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Editor's Word

Dear readers, here is the first issue of 2024, and I begin this letter by congratulating the papers published in this number.

An analysis of the 2023 report revealed that REPeC reached the same level as international journals regarding the number of articles approved, with a 90% rejection rate.

Bruna Avelino and Juliana Prates wrote the editorial, the objective of which was to critically analyze whether researchers share the same understanding of the concept of transparency within the scope of sustainability reporting and the implications of using this construct for accounting. The primary result was that the publications reviewed presented different understandings regarding the transparency of sustainability reports.

This first issue opens with an article by Caroline Soschinski, Alice Carolina Ames, and Ilse Maria Beuren. It analyzes the relationship between business strategy and capital structure. The results showed that the type of business strategy a company adopts is related to how it finances its capital. Hence, prospectors tend to more frequently depend on third-party capital, present greater risk, and have lower cash flow profitability than defenders. In contrast, as defender companies seek market dominance and make more conservative decisions, they generate funds internally to finance their activities.

The second article, by Diego Dantas Siqueira, Gabriel Santos de Jesus, Lauro Vinício de Almeida Lima, and Égon José Mateus Celestino, presents an analysis of the influence of life cycle stages (LCS) on the relationship between corporate governance (CG) and earnings management (EM) among publicly held companies in Latin America. The results show that GC contributes to reducing EM. Additionally, there is a lower level of EM in a company's initial stages (growth and growth) and maturity than in its final stages (turbulence and decline). The analysis of the influence of LCS on the relationship between CG and EM revealed that CG is more effective in reducing EM in a company's initial stages than in its final stages; however, its ability to mitigate EM is lower in the maturity stage than in the final stages.

The third article, written by Luciana de Sousa Santos, Carlos Henrique Silva do Carmo, and Ilírio José Rech investigated the effect of the COVID-19 pandemic on the practice of intentional income smoothing on the market value (MC) of companies listed on [B]3. The results show that the COVID-19 pandemic negatively affected the companies' MV. However, the negative impact of general intentional smoothing was reduced in this period, while the negative effect of intentional smoothing using accruals intensified. These findings suggest that the companies' decreased level of operations during the pandemic more intensively affected the effect of general smoothing. In contrast, the effect of intentional smoothing on the companies' MV value was less intensely affected.

The fourth article by Antonio Rodrigues Albuquerque Filho, Alessandra Carvalho de Vasconcelos, and Editinete André da Rocha Garcia analyzed the relationship between intangible assets and risk disclosure among financial companies listed on B3. The results showed significant differences in financial, non-financial, and general risk disclosure between intangible-intensive and tangible-intensive companies. Additionally, the regression estimates indicated a positive influence of intangible assets on companies' risk disclosure. Hence, the results indicate that intangibility contributes to more transparent information regarding financial, non-financial, and general risks in financial companies listed on B3, which favors the adoption of strategies intended to maximize a company's economic value.

The fifth article was written by Carolini Verdan Brandão, Vagner Antônio Marques, Laise Mascarenhas Ballarini, and Patrícia Pain. It presents an analysis of whether companies restating financial statements experienced changes in fees and/or replaced their auditing firms in the year following the event. As a result, companies that restated financial statements paid higher audit fees in the subsequent year and were more likely to replace audit firms.

The sixth article was written by Vanessa Rodrigues dos Santos Cardoso and Paulo Augusto Pettenuzzo de Britto to analyze the potential relationship between the accounting asset informativeness and the systematic risk of Brazilian companies. The research hypothesis is based on the assumption that investors less frequently perceive risks when there are elements restricting uncertainty, such as better-quality information. The results revealed that asset informativeness is relevant and negatively associated with Brazilian companies' systematic risk, with its non-discretionary affecting systematic risk more intensively than the discretionary portion.

Finally, as shown in its objectives, REPeC is not a publication only linked to education; it encompasses several fields, such as financial, managerial, public, tax, and auditing.

Without further ado, I thank our thoughtful referees and all the researchers who submitted their articles to REPeC. Congratulations to those who had their papers approved, as the demand is reasonably high, and the road to the final publication is arduous.

Dear readers, thank you very much. I hope you enjoy this new issue. Have a great and productive year, accomplishing good-quality research through new submissions and publications.

Academic greetings,

Gerlando Lima, Ph.D.
Editor in Chief

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An analysis of the relationship between intangible assets and risk disclosure among B3's financial companies

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Abstract

Objective: To analyze the relationship between intangible assets and risk disclosure in financial companies listed on B3.

Methods: The sample comprised 78 financial companies traded on B3 between 2015 and 2019. A quantitative approach was adopted along with descriptive statistics, the test of the difference between the means, correlation, and multiple linear regression with panel data for data analysis.

Results: The results showed differences in financial, non-financial, and general risk disclosure means between intangible-intensive and tangible-intensive companies. Additionally, the regression estimates indicated a positive influence of intangible assets on the companies' risk disclosure. The results indicate that intangibility contributes to more transparent information about financial, non-financial, and general risks in financial companies listed on B3, favoring the adoption of strategies aimed at maximizing their economic value.

Contributions: This study's findings expand the discussion on intangible assets and risk reporting. Additionally, managers may see how the representativeness and structure of intangibles can be used to guide practices associated with disclosing risks to external stakeholders and understand how to manage such assets to create and maintain a company's economic value.

Keywords: Intangible Assets. Risk Disclosure. Financial sector.

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1. Introduction

Intangible assets are discussed in the business environment and have stood out in the discussions of the academic community (Albuquerque Filho, Macedo, Moura, Fank & Heberle, 2019; Gharbi, Sahut & Teulon, 2014; Kayo, 2002; Lev, 2001; Perez & Famá, 2006). Such assets are known as knowledge assets (Lev, 2001; Lev 2019; Moura, Dalchiavon, Scheren & Zanin, 2018; Sveiby, 1997), invisible assets (Sveiby, 1997), intellectual capital, or goodwill (Stewart, 1997). Evidence given to these assets is motivated by a combination of phenomena, such as the advancement of information technology and the intensification of business competition (Albuquerque Filho *et al*., 2019).

Intangible assets are unique and have distinctive characteristics, allowing companies to differentiate and obtain a competitive advantage (Santos, 2015). From this perspective, it is conjectured that (i) there is a relationship between intangibles and wealth generation (Moura *et al*., 2018), and (ii) intangible-intensive companies tend to create more value for shareholders than tangible-intensive companies (Perez & Famá, 2006). Intangible-intensive companies predominantly use intangible assets, leading to higher profits and appreciation in the capital market (Stewart, 1997).

That said, intangible assets are essential for entering business and maintaining a company's competitive position (Kayo, 2002; Nagaraja & Vinay, 2016). According to Albuquerque Filho *et al.* (2019) and Moura *et al.* (2018), relevant competitiveness factors, such as investment in human capital and research and development (R&D), are the main drivers of change in business.

Despite the advantages of holding intangible assets, Higgins (2013) considers that intangible-intensive companies demand special attention, as information about these assets involves more complex recognition, measurement, disclosure, and evaluation procedures. Hendriksen and Van Breda (2007) state that one of the main characteristics of intangibles concerns the high degree of uncertainty regarding their benefits. As a result, companies that invest intensively in these assets tend to have a riskier profile (Kayo & Famá, 2004; Santos & Coelho, 2018). It means that although such assets provide owners competitive advantages, increased productivity, and value creation, they also raise doubts regarding the sustainability of results, as they have a high degree of subjectivity involved in their identification and measurement (Albuquerque Filho, Garcia, Vasconcelos, & Lima, 2021).

Thus, investments in intangible assets are also subject to various risks that affect business performance, and the literature presents some results for the relationship between intangible constructs and corporate risks. Jia (2018) examined the relationship between corporate innovation (intangibles) and the risk of stock price fall among American companies. Wu and Lai (2020) assessed the relationship between intangible intensity and the risk of stock price falling among companies listed on US stock exchanges. They reported a positive relationship between intangible resources and risk. On the other hand, Ben-Nasr, Bouslimi, and Zhong (2021) analyzed whether patented innovations reduce the risk of falling stock prices in American companies, and Lev, Radhakrishnan, and Ciftc (2006) examined future benefits, earnings variability, and stock volatility shares of leading R&D companies. They found a negative relationship between such intangibles and risk.

Such divergences in the results corroborate research showing that companies provide investors with greater evaluative possibilities regarding the risk and profitability of their investments when they recognize and disclose intangibles in their financial reports, such as the balance sheet (representativeness) and explanatory notes (structure) (Al-Hadi, Hasan & Habib, 2016; Santos & Coelho, 2018). Therefore, companies reporting strategic investments with a certain degree of complexity and uncertainty support investors in measuring risks and market value (Abdullah, Shukor & Rahmat, 2017). Furthermore, companies that disclose adequate and sufficient information about risks tend to enjoy higher levels of trust (Leite, Nunes, Assis, Adriano & Fonseca, 2016).

As a result, risk disclosure has currently become relevant for the capital market (Dey, Hossain & Rezae, 2018) to decrease information asymmetry, as it involves financial and non-financial information that organizations provide concerning risk analyses in their institutional reports (Miihkinen, 2012).

Difficulties involved in measuring and disclosing intangible assets, as well as the characteristics of the Brazilian stock market listed by Perez and Famá (2006), such as high volatility, liquidity problems, and excessive concentration of ownership, motivate the study of these assets to understand how companies have reported corporate risks. Furthermore, even though plenty of Brazilian studies on intangible assets address different economic sectors, these generally exclude financial companies due to their peculiar characteristics (Moura, Varela & Beuren, 2014).

Intangible assets and risk disclosure are topics widely studied in non-financial companies. Hence, this study's analysis of intangible assets includes these companies' structure and representativeness due to the disclosure of financial, non-financial, and general risks to advance the empirical literature applied to financial companies.

This study analyzes the relationship between intangible assets and risk disclosure in financial companies listed on B3. Therefore, the intangible assets of 78 companies were analyzed using the structural and representative approach. The risk disclosure analysis also included section 4 of the reference form – Risk factors. Descriptive statistics was used to analyze data from 2015 to 2019 (five years), including the test for differences between means, correlation analysis, and multiple linear regression with panel data.

Although the field of intangible assets and risk disclosure are relatively mature, the relevance of this study lies in the gaps that remain when these aspects are studied together, especially when restricted to financial organizations; due to their specific regulations and particularities, they are often excluded (Kayo, 2002). Furthermore, Al-Hadi et al. (2016) highlight that risk disclosure is relevant for companies because this information is the main instrument for containing banking crises. In the meantime, information transparency in the financial system is essential for the economic decision-making process since intermediation in financial institutions requires stakeholders to trust them (Dantas, Rodrigues, Rodrigues & Capelletto, 2010). The transparency of financial companies includes the disclosure of timely information that enables users to assess a business's risk profile, financial conditions, and risk management practices (Torres & Galdi, 2013). Additionally, intangible assets are essential to recover from a fall in market value during crises (Barajas, Shakina & Fernández-Jardón, 2017; Shakina & Barajas, 2015).

This study also expands discussions involving these topics, providing empirical evidence that supports the decision-making of financial managers, investors, and market regulatory bodies. Considering that financial companies tend to take more risks due to the sector's intense competitiveness, this study shows managers the need to be aware of the best market practices and improve processes to promptly and adequately identify corporate risks to minimize losses, confirming that risk management in financial institutions is a current research topic (Alves & Matias, 2014).

2. Literature Review

2.1 Intangible Assets

Intangibles have become essential assets in the organizational scenario (Kayo, 2002). Kaplan and Norton (1997) emphasize that companies' value creation migrates from managing tangible assets to strategies based on knowledge management and exploring intangible assets. In this sense, Stewart (1997) explains that large companies do not become powerful only by accumulating more capital than their competitors but also by having intangible assets that are more valuable than tangible assets, which gives them a competitive advantage.

Although some authors attribute the relevance of intangible assets' definitions to their physical inexistence, Hendriksen and Van Breda (2007) note that this is not a base characteristic for differentiating tangible and intangible assets. They also assert that when the definition, recognition, and measurement requirements are met, intangible assets must be recognized in financial statements. Higgins (2013) considers that companies with intangible assets are more complex and require special attention regarding recognition, measurement, and disclosure procedures. For example, internally generated intangibles are not included in accounting reports, even though the market values them, while acquired intangible assets are identified and presented on the companies' balance sheets (Machado, 2023).

In Brazil, the obligation to record these assets in the balance sheet's non-current assets was determined by Law No. 11,638, from December 28, 2007, which amended and revoked provisions of Law No. 6,404, of December 15, 2007. 1976. Later, based on IAS 38 (2004), CPC 04 established criteria for recognizing and measuring these assets (CPC, 2008, 2010). Based on regulations, not all intangible items can be recorded as intangibles, as they must meet their recognition and measurement requirements.

Regarding the structure, several authors propose classifications, independently of normative provisions, for identifying intangible assets (Brooking, 1996; Edvinsson & Malone, 1998; Kaplan & Norton, 1997; Kayo, 2002; Lev, 2001; Stewart, 1997; Sveiby, 1997). Note that there is no consensus on which classification is the most appropriate, as each author relies on relevant characteristics to facilitate understanding regarding the study of assets intangibility. Therefore, due to the diverse approaches used to address this topic, and also for convenience, this study adopts Kayo's (2002) classification. It divides intangible assets according to shared characteristics: human assets, innovation assets, structural assets, and relationships (with strategic audiences). Among several studies that use this classification, Groff, Marschner, and Sané (2013), Kayo and Famá (2004), Lin and Tang (2009), Machado and Famá (2011), Santos (2015), and Santos, Calíope and Silva Filho (2016), stand out.

Similar to the classification of intangible assets, their representativeness has been the focus of some academic investigations (Leite & Pinheiro, 2014; Mantovani & Santos, 2014; Moura, Fank & Varela, 2012; Moura, Theiss & Cunha, 2014). The representativeness (proportion) of intangible assets has been addressed from the perspective of different groups of the equity structure, such as Non-Current Assets and Total Assets (Mantovani & Santos, 2014).

Regarding representativeness, Moura *et al.* (2018) draw attention to increased investments in intangibles, giving these assets greater prominence and representativeness in total assets. In the opinion of Edvinsson and Malone (1998), intangibility is what fills the gap between a company's accounting value and its market value, being composed of knowledge, applied experience, technology, customer relationships, and professional skills, which provides the company with a competitive advantage (Chiarello, Marassi & Klann, 2015).

Albuquerque Filho et al. (2019) show that the degree of intangibility positively impacts return on equity. Therefore, intangible-intensive companies (predominant in intangible assets) are more profitable than tangible-intensive ones. Kayo and Famá (2004) note that a company's size and market value contribute to increasing or decreasing its probability of being intangible-intensive.

Mansfield and Wagner (1975) warn that investments in intangible assets are more likely to fail than investments in tangible assets though; hence, intangible assets investment imposes more significant risks to a business (Ben-Nasr, Bouslimi & Zhong, 2021; Giuliani, 2013; Wu & Lai, 2020); for example, R&D investments raise different types of corporate risks (Gharbi et al., 2014). They note that the possibility of product failure, systematic risk, profit variability, intellectual property risk, and volatile stock returns lead to such risks. Nonetheless, intangible-intensive companies tend to have low debt levels, as they are often forced to finance their intangibles with internal resources (Santos, 2015).

Furthermore, the risks caused by intangible assets may arise from their internal development, i.e., late and unstable development, but also because they have high acquisition and management costs (Perez & Famá, 2006). Moreover, some intangibles, such as property rights, may be stolen, manipulated, or copied (Lev, 2001). Intangibles such as customer base, relationships, logistics, and distribution channels present high risks since they are at the companies' service but do not belong to them (Perez & Famá, 2015).

Therefore, the relevance of the risks related to these assets in the business and academic context is apparent. Hence, disclosing risks related to these assets decreases information asymmetry between managers, investors, and other interested parties (Moura *et al.*, 2018).

2.2 Risk Disclosures

Even though there is no consensus in reports and studies on the term "risk" (Samson, Reneke & Wiecek, 2009), authors addressing organizational matters propose and accept different understandings. Renn (1992) states that "risk" is the probability that an undesirable state of reality may arise due to human action or natural events. The term "risk" used in this paper aligns with that proposed by Linsley and Shrives (2006). Their definition identifies risk as any opportunity or threat, damage, danger, or exposure that may affect a business in the future or has already affected it, explaining the growing interest among stakeholders in information regarding organizations' risk management (Zonatto & Beuren, 2010).

Miihkinen (2012) states that risk disclosure involves all information an organization provides regarding risk analyses presented in its reports. In turn, Kim and Yasuda (2018) understand that risk disclosure must contain information affecting investor decisions, including all factors influencing a company's future performance.

