00811)
size	0.0352	0.0330	-0.118***	-0.123***	-0.0744	-0.0657*
	(0.0253)	(0.0253)	(0.0309)	(0.0310)	(0.0529)	(0.0396)
MTB	-0.0508*	-0.0442	0.0810***	0.0807***	-0.0937	-0.0905*
	(0.0306)	(0.0307)	(0.0294)	(0.0294)	(0.0602)	(0.0517)
VoltLL	2.40e-05	6.15e-05	-0.00279	-0.00272	-0.00475	-0.00597
	(0.00173)	(0.00173)	(0.00179)	(0.00179)	(0.00449)	(0.00408)
constant	0.0970	0.130	1901***	1987***		
	(0.376)	(0.377)	(0.467)	(0.471)		
Number	1,010	1,010	395	395	276	276
R- squared	0.189	0.194	0.128	0.134		
Number of companies	135	135	59	59	56	56

(1) $\text{Beta}_{i,t} = \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 \text{GR}_{i,t} + \beta_3 \text{DFOGxDGR}_{i,t} + \beta_4 \text{FOGxDGR}_{i,t} + \sum \beta_{j,i,t} \text{Controles}_{j,i,t} + \varepsilon_{i,t}$
Fixed effect panel data with year dummies
(2) $\text{Beta}_{i,t} = \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 \text{GR}_{i,t} + \beta_3 \text{DFOGxDGR}_{i,t} + \beta_4 \text{FOGxDGR}_{i,t} + \sum \beta_{j,i,t} \text{Controles}_{j,i,t} + \varepsilon_{i,t}$
Fixed effect panel data with year dummies
(3) $\text{Ke}_{i,t} = \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 \text{GR}_{i,t} + \beta_3 \text{DFOGxDGR}_{i,t} + \beta_4 \text{FOGxDGR}_{i,t} + \sum \beta_{j,i,t} \text{Controles}_{j,i,t} + \varepsilon_{i,t}$
Fixed effect panel data with year dummies
(4) $\text{Ke}_{i,t} = \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 \text{GR}_{i,t} + \beta_3 \text{DFOGxDGR}_{i,t} + \beta_4 \text{FOGxDGR}_{i,t} + \sum \beta_{j,i,t} \text{Controles}_{j,i,t} + \varepsilon_{i,t}$
Fixed effect panel data with year dummies
(5) $\text{Ke}_{i,t} = \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 \text{GR}_{i,t} + \beta_3 \text{DFOGxDGR}_{i,t} + \beta_4 \text{FOGxDGR}_{i,t} + \sum \beta_{j,i,t} \text{Controles}_{j,i,t} + \varepsilon_{i,t}$
Systemic Generalized Moments Method - GMM
(6) $\text{Ke}_{i,t} = \beta_0 + \beta_1 \text{Read}_{i,t} + \beta_2 \text{GR}_{i,t} + \beta_3 \text{DFOGxDGR}_{i,t} + \beta_4 \text{FOGxDGR}_{i,t} + \sum \beta_{j,i,t} \text{Controles}_{j,i,t} + \varepsilon_{i,t}$
Systemic Generalized Moments Method - GMM
Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Although not presented in the research, all findings persist when replacing the Fog readability metric with the Flesch proxy. The models were also tested, taking into account the meaning of earnings management, with results consistent with those reported here. Finally, the year 2020 was excluded from the database in view of the impact of the pandemic on the model variables, mainly readability and cost of equity; however, there are no significant changes.

Overall, the results found in this study do not support the presented hypothesis H1, demonstrating that there is no robust evidence of a possible consistent association between the quality of accounting information and the cost of equity. The results presented bring yet another contribution to be added to the divergent literature on the subject and oppose previous studies, whose findings support this relationship, to endogeneity problems, which this work sought to reduce through the use of two quality metrics of information, including the interaction between them.

5. Conclusion

The aim of this paper was to investigate the relationship between the quality of accounting information and the cost of equity for publicly traded Brazilian companies in the period from 2011 to 2020. Therefore, throughout the study, we aimed to answer the following question: Does the quality of accounting information influence the cost of equity capital?

In this study specifically, the quality of accounting information was examined from the perspective of earnings management through discretionary accruals and the readability of press releases issued by companies in the last quarter of each year. We also sought to analyze these characteristics both separately and in combination by considering the interaction of the variables representing them.

As highlighted throughout the research, the existing literature on this subject is quite divergent, and our aim was to provide further empirical evidence in an attempt to reduce this gap. In this context, this study did not find statistical evidence of a possible association between the quality of accounting information and the cost of equity in the collected sample. However, we did observe the influence of one specific characteristic of accounting information, namely earnings management, on the idiosyncratic risk of companies when broadly implemented, regardless of its direction. However, this effect was dissipated through diversification and did not affect the cost of equity.

It is important to note that, unlike previous studies, this research examined the various aspects of accounting information quality, including the readability of performance reports presented by companies to the market. Furthermore, we adopted the approach of Lo *et al.* (2017), who discussed the impact of earnings management on readability, in order to avoid endogeneity problems in the proposed empirical models when evaluating the joint effect of readability and earnings management on the cost of equity.

In this sense, it is also worth mentioning the press release as a document whose readability was analyzed. Press releases represent exclusive performance reports that lack a standardized disclosure structure mandated by the regulatory body. Previous studies have shown that investors react less to MD&A disclosures compared to press releases, indicating a difference in language between these two types of reports. Additionally, when it comes to the complete annual report, readability metrics undergo significant changes depending on the section analyzed (Davis and Tama-Sweet, 2012; Huang *et al.*, 2014; Li, 2008; Li, 2011).

Different metrics were utilized to measure the variables in the econometric models, reinforcing the reliability of the results obtained. The consistency of these findings is emphasized both in the measurements of the ex-ante and ex-post cost of equity capital.

Finally, it is important to highlight the high number of lost observations encountered when capturing the variable Ke (the ex-ante cost of capital measured by the RIV model) as a limitation of the findings of this research. The capture of the ex-ante metric, relying on analysts' forecasts, tends to favor the inclusion of certain types of companies in the sample, such as large companies that are more likely to have analyst coverage compared to small-cap companies.

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