Santos and Coelho (2018) state that reporting risk management maximizes the chances of a business' success as it supports shareholders' investment decisions. On the other hand, disclosure is fundamental for assessing a manager's ability to deal with market volatility and uncertainty and its influence on the company's performance (Dobler, Lajili & Zéghal, 2011).

Specifically in financial companies, Al-Hadi et al. (2016) clarify that market risk disclosure is critical since this information is essential for containing banking crises. According to Zonatto and Beuren (2010), market risk may be represented by interest rates, exchange rates, stock, or commodity prices; therefore, these are losses resulting from fluctuations in economic-financial variables.

This paper admits that risk management involves risk reporting and generates effects such as decreased information asymmetry between managers and investors (Santos & Coelho, 2018) and reduced fundraising costs (Dey et al., 2018).

Information disclosure is voluntary or compulsory; the latter results from regulations determining the minimum requirements for information disclosure regarding risk for example (Elshandidy & Neri, 2015). Despite such devices, some companies avoid disclosing unfavorable information, deliberately omitting it (Polinsky & Shavell, 2012).

For this reason, the Sarbanes-Oxley Act (Sox) was enacted in the United States to ensure information transparency about risks and provide investors greater protection. As a result, the risk management model proposed by the Committee of Sponsoring Organizations of the Treadway Commission (Coso) was adopted. However, emerging countries have less rigid regulations, and companies enjoy a greater concentration of ownership. Hence, voluntary disclosure is even more critical (Lanzana, 2004).

To assess risk disclosure in this study, we adopted the score of financial companies that results from the sum of disclosed risk factors, according to a structured checklist based on Linsley and Shrives (2006), Miihkinen (2012) and Ntim, Lindop, and Thomas (2013) described in the methodology.

2.3 Hypothesis Formulation

Studies analyze the relationship between intangible assets and several variables, such as debt and risk level (Kayo, 2002), corporate governance (Moura et al., 2014), corporate social responsibility, innovation (Santos, Silva, Gallon & De Luca, 2012), and business performance (Nagaraja & Vinay, 2016).

Nagaraja and Vinay (2016) investigated the relationship between the intangible assets, financial performance, and financial policies of Indian companies. They found that intangible assets positively influence a company's financial performance and value. On the other hand, the same was not found for financial policies.

Moura et al. (2014) analyzed the balance sheets, explanatory notes, and management reports of 260 BM&FBovespa companies in 2009. They found that (i) the average disclosure compliance index based on CPC 04 was 75%, and (ii) companies with greater intangibility and better governance practices are those with higher levels of compliance with mandatory disclosure.

Elshandidy and Neri (2015) compared non-financial companies in the United Kingdom (290) and Italy (88). They found that governance practices play a significant role in the high levels of risk disclosure in the annual reports of United Kingdom companies. As for the Italian companies, they found that governance motivated them to provide more information on a mandatory basis.

On the other hand, Dey et al. (2018) consider that, despite regulations, companies consistently and regularly resist disclosing risk information. Their findings result from a study comprising 48 industrial companies in Bangladesh from 2010 to 2015.

Still, in the context of companies from different sectors, regarding the relationship between intangible assets and risk, Giuliani (2013) states that intangible assets impose risks, and companies are restricted by long-term strategic investment. This means that the strategic assets of intangible-intensive companies may succeed (or fail) in times of difficulty when resources are limited (Barajas et al., 2017). Therefore, companies' intangibility has been treated as a construct composed of multiple dimensions with different effects on risk (Brasil, Sampaio & Perin, 2008).

Gharbi et al. (2014) note that the uncertainty of investments in intangible assets, especially related to R&D, is substantially higher than that of tangible assets. According to the authors above, R&D investments involve many types of risk, such as product failure, profit variability, systematic risk, intellectual property, and the volatility of stock returns. Therefore, the level of information asymmetry in intangible-intensive companies is generally high due to the complexity and technicality of innovation (Gharbi et al., 2014).

Therefore, intangible assets suggest more significant uncertainty due to their characteristics; i.e., they raise earning potential but increase business risk. Thus, considering these assets are more "subjective," intangible-intensive companies may present higher risks and higher risk disclosure, a conjecture representing the central relationship investigated here through the companies in the B3 financial sector. As noted by Fernandes (2012), disclosing information regarding the effects of a company's operational activity tends to reduce information asymmetry between managers and stakeholders, which might mitigate corporate risks.

Furthermore, previous studies have seldom addressed intangible assets and risk disclosure in the context of financial companies, especially when these are studied together. In any case, investments in intangibles are known to present specific characteristics –, such as uncertainty, intangibility, and difficult appropriation –, which, combined with market failures like informational asymmetry, moral risk, and indivisibility, make activities that consume these resources more risky, costly, and less accessible (O'Brien, 2003).

Chiarello et al. (2015) assessed the level of information disclosure related to intangible assets in financial companies on the BM&FBovespa from 2010 to 2012. Their results show that the financial sector has low levels of disclosure of intangible assets, with larger companies presenting higher levels of disclosure regarding these assets, because large companies are subject to more regulatory requirements or seek to decrease the cost of capital by attracting investors.

Zonatto, Sousa, and Fernandes (2015) analyzed the level of market risk disclosure of 24 financial institutions on the BM&FBovespa and found no significant differences between banks listed at different levels of governance. The results show that the disclosure practices of financial companies are not standardized, highlighting the possibility of companies selecting information for disclosure, which diverges from other studies' results.

By analyzing the annual reports of financial companies listed on the Shanghai "A" share market from 2013 to 2015, Elshandidy, Neri, and Guo (2018) examined the main factors for the quality of risk disclosure and found that the size of companies is the most significant factor, while a firm's capital and risk structure do not affect the quality of risk disclosure.

Li, Li, Liu, and Zhu (2018) analyzed the trends and evolutionary mechanisms of risk disclosure in the annual reports of financial companies from 2006 to 2016. Their study showed that changes in company characteristics might explain the general trends in risk disclosure attributes.

More recently, Souza, Santos, and Gordiano (2022) investigated the relationship between intangible assets and economic-financial performance in a sample of financial companies in 2018. The findings showed that intangible assets positively influence the economic-financial performance of companies in the financial sector.

Thus, based on the arguments in the literature generally aimed at non-financial companies, the following hypothesis is proposed:

H1: The intangibility of assets influences risk disclosure in financial companies listed on the Brazilian stock exchange

3. Methodological Procedures

The study population comprises 83 companies in the financial sector listed on B3 on December 18, 2020. Note that five companies were excluded for not having their financial statements on the B3 website. Thus, data from 78 companies concerning the five-year period (2015-2019) were used. The financial companies were identified according to the B3 classification, whose grouping criteria include analyzing the services or products that contribute the most to these companies' revenues. Table 1 presents the final sample with 78 companies.

Table 1

Segmentation of companies classified in the B3 financial sector B3

Subsector	Segment	Companies	
		Number	Percentage (%)
Financial intermediaries	Banks	23	29
Receivable securitization	Receivable securitization	16	20
Real State Exploration	Real State Exploration	13	17
Pensions and insurance	Insurance	6	7
Miscellaneous financial services	Resource and investment management	5	6
Diversified holdings	Diversified holdings	3	4
Financial intermediaries	Commercial leasing	3	4
Financial intermediaries	Credit and financing	3	4
Real State Exploration	Real State intermediation	2	3
Pensions and insurance	Insurance brokers	2	3
Miscellaneous financial services	Miscellaneous financial services	2	3

Source: developed by the authors.

Table 1 shows that banks (29%), receivables securitization companies (20%), and real estate exploration companies (17%) represent 66% of the study sample.

The next step consisted of analyzing the intangible assets reported by the companies in the balance sheet and the explanatory notes, addressing the assets' representativeness and structure. The first approach (representativeness) aimed to highlight each firm's share of the intangible assets relative to the total assets and non-current assets, which enabled measuring their equity relevance (Albuquerque Filho *et al.*, 2019; Moura *et al.*, 2014; Nagaraja & Vinay, 2016). The second approach (structural) considered the composition of intangible assets integrating the equity structure, according to the classification of Kayo (2002) and Santos (2015): innovation assets, structural assets, and relationship assets.

A qualitative approach was adopted in the reports' documentary analysis to assess risk disclosure. Two researchers concomitantly applied this technique, which two other authors reviewed later. The document analysis focused on the reports' risk section (Beattie, McInnes & Fearnley, 2004). Similar to what was performed by Almendra, Vasconcelos, Silva, and De Luca (2018), the observations were verified using the reference form, section 4 – Risk Factors. The scale proposed by Van Staden and Hooks (2007) was used to measure the information reported by the companies in the risk section (Table 2).

Table 2
Disclosure level measurement scale

Score	Description
0	There is no comment on the risk factor, or there is information that the company is not subject to this factor.
1	Qualitative information with brief mention. Descriptive details only.
2	Qualitative information with an explanation of the sources of risk. Disclosure of risk policies
3	Quantitative information with brief mention. Only details in monetary terms or actual physical quantities.
4	Quantitative information identifying sources of risk. Evidence of policies, impact, and/or probability of risk.

Source: developed by the authors according to Van Staden and Hooks (2007).

Therefore, the scale ranges from 0 to 4 points; the higher the score, the higher the level of risk disclosure. Furthermore, the checklist for measuring the level of risk disclosure was based on Linsley and Shrives (2006), Miihkinen (2012), and Ntim et al. (2013), from which two risk categories encompassing corporate risk factors were identified: financial and non-financial. Another five risk subcategories are considered: financial, operational, strategic, damage, and integrity. Therefore, 38 risk factors are listed and distributed across the five subcategories. Hence, the risk disclosure index's total/maximum score is 152 points: 28 points concern financial risk disclosure, and 124 points concern risk disclosure non-financial (Table 3).

Table 3

Categories, subcategories, and risk factors

Category: Financial risk disclosure	
Subcategory	**Risk Factor**
Financial Risk	Interest rate changes Sudden changes in exchange rates Risk of insufficient working capital (liquidity) Risk of not receiving payments (credit/default) Sudden changes in share price Changes in prices and coverage of financial instruments Commodity price volatility Maximum total subcategory score: 28 points
Category: Non-Financial risk disclosure	
Subcategory	**Risk Factor**
Operational risk	Effects of negative marketing (customer boycott) Third-party complaints Sudden unavailability of resources and/or problems in the supply of inputs Risks in the production and product development process Risk of infringement of industrial property rights and/or problems with their protection Risk of failures in information technology and/or cyber risk Risk of dependence and/or unavailability of human resources Risk of social and environmental damage Risk of reduced revenue and/or significant discount due to inventory obsolescence Risk of brand erosion Health and safety risk in the workplace **Maximum total subcategory score: 44 points**
Damage risk	Risk of insufficient insurance coverage Risk of unfavorable court decisions (significant lawsuits) **Maximum total subcategory score: 8 points**
Integrity risk	Internal or external fraudulent actions Negative impact on the company's reputation or image Ethical problems and corruption in business **Maximum total subcategory score: 12 points**
Strategic risk	High level of competitiveness and risk of unfair competition Risk of Industry-Specific Changes Geopolitical instabilities Risk of regulatory changes Risk of political changes, with the possibility of changes in tax legislation Risk of economic changes Changes in the inflation rate Risk of natural disasters affecting the business environment Risk of loss of control over suppliers and/or risk of dependence on suppliers Changing customer preferences Risk of loss of control over customers and/or risk of customer dependency Risks associated with the launch of new products Risks associated with the preparation and implementation of mergers and acquisitions Political Risk on Sovereign Bonds Risks associated with business portfolio diversification **Maximum total subcategory score: 60 points**

Source: developed by the authors according to Linsley and Shrives (2006), Miihkinen (2012), and Ntim et al. (2013).

Based on specialized literature, this study adopted the following control variables: company size (SIZE), considering that large companies are prone to assume higher levels of risk due to capital availability (Rengel, Sousa, Monteiro & Meurer, 2020); debt (DEBT) because it is associated with a company's risk and it transmits information about business risks (Nascimento, Angotti, Macedo & Bortolon, 2018); and return on assets (ROA), which, according to Shahzad, Fareed, Wang and Shah (2020), the higher the company's performance, the greater a company's perceived risk.

Descriptive statistics, the test of differences between means, correlation analysis, and multiple linear regression with panel data were applied. Basic assumptions such as normality of residuals, homoscedasticity, and multicollinearity were met, and linear regression tests were performed.

The test of difference between means was intended to verify potentially significant differences in risk disclosure (financial, non-financial, and general) between intangible-intensive (G1) and tangible-intensive (G2) companies. These groups were created to represent companies: G1, comprising companies whose values were equal to or above the intangible variables median (representativeness), and G2, comprising companies whose values were below the median (Oliveira, Schossler, Campus & Luce, 2014; Perez & Famá, 2006). Note that the classification of companies into these two groups (G1 and G2) was also considered when performing descriptive statistics and regressions involving the representativeness of intangible assets to obtain more robust results. In this sense, a dummy variable (G1 and G2) was included in each model involving the variables of representative intangible assets (INTANG_TA - quotient between intangible assets and total assets; INTANG_NC - quotient between intangible assets and non-current assets; and NI - mean of intangibility proxies relative to their representativeness) (Carlos & Angelo, 2019; Magro, Silva, Padilha, & Klann, 2017) to verify whether the group of intangible-intensive companies influences the disclosure of financial, non-financial, and general risk. The tests were performed using STATA, version 13.

Table 4 summarizes the study variables.

Table 4
Dependent, independent and control variables

	Variable	Description	References
Dependent	Risk Disclosure	FD – financial risk disclosure Intangibility	Chiarello, Marassi and Klann (2015) Elshandidy *et al.* (2018) Zonatto *et al.* (2015)
		NFD – non-financial risk disclosure	
		GD – general risk disclosure	
Independent	Intangibility (Representativeness)	INTANG_TA – quotient between intangible assets and total assets	Albuquerque Filho et al. (2019) Moura *et al.* (2014) Nagaraja and Vinay (2016)
		INTANG_NC – quotient between intangible assets and non-current assets	
		NI – mean of proxies of intangibility relative to its representativeness	
	Intangibility (Structure)	Relationship assets – proportion relative to total intangible assets	Kayo (2002) Santos (2015)
		Innovation assets - proportion relative to total intangible assets	
		Structural assets – proportion relative to total intangible assets.	
Control		SIZE – company's size – Ln of total assets.	Albuquerque Filho et al. (2019) Kayo (2002) Moura *et al.* (2014) Nagaraja and Vinay (2016) Rengel *et al*. (2020) Shahzad *et al.* (2020)
		DEBT – company's debt – quotient between payable liabilities and total assets.	
		ROA – return on assets – quotient between net profit and total assets	
		Dummy (G1, G2) – takes on 1 for intangible-intensive companies regarding representativeness (G1) and 0 for tangible-intensive companies (G2)	Carlos and Angelo (2019) Magro *et al.* (2017)

Source: developed by the authors.

The econometric models in this study are defined as follows:

$$Risk\ Disclosure = \beta_0 + \beta_1 Intangibility_{i,t}\ (representativeness) + \beta_2 SIZE_{i,t} + \beta_3 DEBT_{i,t} + \beta_4 ROA_{i,t} + Dummy\ (G1,G2)\ \varepsilon_{i,t} \quad \textit{Equation 1}$$

$$Risk\ Disclosure = \beta_0 + \beta_1 Intangibility_{i,t}\ (structure) + \beta_2 SIZE_{i,t} + \beta_3 DEBT_{i,t} + \beta_4 ROA_{i,t} + \varepsilon_{i,t} \quad \textit{Equation 2}$$

As the models were tested using the linear regression technique with panel data, the application of fixed effects (F), random (A), or pooled OLS (P) panel models was performed through the application of the Hausman tests, Breush-Pagan and F test for individual effects. According to the test results, the most appropriate type of effect was used in each model.

4. Results

Table 5 presents the descriptive analysis of risk disclosure and the representativeness and structure of companies' intangible assets in the five years (2015-2019).

Table 5
Descriptive analysis of variables

Variable	No. of observations	Minimum	Maximum	Mean	Standard deviation
FD	390	0	26	9,35	6,324
NFD	390	0	53	22,30	13,009
GD	390	0	73	31,65	17,991
INTANG_TA	390	0	0,7967	0,4618	0,1507
INTANG_NC	390	0	0,6102	0,2071	0,7271
NI	390	0	0,3122	0,1279	0,4227
Relationship assets	116	0	0,7257	0,1951	0,4043
Innovation assets	73	138	0,6947	0,2037	0,5566
Structural assets	126	22	0,6810	0,2570	0,5080

Legend: FD – Financial risk disclosure; NFD – Non-financial risk disclosure; GD – general risk disclosure; INTANG_TA – quotient between intangible assets and total assets; INTANG_NC – quotient between intangible assets and non-current assets; NI – mean of intangibility proxies concerning representativeness; Relationship assets – proportion relative to total intangible assets; Innovation assets – proportion relative to total intangible assets: Structural assets – proportion relative to total intangible assets.

Source: developed by the authors.

The companies recorded a general risk disclosure mean of 31.65 points (20.8%). Some companies did not record any risk factor, while others recorded up to 73 points (48.0%) out of a maximum score of 152. Note that there is a discrepancy in general risk disclosure between companies; some companies scored a maximum of 26 points for financial risk disclosure (92.9% of the total), and some scored 73 points for non-financial risk disclosure (58.9%).

This finding corroborates Almendra et al. (2018) and Polinsky and Shavell (2012), who highlighted that, despite regulations, some companies disclose little or insufficient information about risks. According to Beretta and Bozzolan (2004), such lack of information hinders external users' assessment regarding the impacts to which companies are subjected.

Some financial companies do not report values regarding the representativeness of intangible assets. In contrast, the companies with the most significant representation recorded 79.69% of total assets, 61.02% of non-current assets, and 31.22% of proxies representing intangible assets.

As for the structure of intangibles, the most representative group in financial companies involves structural assets, with a mean of 25.70% of total intangible assets, followed by innovation intangibles, with a mean of 20.37%. Other intangible assets, not included in Kayo's (2002) classification, represent 34.42% of the companies' intangible assets.

Table 6 presents the companies' descriptive statistics based on the classification into intangible-intensive (G1) and tangible-intensive (G2), showing the behavior and dispersion of companies regarding different types of risk disclosure.

Table 6

Descriptive analysis of risk disclosure variables, considering the classification of companies in the G1 and G2 based on the variables of representative intangible

Variable	INTANG_TA	No. of observations	Minimum	Maximum	Mean	Standard-deviation
FD	G1	193	0	26	9,45	6,335
	G2	191	0	26	9,341	6,324
NFD	G1	193	0	53	22,70	13,16
	G2	191	0	53	22,29	13,00
GD	G1	193	0	73	32,16	18,07
	G2	191	0	73	31,64	17,99
Variable	**INTANG_NC**	**No. of observations**	**Minimum**	**Maximum**	**Mean**	**Standard-deviation**
FD	G1	193	0	26	9,33	6,334
	G2	191	0	26	9,28	6,324
NFD	G1	193	0	53	22,43	13,06
	G2	191	0	53	21,30	12,95
GD	G1	193	0	73	33,77	18,05
	G2	191	0	73	32,23	17,87
Variable	**NI**	**No. of observations**	**Minimum**	**Maximum**	**Mean**	**Standard-deviation**
FD	G1	193	0	26	9,538	6,382
	G2	191	0	26	9,351	6,324
NFD	G1	193	0	53	22,63	13,23
	G2	191	0	53	21,14	13,00
GD	G1	193	0	73	32,33	18,17
	G2	191	0	73	31,64	17,99

Legend: FD – Financial risk disclosure; NFD – Non-financial risk disclosure; GD – general risk disclosure; INTANG_TA – quotient between intangible assets and total assets; INTANG_NC – quotient between intangible assets and non-current assets; NI – mean of intangibility proxies concerning representativeness; G1 – group of intangible-intensive companies; G2 – group of tangible-intensive companies.

Source: developed by the authors.

Table 6 shows that intangible-intensive companies are more likely to disclose risk information (general, financial, and non-financial) than tangible-intensive companies despite the greater dispersion identified among G1 companies. In any case, note that both groups comprise companies that did not disclose risk factors. Furthermore, the dispersion of the results concerning G1 and G2 companies is greater in non-financial and general risk disclosure.

The companies recorded a general risk disclosure mean of 31.65 points (20.8%). Some companies did not record any risk factor, while others recorded up to 73 points (48.0%) out of a maximum score of 152 points. Note that there is a discrepancy in general risk disclosure between companies, with some presenting a maximum of 26 points for financial risk disclosure (92.9% of the total) and 73 points for non-financial risk disclosure (58.9%).

Thus, it is clear that some Brazilian financial companies avoid disclosing all their risk information, restricting information disclosure required by law. Despite regulations, some companies consistently and regularly do not disclose risk information (Dey et al., 2018). Polinsky and Shavell (2012) mention that a potential explanation arises from companies not disclosing unfavorable information and risk disclosure, as such information can influence investors' decision-making (Kim & Yasuda, 2018).

Table 7 presents the main intangible assets, according to group and respective components.

Table 7

Primary intangible assets reported by companies according to group and respective components

Intangible group	Components	Companies		Mean in the 2015-2019 period (in thousand Reais)
			Percentage (%)	
Innovation assets	Software development	8	10	40,599.70
	Patents	6	8	603.66
Structural assets	Software	33	42	229,320.76
	Right to use landline telephone	3	4	200.82
	Distribution channel	3	4	10,343.78
Relationship assets	Brands	10	13	8,352.20
	Customer portfolio	10	13	58,208.54
	Non-compete agreement	6	8	535.83
	Exclusivity contract	4	5	118.90
	Right to renew contracts	3	4	55.40
	Service contract	2	3	190.72
	Right of exploration	1	1	200,540.68
	Acquisition of financial rights	1	1	91,4332.26
	Association for promoting and offering financial products and services	1	1	33.66

Source: developed by the authors.

Table 7 shows that the financial companies in the sample reported 14 intangible components within the groups of intangible assets according to Kayo's (2002) classification. Furthermore, it is worth noting that no components of human assets were identified, and other intangibles with unrepresentative individual values were identified in only one company and were not reported in Table 6.

In terms of the companies' structure of intangible assets, the components most frequently disclosed are Software (42%), Brands (13%), Customer portfolio (13%), Software development (10%), Patents (8%), and Non-compete Agreement (8%). A comparison of our results with the findings reported by Moura et al. (2014), in which the most recurrent were Software (85%), Concession contracts (36%), and Trademarks (31%), indicates a certain similarity.

Regarding the representativeness of intangible investments however, Software, Exploration rights, Acquisition of financial rights, Customer portfolio, and Software development present the highest mean values in 2015-2019.

Table 8 presents the results of the test differences between the risk disclosure means (financial, non-financial, and general) of intangible-intensive (G1) and tangible-intensive (G2) companies.

Table 8
Teste de média

Variable	INTANG_TA	No. of observations	Student's t test		Levene's test	
			Mean	Sig.	F	Sig.
FD	G1	193	10,85	0,000(*)	1,330	0,249
	G2	191	8,13	0,000		
NFD	G1	193	27,48	0,000	4,005	0,46(**)
	G2	191	17,76	0,000(*)		
GD	G1	193	38,33	0,000(*)	1,274	0,260
		191	25,89	0,000		
Variable	**INTANG_NC**	**No. of observations**	**Student's t test**		**Levene's test**	
			Mean	**Sig.**	**F**	**Sig.**
FD	G1	193	10,37	0,000(*)	0,001	0,917
	G2	191	7,88	0,000		
NFD	G1	193	27,30	0,000	3,217	0,074(***)
	G2	191	17,10	0,000(*)		
GD	G1	193	37,67	0,000(*)	0,858	0,355
		191	24,99	0,000		
Variable	**NI**	**No. of observations**	**Student's t test**		**Levene's test**	
			Mean	Sig.	F	Sig.
FD	G1	193	10,39	0,000(*)	0,162	0,688
	G2	191	8,01	0,000		
NFD	G1	193	27,09	0,000	8,023	0,005(*)
	G2	191	17,62	0,000(*)		
GD	G1	193	37,48	0,000	3,979	0,047(**)
	G1	191	25,63	0,000(*)		

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.
Legend: FD – Financial risk disclosure; NFD – Non-financial risk disclosure; GD – general risk disclosure; INTANG_TA – quotient between intangible assets and total assets; INTANG_NC – quotient between intangible assets and non-current assets; NI – mean of intangibility proxies concerning representativeness; G1 – group of intangible-intensive companies; G2 – group of tangible-intensive companies.

Source: developed by the authors.

Intangible-intensive and tangible-intensive companies present significant differences between the three risk disclosure proxies. Non-financial risk disclosure is heterogeneous between G1 and G2, while general risk disclosure showed more significant variability when the INTANG_TOTAL variable was used. In general, risk disclosure is more evident in intangible-intensive companies than in tangible-intensive ones. This result is consistent with the findings of Mansfield and Wagner (1975), Gharbi et al. (2014), and Albuquerque Filho *et al.* (2019), who note that intangible-intensive companies are more likely to fail in investments in intangibles, while the market demand more information on the associated risks.

For example, Gharbi et al. (2014) indicate that R&D investments may incur different types of risk, even more so among financial companies, which, in the view of Gomes, Ferreira, De Luca, and Ponte (2013), are prone to more significant risks compared to companies in other sectors. Thus, when financial companies adopt high transparency standards, such as risk disclosure, they provide investors with sufficient conditions to assess their capital sufficiency and performance about risks (Gomes et al., 2013).

Table 9 presents the (in)existing correlations between the independent and control variables and risk disclosure.

Table 9
Pearson's Correlation

Intangible assets	Variable	Risk Disclosure		
		Financial (FD)	Non-financial (NFD)	General (GD)
Representativeness	INTANG_TA	NS	+(**)	+(**)
	INTANG_NC	NS	+(**)	+(**)
	NI	NS	+(**)	+(***)
Structure	Relationship assets	+(*)	+(***)	+(***)
	Innovation assets	+(*)	+(**)	+(**)
	Structural assets	+(*)	NS	NS
Control	SIZE	+(**)	+(**)	+(*)
	DEBT	NS	NS	NS
	ROA	NS	NS	NS

Note: (***) significant at 1%; (**)significant at 5%; (*)significant at 10%; NS – non-significant correlation; + – positive correlation.
Legend: INTANG_TA – quotient between intangible assets and total assets; INTANG_NC – quotient between intangible assets and non-current assets; NI – mean of intangibility proxies concerning representativeness; Relationship assets – proportion relative to total intangible assets; Innovation assets – proportion relative to total intangible assets: Structural assets – proportion relative to total intangible assets; SIZE – company's size; DEBT – company's debt; ROA – return on assets.

Source: developed by the authors.

Intangibility assessed by its representativeness positively correlates with non-financial and general risk disclosure. Additionally, about its structure, intangibility positively correlates with financial risk disclosure. As for relationship and innovation intangibles, these positively correlate with non-financial and general disclosure. Furthermore, size is positively correlated with the three risk disclosure proxies.

Table 10 presents the models' estimations that analyze the influence of the representativeness of intangibles on financial risk disclosure.

Table 10
Intangibility (representativeness) and Financial risk disclosure

Variable	Financial risk disclosure			
	Model I	**Model II**	**Model III**	**Model IV**
INTANG_TA	-0,296	-	-0,959	-
INTANG_NC	-	-0,956	-0,839	-
NI	-	-	-	-1,832
SIZE	0,805(*)	0,737(*)	0,731(*)	0,755(*)
DEBT	0,905	0,335	0,689	0,991
ROA	0,040	1,403(*)	1,234(*)	0,247(*)
Dummy (G1, G2)	0,747	2,232	2,330	2,246
Constant	-0,579	-1,921	-1,837	-1,864
Wald Chi2	19,33	23,74	25,55	-
p-value	0,000	0,000	0,000	-
F	-	-	-	30,05
p-value	-	-	-	0,000
Effect	A	A	A	P
R^2	0,2180	0,2260	0,2250	0,248
Mean VIF	1,20	1,10	1,18	1,16

Note: (*) significant at 10%.
Legend: INTANG_TA – quotient between intangible assets and total assets; INTANG_NC – quotient between intangible assets and non-current assets; NI – mean of intangibility proxies concerning representativeness; SIZE – company's size; DEBT – company's debt; ROA – return on assets; Dummy G1 – intangible-intensive companies; G2 – tangible-intensive companies.

Source: developed by the authors.

The models show that no intangible variables were significant in explaining financial risk disclosure. Additionally, the coefficients of the dummy variable (G1, G2) did not present statistical significance, indicating that intangible-intensive and tangible-intensive companies do not affect financial risk disclosure when considering the representativeness of intangible assets. Therefore, size explains intangibles' disclosure and representativeness, while performance presented a positive coefficient in models I, II, and III.

According to Barcelos, Moreira, and Nossa (2023), the representativeness of intangible assets can be considered a strategic resource in terms of a company's competitiveness and economic value generation. However, it is irrelevant in reducing financial difficulties (financial risk). Furthermore, Shahwan and Habib (2020) note that a company is no less vulnerable when intangibles as a whole (representativeness) or even exclusively the human or intellectual capital is considered.

Table 11 shows the influence of the structure of intangibles on financial risk disclosure.

Table 11
Intangibility (structure) and Financial risk disclosure

Variable	Financial Risk Disclosure			
	Model I	**Model II**	**Model III**	**Model IV**
Relationship assets	0,000	-	-	0,000
Innovation assets	-	0,000(***)	-	0,000(**)
Structural assets	-	-	0,000	-0,000
SIZE	1,202(*)	0,944(**)	0,898(*)	1,132(*)
DEBT	-0,189	-1,569	2,727	9,293
ROA	5,171(*)	3,739	3,386(***)	-1,247
Constant	-6,752	-3,745	-4,594	-12,79(**)
Wald Chi2	49,18	-	22,23	-
p-value	0,000	-	0,000	-
F	-	5,65	-	122,4
p-value	-	0,003	-	0,000
Effect	A	P	A	P
R	0,5900	0,3011	0,3920	0,4178
Mean VIF	1,89	1,22	1,55	1,92

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%
Legend: Relationship assets – proportion relative to total intangible assets; Innovation assets – proportion relative to total intangible assets; Structural assets – proportion relative to total intangible assets; SIZE – company's size; DEBT – company's debt; ROA – Return on assets.

Source: Developed by authors.

Innovation assets have a positive influence (models II and IV), suggesting that innovation assets enable increased financial risk disclosure. It is also noteworthy that size presents a positive influence in all models, while performance (model III) positively affects financial risk disclosure.

These results corroborate Gharbi et al. (2014) who indicate that innovation intangibles bring many risks to companies, caused by technological and market uncertainty and appropriation problems. Therefore, investors tend to demand more information regarding the risks inherent to investments in innovation assets. Gomes et al. (2013) consider this requirement even more evident in financial companies, as it is a sector more prone to risks, to the extent that it is expected to progressively replace investments in tangible by intangible assets. As Stewart (1997, p. 27) noted, it is "characteristic of knowledge companies to eliminate fixed assets from their balance sheets."

Table 12 shows the influence of the representativeness of intangibles on non-financial risk disclosure.

Table 12
Intangible (representativeness) and Non-Financial risk Disclosure

Variable	Non-Financial risk disclosure			
	Model I	Model II	Model III	Model IV
INTANG_TA	8,157(***)	-	1,314	-
INTANG_NC	-	1,799(*)	0,647	-
NI	-	-	-	2,976(**)
SIZE	1,521(*)	1,274(*)	1,269(*)	1,292(*)
DEBT	1,580	-1,215	2,111	-2,438
ROA	-0,469	-0,858	0,719	0,134(*)
Dummy (G1, G2)	1,131(**)	1,701(**)	1,700	2,421(**)
Constant	0,716	0,593	1,668	1,354
Wald Chi2	22,48	-	22,64	-
p-value	0,000	-	0,000	-
F	-	8,83	-	11,37
p-value	-	0,000	-	0,000
Effect	A	P	A	P
R^2	0,288	0,233	0,284	0,278
Mean VIF	1,19	1,18	1,20	1,16

Note: (***) significant at 1%; (**)significant at 5%; (*)significant at 10%.
Legend: INTANG_TA – quotient between intangible assets and total assets; INTANG_NC – quotient between intangible assets and non-current assets; NI – mean of intangibility proxies concerning representativeness; SIZE – company's size; DEBT – company's debt; ROA – return on assets; Dummy G1 – intangible-intensive companies; G2 – tangible-intensive companies.

Source: developed by the authors.

The intangibility variables presented a positive coefficient in Model I (INTANG_TA), model II (INTANG_NC), and model IV (NI). Thus, the representativeness of intangibles in the equity structure contributes to increasing non-financial risk disclosure. Furthermore, representativeness in intangible-intensive companies (Dummy G1, G2) tends to present higher non-financial risk disclosure (models I, II, and IV) than in tangible-intensive companies. Additionally, size obtained a positive coefficient in all models, and performance presented a positive coefficient in Model IV.

Therefore, it is clear that a greater representativeness of intangibles requires companies to disclose their non-financial risk to investors, i.e., companies must signal to the market that they will not misuse their intangibles in the future (Moura *et al.*, 2014), considering that the management of risks inherent to their assets is crucial when exposed to various types of risks, such as strategic and operational risks (Costa, Leal & Ponte, 2017).

Furthermore, as investors' decisions are affected by disclosed risk information, they tend to assess the expected return on these intangibles and the associated risks (Moura *et al.*, 2014). Hence, based on this return-risk relationship, as intangible assets are resources that generate greater performance and create economic value (Barcelos et al., 2023; Lev & Zarowin, 1999; Nagaraja & Vinay, 2016), they are also associated with high risks (Higgins, 2013). Additionally, despite the risks associated with intangibles, intangible-intensive companies obtain better economic results, strengthening the theoretical assumption that competitive advantages and abnormal returns are related to intangible and intellectual resources (Perez & Famá, 2004).

Table 13 shows the influence of the structure of intangibles on non-financial risk disclosure.

Table 13
Intangibility (structure) and Non-Financial Risk Disclosure

Variable	*Non-Financial Risk Disclosure*			
	Model I	**Model II**	**Model III**	**Model IV**
Relationship assets	0,000(**)	-	-	0,000
Innovation assets	-	0,000	-	0,000(**)
Structural assets	-	-	0,000	-0,000
SIZE	1,020(*)	9,699(**)	1,898(*)	1,634(*)
DEBT	-4,031	-11,20	-0,118	-10,59
ROA	-1,835	4,314	-0,574	5,302
Constant	16,10(**)	-12,83(**)	-0,710	-0,791
Wald Chi2	-	-	9,79	
p-value	-	-	0,044	
F	14,13	2,84	-	1,99
p-value	0,000	0,034	-	0,100
Effect	P	F	A	P
R	0,1667	0,4705	0,1169	0,3150
Mean VIF	1,66	1,22	1,75	1,75

Note: (***) significant at 1%; (**) significant at 5%.
Legend: Relationship assets – proportion relative to total intangible assets; Innovation assets – proportion relative to total intangible assets: Structural assets – proportion relative to total intangible assets; SIZE – company's size; DEBT – company's debt; ROA – return on assets.

Source: developed by the authors.

The relationship assets positively influence non-financial risk disclosure (Model III), as well as innovation assets, when in the presence of other classes of intangibles. Furthermore, size presented a positive coefficient for non-financial risk disclosure.

Regarding intangibility and its effects on non-financial risk disclosure, the structure of intangibles was found to increase non-financial risk disclosure. In other words, the disclosure of operational, damage, integrity, and strategic risks (subcategories of non-financial risk) tends to increase due to the companies' intangible structure. Additionally, the reporting of non-financial risk information is even more accentuated among financial companies in the presence of relationship and innovation assets.

According to Melo and Leitão (2018), the disclosure of operational risks is necessary to mitigate the risks of financial companies, as they need to be disclosed to the market to decrease uncertainty associated with financial institutions. In the same sense, Lev and Zarowin (1999) showed that intangibles, such as R&D, technology, and brands, are considered the most critical drivers of a business because they lead to changes in products, operations, economic conditions, and the companies' economic value. Therefore, disclosing information (including risk information) is essential for business continuity (Nagaraja & Vinay, 2016).

In addition, it is worth noting that a Brand brings several other benefits besides improved performance and competitiveness, such as higher loyalty levels, less vulnerability to competitor marketing actions and marketing crises, higher profit margins, price increases, potential licensing opportunities, and brand extension (Kayo, Kimura, Martin & Nakamura, 2006), highlighting the importance of disclosing risks inherent to this intangible. R&D, on the other hand, is relevant not only for a company's survival but also for its valuation (Albuquerque Filho et al., 2021), which corroborates Freeman and Soete's (2008, p. 457) statement, "not innovating is equivalent to dying." [Free translation]

Table 14 shows the influence of intangible representativeness on general risk disclosure.

Table 14

Intangibility (representativeness) and general risk disclosure

Variable	General risk disclosure			
	Model I	Model II	Model III	Model IV
INTANG_TA	9,882(***)	-	28,60(**)	-
INTANG_NC	-	2,157(**)	3,192(***)	-
NI	-	-	-	1,348(**)
SIZE	2,33(*)	2,011(*)	1,999(*)	1,470(*)
DEBT	-2,485	-1,850	-2,845	1,429
ROA	-1,390	-1,487	-5,336	-0,164
Dummy (G1. G2)	1,877(**)	1,833(**)	1,849(**)	1,218(**)
Constant	-1,866	-1,328	1,170	1,519
Wald Chi2	-	-	242,65	21,88
p-value	-	-	0,000	0,000
F	17,88	8,44	-	-
p-value	0,000	0,000	-	-
Effect	P	P	A	A
R^2	0,229	0,292	0,289	0,283
Mean VIF	1,16	1,20	1,30	1,38

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.
Legend: INTANG_TA – quotient between intangible assets and total assets; INTANG_NC – quotient between intangible assets and non-current assets; NI – mean of intangible proxies relative its representativeness; SIZE – company's size: DEBT – company's debt; ROA – return on assets; Dummy G1 – intangible-intensive companies; G2 – tangible-intensive companies.

Source: developed by the authors.

The variables representing intangibles presented positive coefficients in all models. The greater the representativeness of intangibles in a company's equity structure, the greater the general risk disclosure. Furthermore, intangible representativeness in intangible-intensive companies (all models) affects general risk disclosure; also, size positively affects a company's overall risk disclosure.

Perhaps, as companies use their intangibles for better performance (return), these assets will naturally impose more risks to a business. According to Kayo et al. (2006), these risks should not be avoided but adequately managed to create and maintain a company's economic value (Myšková & Hájek, 2020). In the meantime, intangible representativeness in intangible-intensive companies is higher than in other companies, requiring the transparent disclosure of risk information (Cavalcanti, Amaral, Correia & Roma, 2020).

Table 15 presents the influence of the structure of intangibles on general risk disclosure.

Table 15
Intangibility (structure) and general risk disclosure

Variable	General risk disclosure			
	Model I	Model II	Model III	Model IV
Relationship assets	0,000(***)	-	-	0,000
Innovation assets	-	0,000(**)	-	-0,000
Structural assets	-	-	0,000	-0,000
SIZE	2,138(*)	15,14(*)	2,657(*)	2,932(***)
DEBT	-5,192	-16,80	2,309	13,27
ROA	-3,928	-16,60	-2,660	-8,747
Constant	11,41	-20,31(*)	-3,855	-13,47
Wald Chi2	-	-	13,38	10,40
p-value	-	-	0,009	0,100
F	19,55	3,52	-	-
p-value	0,000	0,010	-	-
Effect	P	F	A	A
R	0,3236	0,1890	0,2167	0,2494
Mean VIF	1,56	1,29	1,18	1,68

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.
Legend: Relationship assets – proportion relative to total intangible assets; Innovation assets – proportion relative to total intangible assets: Structural assets – proportion relative to total intangible assets; SIZE – company's size; DEBT – company's debt; ROA – return on assets.

Source: developed by the authors.

Relationship (Model I) and Innovation assets (Model II) positively affect general risk disclosure. Thus, the higher the investments in relationship and innovation intangibles, the greater a company's general risk disclosure; size also showed a positive influence on all models.

Analytically, financial companies with more intangibles have greater risk disclosure, indicating that this study's hypothesis cannot be rejected. As for investments in intangibles, related risks significantly restrict them, i.e., risk is an essential vector in intangible-intensive companies' decisions. Hence, the internal development of such resources is slow and risky, and their costs and management effort are very high (Perez & Famá, 2006). Higher risk disclosure standards have been found among financial companies, which are prone to taking on more significant risks due to their competitiveness in the sector. Such disclosure standards provide external stakeholders with conditions to evaluate a company's risks (Gomes et al., 2013).

Furthermore, the size variable was statistically significant in all models, indicating that the size of a financial company affects its risk disclosure. This result corroborates the literature, which generally shows that large companies assume more significant risks due to their capital availability (Rengel *et al.*, 2020), requiring high-quality risk disclosure (Elshandidy *et al.*, 2018).

5. Conclusion

This study aimed to analyze the relationship between assets intangibility and risk disclosure in financial companies listed on B3.

The risk disclosure proxies (financial, non-financial, and general) in the descriptive analysis indicate that the disclosure of information concerning corporate risks differs among companies in the financial sector. Some companies did not disclose any or little information in some of the years under study, although risk disclosure became more prominent in the five years (2015-2019). The analysis of the structure of intangibles revealed that Software, Brands, Customer portfolio, Software development, Patents, and Non-compete agreement are the components most frequently disclosed in the explanatory notes, while Software, Right of exploitation, Acquisition of financial rights, Customer portfolio, and Software development are those with the highest average investment values in financial companies.

Additionally, the descriptive analysis of risk disclosure in the groups G1 and G2, based on representative intangible variables, indicated that intangible-intensive companies (G1) are likely to present greater risk disclosure (financial, non-financial, and general) despite the high dispersion identified in the non-financial and general risk disclosure of the two groups of companies. Note that there is a slightly lower dispersion in the disclosure of tangible-intensive companies (G2) compared to intangible-intensive companies (G1).

The results of the mean difference tests indicate significant differences in the risk disclosure (financial, non-financial, and general) of intangible-intensive companies compared to tangible-intensive ones. These findings confirm that financial companies with a higher level of intangibility tend to disclose more information about their corporate risks, as intangibles are more prone to uncertainty than other assets. This encourages investors and others interested in financial information to demand that companies take a stand regarding the risks posed by their assets. Therefore, the results might encourage organizations to expand risk reporting, which is essential in the external stakeholders' decision-making.

The analysis of the influence of intangibility on risk disclosure indicated that the representativeness of intangibles impacts non-financial and general risk disclosure. In contrast, in terms of structure, intangible innovation assets affect financial, non-financial, and general risk disclosure, while structural assets impact non-financial and general risk disclosure. Thus, the finding that companies with a greater representation of intangibles in the equity structure and with a more significant record of innovation and relationship intangibles are more susceptible to disclosing information about risks can reveal important insights and contribute to strategies aimed at maximizing their economic value.

Furthermore, similar to previous studies, a company's size is a factor that contributes to the disclosure of corporate risks.

The results of the regressions for the dummy variable, which represents the division of companies into representativeness according to intangible-intensive (G1) and tangible-intensive (G2), showed i) non-significant influence on financial risk disclosure and ii) positive and significant influence on non-financial risk disclosure and general risk disclosure. Therefore, the greater a company's representativeness of intangible assets (intangible-intensive), the greater the disclosure of non-financial and general risk.

Therefore, intangible-intensive companies more frequently disclose risks than tangible-intensive ones, resulting from more significant uncertainty and volatility linked to intangibles, which require companies to be more transparent with investors. Thus, when investors assess a company's intangibles, they relate expected returns (greater competitiveness, economic value creation, and high financial performance) to the business risk and require companies to be more transparent regarding risk disclosure.

This study contributes to the literature on intangibility and risk disclosure, as its interrelationships are investigated here; no Brazilian studies were identified in the field. The findings of this study reinforce the notion that, although intangibles enable improved performance and market value, they are likely to generate significant risks to the same extent; therefore, companies must provide the market with risk information.

This study expands the debate about these constructs in financial firms, as these companies are generally excluded from studies due to their peculiar characteristics. This study was motivated by the fact that financial companies take more significant risks due to the sector's competitiveness, and managers must be attentive to the best market practices to disclose risks and minimize losses promptly and correctly.

This study's primary limitation concerns a difficulty in using a metric to capture the risk disclosure of financial companies, as there is no consensus in the literature. Future studies are suggested to investigate other models discussed in the literature to identify the level of risk disclosure, and analyze other determinants that may influence the companies' risk disclosure in emerging and developed capital markets.

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Relationship between Business Strategy and Capital Structure

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Abstract

Objective: This paper analyzes the relationship between business strategy and capital structure. **Methods:** Archival research was conducted with 488 observations of companies listed in Brasil, Bolsa, Balcão [B]3. As proxies of interest, the classification of companies into prospectors and defenders was adopted for business strategy, and the relationship between third-party and equity capital was used for capital structure. The econometric model was performed using ordinary least squares linear multiple regression, controlling for year and sector fixed effects.

Results: The results reveal that business strategy relates to how a company finances its capital. Prospectors tend to depend more heavily on third-party capital, present more significant risks, and lower cash flow profitability than defender companies. In contrast, because defenders seek market dominance and make more conservative decisions, they generate funds internally to finance their activities.

Contributions: These findings show that the aggressive behavior of companies toward capital financing may be linked to the choice of an expansion strategy, indicating that management decisions influence this financial information.

Keywords: Prospector strategy; Defender strategy; Capital structure.

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1. Introduction

Companies and researchers have paid particular attention to capital structure, especially regarding the decisions that determine its composition, considering that the choice between third-party capital and equity in the capital structure tends to impact a company's profit (Capp, Cetrini & Oriani, 2019). Companies with lower operating cash flow tend to issue debt, while companies with higher operating cash flow use internal resources to meet their needs (Harris & Roark, 2019).

Control over a company's ability to use collateral to subsidize loans appears to be related to its size (Saif-Alyousfi *et al*., 2020). The asset structure suggests that lower agency costs of debt lead to higher productivity in a company's value, resulting in more growth opportunities and greater transfer of wealth from debt holders to shareholders (Ramli, Latan & Solovida, 2019). In this conjecture, the managers' experience supports decision-making regarding capital structure in balancing benefits and costs of debt financing, adding value to a company (Matemilola, Bany-Ariffin, Azman-Saini & Nassir, 2018).

A company's strategic choices may also influence its capital structure. From this perspective, Cappa *et al*. (2019) investigated the impact of corporate internationalization, diversification, and integration strategies on the capital structure of Italian firms. The results indicate that strategic decisions affect the companies' capital structure. Although this topic has attracted the attention of researchers, the literature has focused primarily on isolated strategies. This study differs from that of Cappa *et al*. (2019), in which three corporate strategies and the debt ratio are analyzed.

Considering the gap Cappa *et al*. (2019) identified, this study focuses on the impact of business (non-corporate) strategies on capital structure. Business strategy is a characteristic that defines companies according to their practices in the pursuit of main organizational objectives. According to Miles and Snow (1978), companies are classified into four types of business strategies: (i) defenders – intended to control costs and keep the market share stable, considering a limited set of products; (ii) prospectors – seek growth, hence, updating and innovating products and services is required; (iii) analyzers – which combines the characteristics of defenders and prospectors; and (iv) reactors – which are unable to respond to the environment's changes and uncertainties properly.

Previous studies have addressed the impact of corporate strategies on capital structure (Chkir & Cosset, 2003; Javorcik & Spatareanu, 2009; Jouida, 2018; Cappa *et al*., 2019); however, little attention has been paid to other types of organizational strategies such as defenders, prospectors, analyzers, and reactors. Cappa *et al*. (2019) highlight that, despite the financial field recognizing the importance of considering strategic management aspects as capital structure determinants, research has yet to agree on the relationship between business strategy and capital structure.

From this perspective, the following study question arises: **What is the relationship between companies' business strategy and their capital structure?** Therefore, this study analyzes the relationship between companies' business strategy and capital structure. This objective was motivated by a gap in research that focuses on analyzing the relationship between managerial decisions and corporate strategies on capital structure but not the influence of business strategies on capital composition.

It is assumed that a relationship between business strategy and capital structure exists. According to Bentley-Goode, Omer, and Twedt (2019), prospectors with strategies to innovate and differentiate themselves in the market tend to exceed their resources, which may compromise profitability in the short term. Lower profitability, in turn, indicates that these companies are likely to need more resources to finance extensive investments in research and development (R&D), leading them to raise funds from third parties. Therefore, it is conjectured that companies with different business strategies use different resources (their own or those of third parties) to finance their activities.

The study showed that prospector companies depend on third-party capital, while defender companies rely on their own capital. The propensity test showed robust results, equating defenders and prospectors in the same sector based on similar size, profitability, liquidity, and risk. Even though the companies present similar criteria, different business strategies led them to rely on different sources to finance their activities.

These results have implications for different stakeholders and the literature. For example, there are implications for research investigating the effects of business strategy on capital structure, as the results highlight that the composition of a company's capital structure may be related to its business strategies. Hence, capital structure composition might be used as a control variable to analyze capital financing decisions. Companies that align their strategies around innovation and expansion objectives may attempt to access external resources to finance these activities.

The implications for the market, potential investors, and analysts concern the results showing that the more aggressive behavior of prospector companies when seeking resources to finance their capital may be linked to a business strategy. Therefore, identifying prospectors may help to understand the use of third-party capital in terms of debt or leverage, as these companies seem motivated to leverage their businesses and expand their market.

This study's contributions include considering two apparently disconnected areas in accounting research: management accounting, when the focus is on business strategy, and financial accounting, when capital structure is considered. The results show that strategic decisions may indicate a significant relationship between managerial and financial information. Managerial decisions regarding a company's future expansion prospects provide helpful information to investors and analysts when such a relationship is properly understood, especially regarding financial information relating to the capital structure.

2. Theoretical Framework and Hypotheses

2.1 Capital structure determinants

Capital structure, a combination of debt and equity that an organization uses to subsidize investment and financing decisions, is vital for a company's growth (Kumar, Colombage & Rao, 2017). The trade-off theory of capital structure concerns the notion that a company replaces debt with equity or equity with debt to increase its value and balance the tax benefits that arise from the interest embedded in financial costs (Myers, 1984).

The optimal level of debt to minimize the general cost of capital and simultaneously increase a company's profitability is discussed within the scope of corporate finance (Jaisinghani & Kanjilal, 2017). The cost of capital is equal to the interest rate on bonds, so it does not depend on funds acquired through debt instruments or new equity issues (Modigliani & Miller, 1958). Due to the importance of analyzing companies' capital structure, previous studies have focused on identifying factors that can impact it (Ramli *et al.*, 2019) as a way to reduce the costs of capital and maximize profitability (Jaisinghani & Kanjilal, 2017).

Several studies investigated the determinants of capital structure. They found that factors such as company size, asset structure, growth opportunity (Ramli *et al.*, 2019), manager experience (Matemilola *et al.*, 2018), and corporate strategy (Cappa *et al.*, 2019) have an impact on capital structure. Chkir and Cosset (2003), Javorcik and Spatareanu (2009), Jouida (2018), and Cappa *et al.* (2019) stand out among the studies addressing strategy.

Chkir and Cosset (2003) suggest that average debt decreases in the year of acquisition, increasing only after the first to the third year after the acquisition. It shows that in addition to the impact of size and profitability on capital structure, debt financing also increases when a company does not have subsidiaries in another country, indicating the effect of diversification. Javorcik and Spatareanu (2009) confirm that companies supplying multinational companies experience fewer credit restrictions, suggesting that the self-selection of firms with fewer restrictions for multinational suppliers, rather than benefits related to supply, indicates good commercial relationships in credit markets.

Jouida (2018) confirmed the reverse causality between the elements addressed in this relationship. However, there is a bidirectional but inverse causal relationship between profitability and debt, as stability does not confirm the relationship between diversification and leverage. The study above considers this dynamic structure, offering new avenues for research involving diversification strategy, capital structure, and profitability in the financial sector to assist managers in making better strategic and financial decisions. Finally, Cappa *et al.* (2019) verified the effect of internationalization, diversification, and integration strategies on capital structure. They observed that corporate strategy impacts less externally financially exposed internationalized and integrated companies, while diversified companies with greater debt experience an impact on investment decisions depending on the strategy used.

The previous discussion regarding capital structure determinants indicates different implications for the models analyzing them. Frank and Goyal (2009) consider that companies must decide on debt financing and reallocate some future cash flows. However, they warn that the factors driving this decision are yet to be explored, despite efforts in recent decades in this direction. Therefore, this study considers the financial approach concerning its impact on capital structure and the managerial approach considering its impact on business strategies.

2.2 Miles and Snow's (1978) Business Strategies

This study is based on the business strategies proposed by Miles and Snow (1978) to characterize the behavior of companies in strategic terms and the effects of such strategies on capital structure. They classify business strategies as prospectors, defenders, analyzers, and reactors. Miles and Snow (1978) note that, unlike the analyzer and reactor typologies, defender and prospector companies have opposite characteristics. In line with Beuren and Gomes (2022), we address only the two extreme archetypes reported in the literature, i.e., the defender and prospector strategic profiles.

The prospector strategy focuses on reaching new markets and maintaining a reputation for innovative product development, i.e., focusing more on this purpose than high profitability (Miles & Snow, 1978). Such a strategy may lead prospectors to experience failures and difficulty reaching certain profit levels; product and market innovation strategies lead to increased risks, making companies more prone to failure (Rajagopalan, 1997).

On the other hand, the defender strategy seeks to isolate part of the total market and create a domain, even if with a limited set of products targeted at a restricted market segment (Miles & Snow, 1978). Therefore, defenders use technical and standardized procedures through cost leadership to achieve greater cost efficiency (Zhang, 2020).

Analyzers, in turn, combine the defender and prospector strategies to minimize risk and obtain increased profits. Hence, this typology emphasizes the strengths of these two classifications, searching for technical efficiency with lower costs and focusing on new products and services, though less strongly than prospectors (Zhang, 2020). Thus, analyzers are assumed to share the characteristics of these two strategies, considering the environment's risks and uncertainties.

Finally, unstable companies lacking response mechanisms to face environmental changes are classified as reactors (Miles & Snow, 1978), as they do not adapt to environmental changes and lack institutionalized practices to deal with management changes. For this reason, Miles and Snow (1978) note that this strategy is a residue, i.e., a company is classified as a reactor when none of the other three strategies is chosen.

Brazilian studies, such as Ghobril and Moori (2009) and Pletsch, Dal Magro, Silva, and Lavarda (2015), have addressed Miles and Snow's (1978) strategies. Ghobril and Moori (2009) investigated the dynamics of strategic alignment between goods, capital, and food industries. The results showed a significant relationship between the environmental context, and the organizations' structure and internal processes. They also highlighted how organizations develop according to the strategy adopted.

Pletsch *et al.* (2015) note that these strategies help to explain economic-financial performance measures, with prospectors tending to obtain higher returns on equity and better liquidity, while reactors present lower performance.

These Brazilian studies related Miles and Snow's (1978) strategies with performance and compared them with international research on the relationship between corporate strategy and capital structure. Therefore, this study revisits the concept proposed by Miles and Snow (1978) to argue that business strategy can impact and determine a company's capital structure.

2.3 Hypotheses

This study's hypotheses are based on the characteristics proposed by Miles and Snow (1978) to support the assumption that prospector and defender strategies impact a company's decision regarding whether to use its own or third-party resources to finance its activities differently. Despite the diverse existing strategies, Anwar and Hasnu (2016) argue that this structure is the most durable one, frequently examined, validated, debated, and supported by several researchers. Furthermore, the literature review performed by Anwar *et al.* (2021) revealed that the Miles and Snow (1978) typology is widely used in management, information systems, and business research, contrasting with the few studies in accounting and finance.

In line with Miles and Snow's (1978) typology, because prospectors consider advancements in innovation that impact strategic choices (Dobucsh & Kapeller, 2017) and the importance of the strategy and profit relationship (Cappa *et al*., 2019), they are more likely to explore market opportunities. On the other hand, Defenders choose to operate in a restricted niche; hence, it is a more predictable strategy.

Prospectors envision new products and markets (Miles & Snow (1978) and, for this reason, tend to present lower profitability and lower cash flows, as they tend to spend a significant volume of resources on research and development (R&D) (Bentley-Goode *et al*., 2019). Thus, they tend to exhaust their resources with R&D expenses and depend more on external financing. Therefore, prospectors are expected to have a capital structure mainly composed of third-party capital. Hence, the first hypothesis is proposed:

H1: Prospectors tend to more frequently depend on third-party capital to finance their activities.

Miles and Snow (1978) suggest that defenders can generate funds internally through their operations because their defensive behavior leads them to obtain market and product dominance and pay greater attention to efficiency. Hence, these companies tend to less frequently depend on third-party capital to finance their activities as they generate funds internally and seek to maintain their market share in which they operate efficiently.

Hence, defenders tend to prioritize internal financing as their operations enable them to generate funds internally. As they seek to dominate their markets, they may depend heavily on internal finance and debt (Myers, 1984), first choosing to finance their resources internally. Therefore, a defender's capital structure is expected to be mainly composed of equity capital. Hence, the second hypothesis proposes that:

H2: Defenders tend to more frequently depend on equity capital to finance their activities.

We chose not to propose a hypothesis for analyzers because these companies tend to balance equity financing. Because analyzers have attributes of both defenders and prospectors, they tend to stabilize their actions over time and establish a response pattern to the environment (Anwar et al., 2021). Additionally, considering each classification separately enables us to better understand each strategy's choice of capital without contaminating the analysis, as a classification that includes both types of strategy would, as is the case of the analyzer strategy.

When analyzing strategic choices, it is worth noting that environmental conditions determine organizational behavior and that the choices made by senior management come from the organizational process (Miles & Snow, 1978). In a more specific field, financial literature points out that a company's strategy is one of the factors likely to impact capital structure (Cappa *et al*., 2019).

3. Methodological Procedures

The study's population comprises Brazilian companies listed on Brasil, Bolsa, Balcão [B][3] and available in the Refinitiv Eikon database. There is specific legislation in Brazil addressing the mandatory minimum payment of dividends of 25% of adjusted net profit in publicly traded companies (Galvão, Santos & Araújo, 2018). However, we emphasize that there is a common practice of paying incremental payout in addition to the mandatory installment, which indicates a payment of dividends to shareholders above the mandatory amount. As a result, companies limit the resources generated in their operations since part of it is allocated to the mandatory payment of dividends.

Companies from the financial (190 observations) and the utilities (225 observations) sectors and those without a sector classification (35 observations) were excluded from the sample, besides companies that did not provide the information needed to calculate the variables (608 observations), and companies with negative equity (48 observations). The companies in the financial and utilities sectors were excluded due to specific regulations that would possibly lead to an analysis of results at the company level, which would not be comparable to that of other companies (Khedmati, Lim, Naiker & Navissi, 2019; Zhang, 2020). Additionally, companies without a sector classification were excluded because this information is necessary to determine business strategy. Hence, after exclusions, the sample remained with 440 publicly traded Brazilian companies observations.

An archival search was performed from 2015 to 2019. The variables' data started to be collected in 2010 when Brazilian companies were obligated to adopt the International Reporting Standards (IFRS). Considering 2010 was important to enable the analyses from 2015 to 2019, as information regarding the five previous years was needed to calculate the moving average of the business strategy variable. Therefore, it was essential to obtain accounting information from the five years before analyzing the six measures of the business strategy variable.

The explanation for considering the effects of fully adopting IFRS is based on Klann and Beuren (2018), who argue that companies experienced considerable changes in accounting between periods before and after the IFRS adoption. Therefore, the period prior to the adoption of IFRS is considered in this study because changes in balance sheets and income accounts might bias the results. Thus, data were collected since 2010 and analyzed from 2015.

The companies comprising the sample are distributed over the years in nine sectors, classified by the Global Industry Classification Standard (GICS), as shown in Table 1.

Table 1
Classification of the companies in the sample according to sector over the years

Sectors	2015	2016	2017	2018	2019	Total
Basic Materials	10	12	12	11	10	55
Consumer Cyclical	8	8	9	10	10	45
Non-Consumer Cyclical	21	22	22	24	22	111
Energy	6	6	6	6	6	30
Healthcare	7	7	7	8	8	37
Industrial	20	20	20	20	17	97
Real State	8	7	7	7	7	36
Technology	3	3	2	2	1	11
Telecommunication Services	4	2	3	5	4	18
Total	87	87	88	93	85	440

Source: Study's data.

Because the sample is characterized as an unbalanced panel, the number of companies analyzed each year varies from 85 to 93. Note that there were 440 observations over the five years. As for the sectors, consumer non-cyclical, composed of the subsectors agriculture, processed foods, beverages, and commerce and distribution of personal and cleaning products, is the most representative, with 111 observations. The least representative sector is technology, with 11 observations.

3.1 Study's variables

Table 2 presents the variables adopted in this study and their respective description, the calculation method, and the authors who supported each.

Table 2
Study's variables

Variable	Description	Calculation	Authors
		Dependent Variable	
Capital Structure (EC_{it})	It measures how much the company raised in third-party resources for each R$1.00 of its resources.	Passivo total dividido pelo patrimônio líquido	Adaptado de Cappa *et al.* (2019)
		Independent Variable	
Business Strategy (EN_{it})	It classifies the companies as prospectors or defenders	Ranking de seis variáveis*	Bentley-Goode *et al.* (2019)
		Control Variables	
Profitability (LR_{it})	It measures the asset's profitability	Net profit before extraordinary items divided by total assets.	Jaisinghani e Kanjilal. (2017); Cappa et al. (2019)
Size (TAM_{it})	It measures the company's size according to its revenue	Income's natural logarithm	Attar (2014); Cappa *et al.* (2019)
Risk (RIS_{it})	It measures the market's systematic risk according to the Beta	Relationship between asset returns covariance and market return variance.	Cappa et al. (2019)
Liquidity (LIQ_{it})	It measures current liquidity	Current assets divided by current liabilities	Pletsch *et al.* (2015); Cappa *et al*. (2019)
Tangibility (TANG)	It measures the level of tangibility	Fixed Assets divided by total assets	Henrique, Silva, Soares e Silva (2018)
Sector	It represents the company's main activity.	Dummies for each sector classified by the GICS Sector Code	Zhang (2020)
Year	It represents the period of analysis – from 2015 to 2019.	Year Dummies	Zhang (2020)

Legend: *Details of the ranking of the six variables are presented in Table 3.

The dependent variable, capital structure, analyzes the choice between equity or third-party capital resources. This measure was adapted from Cappa et al. (2019), who used it to check how many liabilities a company has, considering the total value invested in assets to represent the total debt to finance assets. Therefore, the ratio of third-party capital (total liabilities) to own capital (net equity) was a proxy to determine the relationship between business strategy and capital structure. Complementarily, the structure was analyzed considering assets. It follows that companies with higher liquidity ratios are likely more capable of meeting their obligations, resulting in greater financial leverage (Cappa *et al.*, 2019).

The dependent variable was based on Barton and Gordon (1987) and Andrews (1980) from the corporate strategy point of view. Note that the point of financing a company (debt *versus* equity) is linked to a functional financial decision that must support the long-term strategy. According to Andrews (1980), the main potential implication for financial economics in this case would be notes from senior management concerning the choice of a capital structure. Frank and Goyal (2009) warn that there is no optimal debt index based on the pecking-order theory. Barton and Gordon (1987) state that, regarding capital structure, financial economics has not agreed on the factors that may affect the selection of a specific leverage position.

The ranking developed by Bentley-Goode et al. (2019), based on the typology of Miles and Snow (1978) and used to classify companies as prospectors or defenders, was considered a proxy for business strategy. Table 3 explains the details of this variable.

Table 3
Details of the business strategy variable

Variable	Measure	Calculation	Expected
EN1	Development of new products	Proportion between R&D expenses and sales.	It is expected to be higher among prospectors investing heavily in R&D to locate and develop new product market opportunities.
EN2	Exploring new product market opportunities	Proportion between general, administrative, and sales expenses on sales.	It is expected to be higher among prospectors due to their significant investment in marketing activities.
EN3	Growth opportunity	Annual sales growth rate.	It is expected to be higher among prospectors exhibiting rapid and sporadic growth patterns as new product market opportunities become viable.
EN4	Production and distribution e	Proportion between the number of employees and sales.	It is expected to be higher among prospectors that do not achieve maximum production efficiency due to their focus on innovation.
EN5	Capital intensity	The ratio between fixed assets and total assets.	It is expected to be lower among prospectors due to low capital intensity to maintain flexibility in their ever-changing production lines.
EN6	Managerial stability	The standard deviation of the number of employees.	It is expected to be higher among prospectors because management tenure is shorter in these companies, and managers are often hired outside the company.

Source: adapted from Bentley-Goode et al. (2019).

The moving average was calculated for each of the six measures, considering the five years before the analysis period. Hence, data from 2010 to 2014 were used to calculate the moving average of the following years, from 2015 to 2019. The moving average of each of the six variables was grouped by quintile, considering each sector and year, and the quintile values were added to obtain a score for each company. The score ranges from 6 to 30, where the highest (lowest) levels concern prospectors (defenders). Note that the scale of the EN5 variable was inverted to create the score so that the fifth quintile represented characteristics of prospectors, as well as the others (Bentley-Goode *et al.*, 2019).

According to the study by Zhang (2020), the business strategy score was transformed into a binary variable, where 1 was assigned to the companies with scores above the median (16 points) and 0 otherwise; hence, (1) concerned prospectors and (0) defenders. For the additional tests, the business strategy score was separated according to percentiles: in the first case, 1 was assigned to the companies with scores above the 75th percentile (18 points) and 0 otherwise. In the second case, 1 was assigned to companies with scores below the 25th percentile (14 points) and 0 otherwise. These separations were used as sensitivity tests to identify companies that were strong prospectors (above the 75th percentile) or strong defenders (below the 25th percentile).

The control variables were based on Cappa *et al*. (2019), in which profitability, size, risk, and liquidity were considered variables that reflect factors specific to each company and affect the financial structure. The influence of profitability on companies' capital structure can be seen from the pecking-order or trade-off theory perspectives. The first suggests that more profitable companies prefer to finance their activities with internal resources for economic convenience and to reduce information asymmetry. The second suggests that higher profitability leads companies to prefer external resources due to tax benefits.

Regarding size, larger companies are assumed to depend less on third-party resources because they have lower transaction costs (Wald, 1999) and easier access to the capital market (Attar, 2014). On the other hand, larger companies have more tangible assets to ensure bank loans, so they also have higher debt (Coleman, Cotei & Farhat, 2016). Additionally, larger companies are less likely to default, which makes access to third-party capital more favorable (Cappa *et al*., 2019).

The risk variable reflects the total expected variation in future profits and is measured by the equity beta (Cappa *et al*., 2019). Risk is expected to affect a company's financial policy negatively, as the riskier the business, the higher its profit and cost-volatility relationship tends to be. The liquidity variable may influence capital structure, as higher liquidity generates a greater capacity to meet obligations, which might facilitate access to third-party capital. Finally, the tangibility variable was inserted into the model to explain the capital structure. As noted by Henrique et al. (2018), tangibility is a factor that enhances the expansion of third-party capital because it represents a form of payment guarantee.

3.2 Operationalization

Correlation and regression techniques were used to verify the impact of business strategies on the capital structure. Ordinal least squares (OLS) multiple linear regression was operationalized with year and sector fixed effect control. The econometric model is represented in Equation 1.

$$EC_{it} = \beta_0 + \beta_1 Strategy_{it} + \beta_2 LR_{it} + \beta_3 TAM_{it} + \beta_4 RIS_{it} + \beta_5 LIQ_{it} + \beta_6 TANG_{it} + \Sigma EFixed\ Effect_{Sector} + \Sigma EFixed\ effect_{Year} + \varepsilon_{it} \quad \text{(Equation 1)}$$

Standard tests were performed, using Durbin Watson for autocorrelation of residuals, White for homogeneity of residuals, and Variance Inflation Factor (VIF) for multicollinearity between the research variables to verify the OLS regression assumptions. The assumption of data normality was not tested because the central limit theorem is assumed given the number of observations; the data fits a normal distribution when there are many observations.

3.3 Additional tests

Propensity Score Matching (PSM) was performed as an additional test. This propensity score was developed by Rosenbaum and Rubin (1983) and generated weights for observations according to pre-selected criteria. In this study, the sample was separated into a treated group (prospectors) and a control group (defenders), and the propensity criteria comprised all control variables in addition to sector and year. This study's sample comprises 221 observations from prospectors, so the PSM chose another 221 observations from defenders to match. Because of fewer observations from defenders in the sample (219), the PSM repeats observations to compare to the treated group. The PSM sample comprised 442 observations.

An alternative proxy was used to measure capital structure. Frank and Goyal (2009) highlight that, according to the pecking-order theory, there is no optimal debt index based on information asymmetry. Both the pecking-order and the trade-off are based on market imperfections. Thus, a proxy that starts from the perspective of total debt to finance a firm's assets is used and compared with the book value, in line with Ferri and Jones (1979), Frank and Goyal (2009), Abdioğlu (2019) and Cappa *et al.* (2019). This additional measure is measured by dividing total liabilities by total assets, which determines how much resources (assets) are financed with third-party capital; the higher this index, the greater a company's dependence on third-party capital. Therefore, this variable was used to verify the robustness of the primary capital structure measure.

4. Analyses and Discussion of Results

Table 4 presents the companies classified according to business strategy, highlighting the number of companies classified as defenders and prospectors.

Table 4
Business strategy of sample companies by sector

Sectors	Total Sample		Prospectors		Defenders	
	No. Observations		No. Observations		No. Observations	
Cyclical consumer	45	10%	26	12%	19	9%
Non-cyclical consumer	111	25%	68	31%	43	20%
Energy	30	7%	16	7%	14	6%
Health	37	8%	14	6%	23	11%
Industry	97	22%	40	18%	57	26%
Real State	36	8%	14	6%	22	10%
Technology	11	3%	4	2%	7	3%
Telecommunication services	18	4%	12	5%	7	3%
Basic materials	55	13%	27	12%	28	13%
Total	440	100%	221	100%	219	100%

Note: sectors classified according to GICS.

Of the 440 observations, 221 were from prospectors, and 219 were from defenders. The percentage of prospectors and defenders is equivalent; for example, 12% of the companies in the basic materials sector concern defenders, while 13% are prospectors.

This analysis shows equivalence in the number of companies with different business strategies in relation to the general sample and specific sectors. It reveals that companies classify themselves as prospectors or defenders in all sectors (Miles & Snow, 1978). Therefore, this sample will likely generate consistent results, considering an equivalent number of companies with different business strategies.

Table 5 presents the descriptive statistics of the main variables.

Table 5
Variables' descriptive statistics

Panel A. Total sample					
	Mean	**Median**	**SD**	**25p**	**75p**
EC_{it}	4,6333	1,2928	22,0366	0,7205	2,7343
LR_{it}	0,0339	0,0335	0,0803	0,0005	0,0725
TAM_{it}	21,7180	21,5514	1,7718	20,4836	22,8287
RIS_{it}	0,8112	0,7800	0,5239	0,5000	1,0250
LIQ_{it}	2,0246	1,5855	1,5399	1,1747	2,3657
$TANG_{it}$	0,2529	0,2260	0,2059	0,0700	0,3923
Observations			440		
Panel B. T-test of means between groups of prospectors and defenders					
	Prospectors		**Defenders**		**t**
EC_{it}	6,7010		2,5466		-1,9838**
LR_{it}	0,0313		0,0365		0,6799
TAM_{it}	22,0940		21,3385		-4,5722***
RIS_{it}	0,8510		0,7710		-1,6042
LIQ_{it}	1,9388		2,1112		1,1746
$TANG_{it}$	0,2181		0,2880		3,6075***
Observations	221		219		

Note 1: significant at *0.10, **0.05, ***0.01 level.
Note 2: 25p = Percentile 25; 75p = Percentile 75.
Legend: ECit = capital structure; PROSPit = prospectors; LRit = profitability; TAMit = income natural logarithm; RISit = market systematic risk; LIQit = current liquidity.

Panel A's capital structure (ECit) variable indicates that the companies have R$4.63 of third-party capital on average for every R$1.00 of equity. However, the high standard deviation indicates extreme observations, mainly at the upper limit, raising the mean. The median shows that 50% of companies have less than R$1.29 of third-party capital for every R$1.00 of equity, revealing their lower dependence on third-party capital. These companies depend more heavily on their own capital than third-party capital, confirming the pecking-order theory proposed by Modigliani and Miller (1958; 1963). As Miles and Snow (1978) described, companies choose this cost of capital depending on their business strategy characteristics.

As for the other variables, the sample appears to be not very profitable on average. As for current liquidity, for every R$1.00 of current liabilities, the companies presented R$2.02 of current assets, indicating the existence of working capital and sufficient resources to pay off obligations. Finally, the tangibility variable indicates that for every R$1.00 in total assets, the companies presented R$0.25 in fixed assets.

Systemic risk, which concerns how vulnerable an asset is in the market, indicates that most companies have defensive assets. A systemic risk below 1 indicates that a company's shares do not closely follow market fluctuations, which occurs in approximately 75% of the sample. Prospectors increase risks to promoting product and market innovation (Rajagopalan, 1997). Variability may result in creditors demanding higher premiums to grant resources, hindering high-risk companies' access to third-party capital (Cappa *et al.*, 2019).

The t-test in Panel B comparing the variables' means of prospectors (221 observations) and defenders (219 observations) indicates that, on average, the prospectors are larger companies (TAM) with a lower level of tangibility than the defenders (TANG). As for the variable of interest, prospectors have a considerably higher average capital structure (CE) than the defenders. This preliminary result suggests that prospectors use more third-party capital than defenders.

Table 6 presents the Pearson correlation matrix (suitable for data normally distributed) between the main variables.

Table 6
Correlation Matrix

	EC_{it}	**$PROSP_{it}$**	**LR_{it}**	**TAM_{it}**	**RIS_{it}**	**$TANG_{it}$**
EC_{it}	1					
$PROSP_{it}$	0,0944**	1				
LR_{it}	-0,1106**	-0,0325	1			
TAM_{it}	-0,1643***	0,2134***	0,1077**	1		
RIS_{it}	0,0545	0,0764	-0,1309***	0,0189	1	
$TANG_{it}$	-0,0754	-0,1699***	-0,0701	0,1818***	0,0683	1
LIQ_{it}	-0,1086**	-0,0560	0,2734***	-0,2018***	-0,0475	-0,0872*

Note: significant at *0.10, **0.05, ***0.01 level.
Legend: ECit = capital structure; PROSP it = Prospectors; LRit = profitability; TAMit = income natural logarithm; RISit = market systematic risk; LIQit = current liquidity.

In the model presented by Equation 1, size (TAMit), profitability (LRit), and liquidity (LIQit) were negatively correlated with the capital structure proxy, suggesting that larger and more profitable companies with higher levels of liquidity less frequently use third-party capital.

Table 7 presents the results of Equation 1, the focus of this investigation. Two models are presented: model 1, described by Equation 1, and model 2, in which control variables were not considered.

Table 7
Results of the relationship between business strategy (median) and capital structure

Variable	Model 1 - EC_{it}			Model 2 - EC_{it}		
	Coefficient	t	β	Coefficient	t	β
Constant	75,2458***	4,45		-2,7546	-0,59	
$PROSP_{it}$	6,0873***	2,78	0,1382	5,2524**	2,47	0,1193
LR_{it}	-9,7789	-0,70	-0,0356			
TAM_{it}	-3,3111***	-4,69	-0,2662			
RIS_{it}	1,5423	0,69	0,0366			
LIQ_{it}	-1,6853**	-2,23	-0,1177			
$TANG_{it}$	-8,9956	-1,39	-0,0840			
EF Sector		Sim			Sim	
EF Year		Sim			Sim	
R^2		11,37%			5,06%	
R-Adjusted		7,58%			2,16%	
Maximum VIF		1,74			1,04	
DW		1,5519			1,5245	
White		0,0000***			0,0149**	
Observations		440			440	

Note 1: significant at *0.10, **0.05, ***0.01 level.
Note 2: Maximum VIF between the variables tests for multicollinearity. DW is the Durbin-Watson test for residue self-correlation. White is the test for homoscedasticity of the residuals.
Legend: EC = capital structure; β = Standardized Beta; Prosp. = Categorical variable, in which 1 represents prospectors, and 0 represents defenders; LR = Profitability; TAM = income natural logarithm; RIS = systematic market risk; LIQ = current liquidity; TANG = Tangibility; EF = Fixed effect.

The variable of interest (PROSPit) was positively and significantly related to capital structure (ECit) in both models (1 and 2). When the control variables were not considered, and only sector and year-fixed effects were controlled, prospectors appeared more dependent on third-party capital. Such a finding is reinforced by the significant results at the 1% level in model 1, in which the control variables increased the explanatory power of the model and isolated effects according to the company, rendering greater reliability to the results.

An additional analysis of the relationship between business strategy and capital structure, separating the business strategy scores according to 25th and 75th percentiles, was performed to confirm these initial results. Hence, the companies with extreme scores were classified as defenders or prospectors. Therefore, in model 3, 1 was assigned to companies with scores above 18 (75th percentile), and 0 otherwise. In model 4, 1 was assigned to companies with scores lower than 14 (25th percentile) and 0 otherwise. Table 8 shows the results.

Table 8

Results of the relationship between business strategy (percentiles 75th and 25th) and capital structurel

Variables	Model 3 - EC_{it}			Model 4 - EC_{it}		
	Coefficient	t	β	Coefficient	t	β
Constant	70,7647***	4,16		82,4931***	4,76	
$PROSP_{it}$	0,8523	0,36	0,0175			
$DEFEN_{it}$				-6,6223***	-2,89	-0,1441
LR_{it}	-12,4619	-0,89	-0,0454	-9.,554	-0,70	-0,0355
TAM_{it}	-2,9352***	-4,18	-0,2359	-3,4380***	-4,81	-0,2764
RIS_{it}	1,8912	0,83	0,0449	2,1271	0,95	0,0505
LIQ_{it}	-1,7459**	-2,29	-0,1220	-1,6919**	-2,24	-0,1182
$TANG_{it}$	-12,8832**	-1,99	-0,1203	-9,5009	-1,48	-0,0887
EF Sector		Sim			Sim	
EF Year		Sim			Sim	
R^2		9,77%			11,50%	
R-Adjusted		5,91%			7,72%	
Maximum VIF		1,71			1,71	
DW		1,5333			1,5575	
White		0,0000***			0,0000***	
Observations		440			440	

Note 1: significant at *0.10, **0.05, ***0.01 level.
Note 2: Maximum VIF between variables is the test for multicollinearity. DW is the Durbin-Watson test for the residual autocorrelation. White is the test for residual homoscedasticity.
Legend: EC = capital structure; β = Standardized Beta; Prosp. = categorical variable in which 1 represents prospectors, and 0 represents defenders; LR = Profitability; TAM = income natural logarithm; RIS = market systematic risk; LIQ = current liquidity; TANG = Tangibility; EF = Fixed effects.

Model 3 shows a statistically non-significant relationship between companies classified as prospectors and capital structure. It indicates that companies positioned between the median and the 75th percentile were responsible for a statistically significant relationship between prospectors and the decision to use third-party capital; the coefficient became non-significant when these companies were excluded from the analysis. These results diverge from evidence found in models 1 and 2, which shows that prospector companies tend to depend more heavily on third-party capital than defenders.

Regarding the control variables of models 1, 3, and 4, note that the signs and the level of statistical significance converge. More profitable companies depend more strongly on third-party resources, while smaller companies with low current liquidity tend to opt for this source less frequently.

Model 4 analyzes the relationship between the capital structure and companies classified as defenders. The results align with this study's theoretical assumption that these companies mainly depend on their resources. The negative and significant relationship at the 1% level between defenders and capital structure shows that the choice of the defender business strategy encourages companies to use third-party resources less frequently than prospector companies.

Table 9 presents the results of the PSM method and the replacement of the dependent variable by the alternative measure of capital structure. The model in the PSM method (Model 5) was operationalized with 442 observations, 221 from prospectors, and 221 from defenders. Then, the model was operationalized with all observations in the sample for the alternative capital structure proxy (Model 6).

Table 9

Results of the relationship between business strategy (median) and capital structure according to the PSM method and the capital structure alternative proxy.

Variables	Model 5 – EC (PSM)			Model 6 – EC alternativo (OLS)		
	Coefficient	t	β	Coefficient	t	β
Const.	75,6568***	4,24		0,5678***	13,14	
$PROSP_{it}$	4,2225**	1,97	0,09591	0,0575***	2,92	0,1317
PSM Criteria	**SECTOR, YEAR, TAM, LR, RIS, LIQ, TANG**					
Controls	Sim			Não		
EF Sector	Sim			Sim		
EF Year	Sim			Sim		
R^2	12,09%			16,83%		
R-Adjusted	8,34%			14,29%		
Maximum VIF	1,83			1,04		
DW	1,5454			1,5722		
White	0,0000***			0,0000***		
Observations	442			440		

Note 1: significant at *0.10, **0.05, ***0.01 level.
Note 2: Alternative EC = Total liabilities divided by total assets; Maximum VIF between the variables tests for multicollinearity. DW is the Durbin-Watson test for residual self-correlation. White is the test for residual homoscedasticity. Legend: β = Standardized Beta; Prosp. = Categorical variable in which 1 represents prospectors, and 0 represents defenders; LR = Profitability; TAM = income natural logarithm; RIS = market systematic risk; LIQ = current liquidity; TANG = Tangibility; EF = Fixed effects; R-Adjusted.

The control variables were not included in the OLS model when comparing the OLS and PSM models with the alternative measure of capital structure, as they showed that they were inversely correlated with the dependent variable. The results confirm the main analysis and show that prospectors more frequently rely on third-party capital. Hence, as hypothesized, by investing in new products and markets (Miles & Snow, 1978), prospectors tend to present lower profitability and lower cash flows due to more heavily investing in research and development (Bentley-Goode et al., 2019). Furthermore, the results concerning the alternative measure of capital structure tested by Model 6 are robust.

5. Discussion

The results using Miles and Snow's (1978) business strategies show that prospector companies use third-party capital more intensely, while defenders tend to rely more on their own resources. Such evidence regarding the companies addressed here suggests that business strategy impacts capital structure; the tests confirm the results' robustness.

Therefore, H_1 failed to be rejected. The notion that prospectors tend to rely on third-party capital to finance their activities more heavily was tested, and the results of the main analysis and PSM confirmed the hypothesis; as noted by Miles and Snow (1978), these companies tend to invest in new products and markets. H_2 also failed to be rejected, confirming that defenders rely on their capital to finance their activities more frequently. Hence, these findings suggest that these companies depend on their resources, decreasing the chances of using third-party resources.

Previous studies highlight that a company's strategy is one determinant of capital structure (Chkir & Cosset, 2003; Javorcik & Spatareanu, 2009; Jouida, 2018; Cappa *et al.*, 2019). However, such studies investigated the impact of differentiation, internationalization, and integration strategies on the capital structure. Thus, this study contributes to previous literature by shedding light on the impact of Miles and Snow's (1978) business strategy on the composition of Brazilian companies' sources of resources. These findings inform companies and their managers that a company's business strategic choice has an impact that goes beyond their market behavior and R&D spending, as it also impacts the composition of funding sources.

Hence, this study confirms the relevance of business strategy in forming a company's business model and determining company-specific factors, such as managerial decisions on the source of financial resources. As shown by H_1 and H_2, this depends on the company's business strategy and whether it chooses to depend more heavily on internal capital. Therefore, this study's main contribution is to highlight that prospectors and defenders tend to have different capital structure compositions due to debt financing choices.

A company chooses between internal or external financing depending on its classification. As reported in the literature, the capital structure combines a company's debt and equity to subsidize its investment and financing decisions (Kumar, Colombage, and Rao, 2017). Miles and Snow's (1978) business strategy paves the way for new investigations into organizations' practices to achieve objectives, and depending on the strategy, companies opt for cost control and different financing options. In addition to the factors determining the capital structure, the corporate strategy comes from the understanding that managers must be able to meet environmental conditions (Miles & Snow, 1978); one can infer that this capacity influences financing decisions.

6. Final Considerations

This study analyzed the relationship between Brazilian companies' business strategy and capital structure listed on Brasil, Bolsa, Balcão [B][3]. The results show that business strategy is related to capital structure. Prospector companies more frequently rely on third-party resources to cover their market expansion and extensive R&D expenses. These expenses imply lower profitability, thus requiring third-party capital. This situation is aggravated in the Brazilian context, where companies have limited resources due to the mandatory distribution of dividends. On the other hand, defenders seem to depend on their resources more heavily.

These findings reveal the importance of associating themes pertinent to management accounting (business strategy) and financial accounting (capital structure). This study highlights interfaces between these broad areas by showing that managerial decisions significantly impact financial information, which interests managers, investors, and shareholders.

These results contribute to the literature on business strategies and capital structure by showing that companies with different business strategies tend to structure their capital composition differently. The findings reveal that different strategies have different impacts on the capital structure of companies, which is reflected in the composition and cost of capital, even in companies that belong to the same context. Additionally, they contribute to the literature by showing that business strategy is one of the determinants of capital structure.

The contributions to the market include the information that a more aggressive capital structure (dependent on third-party capital) might result from an expansion strategy, as is the case with the prospector strategy. Potential investors might realize that the increased risk due to dependence on third-party capital is part of a business strategy aimed at a company's future growth. Considering that there is a strategy, investors may also feel more comfortable identifying this composition of capital structure. Note that in an emerging context, as is the Brazilian case, companies opting for innovation and expansion need to seek more capital from external sources.

This study's limitations underlying the results must be considered. First is the business strategy variable; the moving average of each was calculated considering the previous five years. Hence, future studies are suggested to calculate the mean by considering a more extended period. The second limitation is that the results change depending on how the business strategy scores are classified, possibly indicating a limitation of the companies in the sample. Although additional tests were performed to improve the results' reliability, future studies could investigate the relationships proposed here to confirm the results. Third, future studies may also insert the classification of companies into prospectors and defenders into econometric models to explain decisions regarding the use of third-party capital among Brazilian companies.

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The influence of life cycle stages on the corporate governance and earnings management relationship among Latin American publicly held companies

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Abstract

Objective: To analyze the influence of life cycle stages (LCS) on the relationship between corporate governance (CG) and earnings management (EM) of publicly listed companies in Latin America.

Method: Data from 278 Latin American companies were collected from 2011 to 2021 from Refinitiv Eikon® and analyzed using Heckman correction for self-selection model (1979) and multiple linear regression, with robust error correction and fixed effects for country, year, and sector, resulting in 1,792 observations. Dickinson's (2011) model was used to classify LCS, and Pae's (2005) model was adopted for EM. CG was measured according to the Refinitiv Eikon® governance standard.

Results: CG contributed to reducing EM, and a lower level of EM was found in the initial (introductory and growth) and maturity stages compared to the final stages (shake-out and decline). The analysis of the influence of LCS on the CG and EM relationship showed that CG is more effective in reducing EM in a company's initial stages than in its final stages. In contrast, there is a decrease in CG's ability to mitigate EM in the maturity stage compared to the final stages.

Contributions: These results enable a better understanding of how the effectiveness of CG mechanisms in reducing EM practices can be enhanced or minimized throughout LCS. Thus, organizations should pay attention to their LCS when attempting to improve their control mechanisms.

Keywords: Earnings management; Corporate governance; Life cycle stages.

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1. Introduction

The quality of the accounting information a company provides is vital because it decreases information asymmetry between internal and external investors, reducing conflicts of interest (Correia, Amaral & Louvet, 2017). Quality information is relevant for decision-making and reliably represents an organization's situation (Dechow, Ge & Schrand, 2010; Ma, Wang, Xu & Zhang, 2023). The literature infers the quality of information through the quality of reported profits. Therefore, empirical research usually adopts proxies such as earnings management (EM), earnings persistence, earnings smoothing, and conservatism to verify the quality of information (Paulo, 2007; Dechow *et al.*, 2010).

Although accounting information reports are regulated by agencies responsible for the functioning of markets, preparing these reports involves choosing what to recognize, measure, and disclose about economic events, enabling managers to make accounting-related decisions to achieve specific objectives, and possibly affecting the quality of accounting information (Xu, 2007; Lima, Carvalho, Paulo & Girão, 2015; Santos, Guerra, Marques & Maria Júnior, 2020).

The literature presents a set of individual incentives for managers to act in their interest when making accounting decisions, such as avoiding the disclosure of losses or declines in accounting results, increasing their remuneration, and achieving a particular goal related to results or market expectations (Martinez, 2001; Paulo, 2007). Therefore, a search for specific objectives may lead managers to resort to EM strategies that have the potential to negatively affect the quality of accounting information (Soschinski, Haussmann, Peyerl & Klann, 2021).

Because aligning the interests of administrators and capital holders remains a challenge and may encourage EM practices, organizations must implement control mechanisms to safeguard the interests of shareholders and ensure that more transparent and quality information is provided to stakeholders (Rahman & Ali, 2006). Such mechanisms include corporate governance (CG) practices, whose purpose is to decrease agency conflicts (Correia et al., 2017; Nazir & Afza, 2018) and, consequently, discourage EM practices (Peasnell, Pope & Young, 2005; Morás & Klann, 2020). Thus, empirical evidence indicates that CG contributes to mitigating such practices (Bao & Lewellyn, 2017; Correia *et al.*, 2017; Soschinski *et al.*, 2021).

Nonetheless, despite the high levels of CG standards held by *Companhia Americanas S.A.*, listed in the B[3]'s "*Novo Mercado*," a listing segment on transparency and corporate governance, revealed that higher CG levels do not necessarily mitigate risks associated with EM or accounting frauds. In January 2023, this company reported accounting inconsistencies that decreased supplier account values in previous years, which resulted in approximately R$20 billion in omitted liabilities up to the base date of September 2022. The immediate consequences were a request for judicial recovery in January 2023 and the postponement of the release of the 2022 financial statements (Americanas, 2023). Even though Americanas' formal governance structure followed the standards recommended, this case highlights that CG is not always efficient in protecting the shareholders' interests.

Furthermore, there is no consensus in the literature that CG can reduce EM. Some studies found a negative relationship (Bao & Lewellyn, 2017; Correia et al., 2017; Soschinski et al., 2021), while others found a positive relationship or no relationship at all (Erfurth & Bezerra, 2013; Konraht, Soutes & Alencar, 2016; Morás & Klann, 2020; Rahman & Ali, 2006; Waweru & Prot, 2018). Perhaps these controversial results are partially explained by the fact that previous studies have not considered the companies' other characteristics that might affect this relationship. Not only governance but also a company's life cycle stage (LCS) might affect whether EM practices are adopted.

Considering that the managers' interests in adopting earning management strategies may differ across a company's different LCS (Lima et al., 2015; Souza & Moraes, 2019), LCS might significantly influence commercial aspects, investment and financing strategies, competitiveness, as well as the quality and relevance of the information it provides according to its LCS (Dickinson, 2011; Lima et al., 2015; Habib & Hasan, 2019).

Thus, a company's LCS affects organizational characteristics, managers' priorities, and the adoption of CG mechanisms (Dickinson, 2011; Habib & Hasan, 2019). Governance mechanisms may change throughout a company's LCS, as the governance's role, such as wealth creation and preservation, are necessary in different LCS (Filatotchev, Toms & Wright, 2006; Habib & Hasan, 2019). The association between LCS and the CG structure has been empirically verified (O'Connor & Byrne, 2015; Li & Zhang, 2018). Therefore, this study is based on the premise that the effectiveness of CG in mitigating EM practices may be enhanced or attenuated depending on a company's LCS. However, the literature has not yet considered this relationship, indicating a research gap to be explored.

Given the previous discussion, this study aims to analyze the influence of life cycle stages on the relationship between corporate governance and earnings management in publicly held companies in Latin America. Bao and Lewellyn (2017) note that studies on EM have seldom addressed the companies' national institutional environment, especially in emerging markets, highlighting the relevance of investigating such markets, considering the growing importance of these in the global economy.

Such a lack of emphasis encouraged the analysis of Latin American countries (specifically, Argentina, Brazil, Chile, Colombia, Mexico, and Peru). Additionally, data from the latest report published by the International Monetary Fund (IMF) in April 2022 (Bloomberg Línea, 2022) indicate that Latin American and Caribbean economies represent approximately 5.26% of the world's Gross Domestic Product (GDP). This information provided additional motivation to study this region and its economic aspects, considering the companies' EM practices and LCS, besides corporate governance, an aspect differentiating this study from previous research.

The importance of studying the capital markets of Latin American countries lies in the specificities of these markets when compared to developed countries, as the former are smaller, present lower liquidity levels, are less developed, impose more significant restrictions on companies, present greater volatility and risks, and have lower levels of regulation and investor protection, among other particularities. Thus, analyzing these markets might provide significant findings for the literature and practice and be useful for future studies making comparisons with developed markets.

Thus, this study contributes with evidence that the influence of CG mechanisms on EM differs depending on a company's LCS, providing a broader view of the contribution of CG practices to reducing EM. EM. Soschinski et al. (2021) draw attention to the fact that the studies analyzing the influence of CG on EM typically considered CG mechanisms in isolation, such as the characteristics of companies' audit committees and boards of directors, and highlight the importance of considering more comprehensive CG metrics. Thus, following Soschinski et al. (2021), this study's contributions include the use of aggregated CG metrics (provided by Refinitiv Eikon®), which shows the effectiveness of mechanisms concerning shareholder protection and integration and management strategies; hence, a more robust CG proxy.

2. Theoretical Framework

2.1 Earnings Management

Accountants have discussed the adoption of EM for many years based on the assumption of principal-agent problem (Jensen & Meckling, 1976). EM concerns the manipulation of profits towards an objective. It may be materialized by a manager or a market analyst's forecast, converging with the agent's interest (Lima et al., 2015). Hence, managers may manipulate earnings to maximize their interests (Wang, Chi & Wang, 2023) or signal their private information, impacting the informativeness of profits (Ching, Firth & Rui, 2006).

Asymmetric information implies the risk that disclosed results do not reflect the actual context of a company's performance, being loaded with biases from opportunistic managers (Martinez, 2001). In the business world, investors and managers deal with asymmetric data and act in situations where information is incomplete and inaccurate; information asymmetry and opportunism result in conflicts between the agent and the principal. Plenty of literature analyzes this relationship, which is explained by agency theory (Lopes & Martins, 2005).

Due to accounting and tax legislation gaps, managers may choose different approaches, even towards an economic occurrence (Cabello & Pereira, 2015). Usually, EM is triggered by alternative accounting measurement methods that enable managers' discretion when preparing and disclosing financial statements (Morás & Klann, 2020; Santos *et al.*, 2020).

The different measurement methods, gaps, and the specificities of the accrual basis lead to differences between net profit and net operating cash flow, known as accruals (accumulation), which are the income accounts that enter the profit composition but do not necessarily imply a movement in availability (Martinez, 2008; Morás & Klann, 2020). There are no problems or errors in recording accruals, as the intention is to improve the quality of information when measuring profit in its economic form. The problem lies in the fact that managers have the discretion to increase these accruals (or not) to influence profit opportunistically (Martinez, 2008).

In turn, accruals may be divided into discretionary, which refers to the manager's choices, and non-discretionary, which occurs due to the conditions of the business itself and accounting standards (Oliveira & Soares, 2018). However, Hendriksen and Van Breda (2009) warn that, because of managers' discretion, profit is a dangerous measure for external users, as managers encouraged to change accounting practices may distort it. On the other hand, Francis, Olsson, and Schipper (2008) state that profit is better quality information when closer to cash flow.

Therefore, even within the alternatives allowed by accounting legislation (Lima et al., 2015), EM results from intentionally misrepresenting a company's economic performance to obtain an advantage or particular gain. Hence, it entails the preparation and disclosure of accounting reports with some bias, which indicates the low quality of the information disclosed (Xue & Hong, 2016; Wang, Chi & Wang, 2023).

Furthermore, EM is also used as a prediction variable in corporate bankruptcy models. The identification of substantial manipulated profits enables predicting a company's bankruptcy. Accruals have better supported the forecast of bankrupt companies, but the actual activities variable improves the forecasts of non-bankrupt companies. These findings highlight the importance of indicators of the EM magnitude and the tools used to improve the performance of corporate bankruptcy models (Veganzones, Séverin & Chlibi, 2023); such a relationship between earnings management and company bankruptcy is apparent in the case of Americanas S.A. in Brazil.

2.2 Corporate Governance

The literature has no consensual definition of governance/good governance practices. However, according to Silveira (2006), it is a set of controls and incentive mechanisms aimed at minimizing the costs caused by agency conflicts. Thus, CG comprises bodies responsible for guiding, supporting, and monitoring management, providing a set of rules intended to align the interests of investors and managers and maximize business performance (IBCG, 2015).

CG mechanisms help align the interests of the principal and the agent to increase the reliability of financial information and financial reports (Nazir & Afza, 2018). The literature points to a series of CG mechanisms, such as the board of directors (e.g., addressing issues related to the board's size and independence, CEO duality, etc.) and audit committee (e.g., concerning issues related to the committee's size, auditors rotation, etc.), among other indicators (Muda et al., 2018; Morás & Klann, 2020).

A solid CG system based on good practices, a well-structured board of directors, and good communication with stakeholders is vital for aligning interests and reducing EM practices (Gonzales & Garcia-Meca, 2014).

Regarding the association of CG with EM, some studies note that companies with a certain level of governance tend to present lower EM levels (Gonzalez & Garcia-Meca, 2014; Riwayati et al., 2016; Bajra & Cadez, 2018). However, no studies addressing such behavior, considering the companies' different LCS, were found, precisely the aspect we address in this study.

Although CG plays an essential role in ensuring the presence of control mechanisms in the absence of competition (Campbell, Hollingsworth & Lindberg, 1991), it sometimes fails to prevent illicit financial practices in concentrated markets (Diri, Lambrinoudakis & Alhadab, 2020). For example, Google manipulated its accounting records to avoid high tax payments and transferred its earnings to low-tax jurisdictions around the world; Coca-Cola overstated its assets, reporting a value of nine million dollars (Diri et al., 2020); and there is a more recent case in Brazil concerning Americanas S.A's omission of liabilities.

Companies operating in concentrated markets more frequently perform EM than companies in non-concentrated markets (Diri et al., 2020). Furthermore, there is evidence that CG, in the form of the board's quality characteristics, is more effective in mitigating EM in non-concentrated markets (Diri et al., 2020). In contrast, CG in concentrated markets causes managers to replace EM for accruals with EM for actual activities, as the latter is less easily detectable, and its long-term negative consequences on firm value are likely to be mitigated by greater competitiveness power of companies in concentrated markets (Diri et al., 2020). Companies with better CG levels were found to experience lower EM levels in emerging economies, such as Vietnam (Nguyen, Kim & Ali, 2023).

2.3 Life Cycle Stages and Hypotheses Formulation

A wave of empirical studies emerged in recent decades, showing that a company's life cycle considerably affects its financial reports, corporate financial policies, and governance mechanisms (Habib & Hasan, 2019). Companies experience various distinct phases throughout their development as they are established and grow, phases defined as LCS (Ribeiro, Viana & Martins, 2021). Considering that each stage is associated with different environmental, strategic, structural, and decision-making standards, organizations experience new situations according to their life cycle stages.

The organizational life cycle (OLC) theory analyzes how organizations develop over time and their ability to adapt to the environment. Thus, some scholars metaphorically compare the organizations' development to the life cycle of living beings, in which companies are born, grow, and die (Assunção, De Luca, Vasconcelos & Cardoso, 2014).

The objective of studying LCS focuses on analyzing how changes in incentives, restrictions, and strategies throughout life cycle stages relate to managers' decisions and organizations' performance (Hasan et al., 2015; Oliveira & Monte; Mor, 2022). Note that a company's life cycle, although compared to the biological life cycle, does not follow a linear timeline; hence, a company may jump from one phase to another or even go back from a more advanced phase to a more initial one. Theoretically, when it comes to decline, companies may enter this stage from any other stage; however, this is where they can reach bankruptcy (Dickinson, 2011).

Thus, based on the classification proposed by Miller and Friesen (1984) and economic theory, Dickinson (2011) classified the five phases of a company's life cycle based on cash flows: introductory, growth, maturity, shake-out, and decline. The first two (introductory and growth stages) concern the initial stages, and the last two (shake-out and decline stages) are the final ones (Oliveira & Monte-Mor, 2022).

Thus, different studies highlight whether and how the organizations' characteristics in different LCS are reflected, for example, in their financial reports and policies (Habib & Hasan, 2019; Krishnan, Myllymäki & Nagar, 2021), in the smoothing of results (Ribeiro *et al.*, 2018), EM strategies (Lima *et al.*, 2015; Souza & Moraes, 2019; Roma *et al.*, 2021), and CG practices (Esqueda & O'Connor, 2020; Filatotchev *et al.*, 2006; Habib & Hasan, 2019; O'Connor & Byrne, 2015; Shaheen *et al.*, 2020).

At a company's inception, its focus is on its viability; hence, its strategy is to identify and capture as many customers as possible (Lima *et al.*, 2015). This stage is characterized by rapid growth and high investments in production, though companies cannot achieve profitability at this stage (Ribeiro *et al.*, 2018). Young companies are controlled by managers and have basic informational structures. Usually, they are not experienced in the production process, tend to have fewer employees, and profits are distributed less frequently, as there is a need for reinvestment (Miller & Friesen, 1984; Lester, Parnell & Carraher, 2003).

At this stage, companies make considerable investments to consolidate in the market. Financing and debt issuance are generally obtained for the firm to finance this investment (Lima et al., 2015). Such operations increase expenses that generate accruals, such as depreciation, amortization, and financial expenses, enabling the adoption of EM strategies (Souza & Moraes, 2019). Likewise, other factors associated with the initial life cycle phases, e.g., low profitability, high cost of debt, and risk of bankruptcy, can provide incentives for managers to engage in EM practices to convince creditors that their company is in a superior condition (Hussain et al., 2020; Krishnan et al., 2021; Roma et al., 2021). Furthermore, companies at this stage are likely to adopt CG mechanisms less frequently (Machado et al., 2020).

The growth phase follows after the company has successfully overcome its introductory phase. At this point, the company is expected to have established its distinct competencies and enjoyed initial success in the market. Companies in the growth phase are less conservative, focusing on increasing sales and obtaining new investors through the expectation of high returns. At this point, companies may enjoy profits, but growth slows down compared to the introductory phase (Alves & Marques, 2007; Ribeiro *et al.*, 2018).

Anthony and Ramesh (1992) argue that profits are greatly expected in the introductory and growth stages because investors seek to verify a company's performance. However, increased pressure is imposed on companies in the growth phase to show performance, considering that firms are better structured and have more established procedures (Miller & Friesen, 1984), characteristics that may impact the adoption of EM. However, companies have the opportunity to adopt governance mechanisms at this stage, even if not firmly consolidated (Machado et al., 2020). Hence, we conjecture that CG mechanisms are more effective in reducing EM in the growth stage than in the previous stage, considering improvements in the decision-making processes in the growth phase (Miller & Friesen, 1984).

Furthermore, considering the companies' need for external financing in the introductory and growth stages, they tend to improve the quality of CG to access financing to support their growth (Esqueda & O'Connor, 2020; Filatotchev et al., 2006; O'Connor & Byrne, 2015). On the other hand, while companies in the growth stage focus on increasing sales, in the maturity stage, firms seek increased profitability through cost optimization (Lima et al., 2015). Mature companies enjoy a more comfortable position than those in other LCS, as they tend to show more persistent profits and less volatile cash flows (Dickinson, 2011). Due to less uncertainty and risks concerning future earnings, Roma et al. (2021) suggest that these companies are less motivated to manage results.

Additionally, companies in the maturity stage tend to have better CG mechanisms (Filatotchev et al., 2006; O'Connor & Byrne, 2015; Shaheen *et al.*, 2020) and more efficient controls (Miller & Friesen, 1984), which may result in greater governance effectiveness in reducing EM.

Companies in the shake-out stage are characterized by focusing on their recovery or survival (Oliveira & Monte-Mor, 2022). Hence, costs are reduced in this phase, and some assets are liquidated to generate cash and restructure operations (Dickinson, 2011; Ribeiro *et al.*, 2018).

In turn, the decline stage represents a critical phase for a company's survival, in which it tends to be more conservative than in other stages (Costa *et al.*, 2017). Furthermore, declining companies tend to sell their assets, report greater expenses and losses, and present accumulated losses in their operations (Miller & Friesen, 1984; Ribeiro *et al.*, 2018).

Comparatively, companies in the shake-out stage experience decreasing operating cash flows, while in the decline stage, they are negative (Roma et al., 2021). Additionally, there is more significant uncertainty about cash flows, performance, and future investments in these phases (Dickinson, 2011). Thus, Krishnan et al. (2021) suggest that companies in both stages are more motivated to adopt EM strategies when attempting to convince stakeholders about favorable prospects (Hussain et al., 2020; Roma et al., 2021).

In the shake-out and decline stages, companies tend to divest, make extremely conservative decisions, and have zero net inflows (Miller & Friesen, 1984). Thus, we conjecture that these characteristics might negatively impact the quality of CG and its monitoring relevance, such that the system is insufficient to prevent managerial opportunism (Machado et al., 2020).

Previous studies show that organizational LCS influences EM in different contexts. Costa Filho et al. (2018) analyzed a global population of companies headquartered in 63 countries and discovered that LCS' role in EM differs according to accruals. Addressing a sample of publicly traded companies in the USA and Brazil, Roma et al. (2021) found evidence that LCS influences EM. Souza & Moraes (2019) found similar evidence, and Ribeiro et al. (2018) found that companies in the shake-out stage are more likely to smooth profits. Choi, Choi, and Lee (2016) confirmed that growing companies are more likely to beat or exceed earnings benchmarks when compared to the maturity stage.

In Taiwan, an analysis of the impact of LCS on the decision to adopt alternative EM mechanisms found that declining companies are more likely to manage profit maximization with actual activities than mature companies. In turn, companies in the early stages of the life cycle prefer to manage their sales, especially with expense management, while declining companies more frequently adopt sales and production cost management (Xie, Chang & Shiue, 2022).

Evidence indicates that LCS affects the CG mechanisms used by organizations. Filatotchev et al. (2006) showed that CG mechanisms are related to the strategies adopted by organizations throughout the life cycle. The authors reject the notion of a universal governance structure applicable to all LCS, considering that governance parameters may be related to changes that occur from one stage to another.

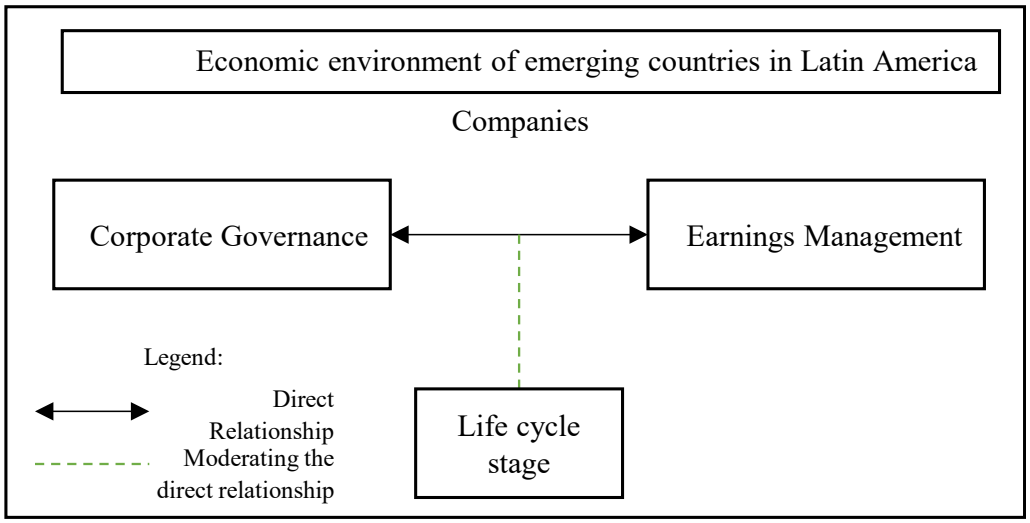
O'Connor and Byrne (2015) addressed 205 companies from 21 emerging countries and found that, in general, mature companies tend to present better CG levels. Their study findings indicate that governance mechanisms, such as monitoring and control, are relevant but depend on different LCS. Shaheen et al. (2020) found similar results, as did Habib and Hassan (2019), whose results show that LCS considerably influences CG.

The evidence presented in the literature indicates that a company's LCS affects both EM and CG practices. Therefore, considering that the CG's ability to minimize EM may depend on different f

actors (Soschinski et al., 2021), the following hypothesis is proposed:

H1: The ability of CG to mitigate EM practices is enhanced in the initial and maturity stages compared to the final life cycle stages.

Figure 1 presents this study's theoretical model and highlights the influence of LCS on the CG and EM relationship. Thus, considering that the direct relationship between CG and EM has been widely discussed in previous literature (Bao & Lewellyn, 2017; Morás & Klann, 2020; Rahman & Ali, 2006; Soschinski *et al.*, 2021; Waweru & Prot, 2018), this study focuses on exploring the potential effect, yet unexplored by previous studies, of LCS and its potential to moderate this direct relationship, which may even explain the conflicting results in the literature on CG and EM.



Source: developed by the authors.

Figure 1. Theoretical Framework

3. Method

3.1 Population and Sample

This study's population comprised listed companies in Latin American countries, considering the period between 2011 and 2021. This period was chosen because, in 2011, it became mandatory that all publicly traded companies in the countries analyzed here prepare their consolidated financial statements according to international accounting standards – IFRS, and 2021 was the last year with data available.

The sampling design considered the population of 1,098 non-financial companies in the Refinitiv Eikon® database (the companies in the financial sector were not considered because they have a different accounting structure). Of these, 820 companies were excluded for not disclosing any CG practices (the criterion that accounted for the most significant number of excluded companies) in none of the years addressed here or for providing insufficient data to calculate the variables.

Hence, an unbalanced panel of 278 companies remained: 48 from Argentina, 105 from Brazil, 36 from Chile, 15 from Colombia, 48 from Mexico, and 26 from Peru, which represent approximately 25% of the population and comprise 1,792 observations in the study period. Table 1 shows the number of observations by country and year.

Table 1
Number of observations according to country and year

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
Argentina	-	-	-	-	-	-	24	32	42	45	47	190
Brazil	45	56	59	65	66	67	67	73	76	95	104	773
Chile	17	17	18	18	19	21	31	33	33	33	34	274
Colombia	-	-	-	-	-	12	13	13	15	15	17	85
Mexico	17	18	21	23	27	30	31	36	37	38	44	322
Peru	-	-	-	-	-	22	24	25	25	26	26	148
Total	**79**	**91**	**98**	**106**	**112**	**152**	**190**	**212**	**228**	**252**	**272**	**1792**

Source: study's data (2023).

Table 1 shows that Brazil is the most representative country in the number of observations, with 43% of the total observations, followed by Mexico, with 322 observations, and Chile, with 274 observations, respectively, representing 18% and 15% of the total observations in the period. On the other hand, Colombia and Peru present the lowest number of observations, 85 and 148, respectively; together, these two countries represent 13% of the total observations. Note that the low number of observations mainly concerns the variable measuring CG. Note that the companies in Argentina, Colombia, and Peru spent considerable time without disclosing CG practices. Soschinski (2021) found a similar result with companies from Argentina.

Considering that the sample was selected according to its accessibility, i.e., only companies with information available in the period were included, as the variable of interest was found only in a subset of the population, sample selection bias may arise (Bastos, 2018). Furthermore, adjusting econometric models in these circumstances only for the portion in which the variable of interest was found might lead to biased and inconsistent results (Heckman, 1979).

Heckman (1979) developed a two-equation model to solve the sample selection bias problem. First, the factors that determine inclusion in the sample are assessed, and then a second equation is estimated to analyze the variable of interest. These equations are described below.

3.2 Study Variables

The methodology in which Dickinson (2011) classifies the companies into five stages, introductory, growth, maturity, shake-out, and decline, was adopted to identify the companies' LCS. This model considers the behavior (positive or negative signs) of the Cash Flow Statement (CFS) components (i.e., cash flow from operating activities [CFO], cash flow from investing activities [CFI], and cash flow from financing activities [CFF]) to classify organizations into distinct phases (Table 2).

Table 2
Lifecycle Stage Classification

Cash Flow	Introductory	Growth	Maturity	Shake-out	Decline
Operational	-	+	+	+ - +	- -
Investment	-	-	-	+ - +	+ +
Financing	+	+	-	+ - -	+ -

Source: Dickinson (2011, p. 9).

The companies in the introductory stage are taken as an example to illustrate this classification. According to Dickinson's (2011) methodology, an organization is in its introductory stage when it has a negative CFO, a negative CFI, and a positive CFF. She explains that organizations in the introductory phase do not have established clientele and lack business experience. Hence, these organizations are not yet in a position to generate cash from their operational activities (negative sign). For these companies to ensure their permanence and gain market share, they need cash flow to invest (negative sign) in projects, which is why they need financing (positive sign) (Oliveira & Girão, 2018).

Table 2 shows that the shake-out stage admits three distinct combinations of cash flow signs. Dickinson (2011) explains that no theoretical support was found in the economics literature to make concrete propositions regarding this phase. Hence, this stage was classified according to the following exclusion criterion: cash flows not fitting into previous stages indicate that a company is in the shake-out stage (Costa *et al.*, 2017).

Note that due to the low number of observations found in the initial LCS (introductory and decline; 5% and 3%, respectively), the classification performed by Oliveira and Monte-Mor (2022) was adopted. They grouped LCS into three categories: i) initial stages (introductory and growth), ii) maturity, and iii) final stages (shake-out and decline). Additionally, the final stages (shake-out and decline) were used to make comparisons, as the literature suggests that there is a greater incentive to implement EM in these stages (Krishnan et al., 2021), as well as a tendency to decrease CG quality (Filatotchev *et al.*, 2006; Loderer *et al.*, 2012).

The model proposed by Pae (2005) was adopted to estimate the EM levels through discretionary accruals, considering that it is an improved model that made advancements regarding some of the weaknesses presented by the model proposed by Jones (1991) (Paulo, 2007); a model that was widely used up to that time. Pae's model (2005) is evidenced in Equation 1. As for total accruals, these were estimated based on the cash flow approach, according to Equation 2. Additionally, as suggested by previous research (Costa & Soares, 2022), the estimation of Pae's EM model (2005) was operationalized through a cross-section by sector and year, with companies presenting at least ten observations to reduce potential biases.

$$TA_{it}/A_{it-1} = \alpha_0 + \alpha_1 1/A_{it-1} + \alpha_2 \Delta R_{it}/A_{it-1} + \alpha_3 PPE_{it}/A_{it-1} + \alpha_4 CFO_{it}/A_{it-1} + \alpha_5 CFO_{it-1}/A_{it-2} + \alpha_6 TA_{it-1}/A_{it-2} + \varepsilon_{it} \quad \text{(Equation 1)}$$

$$TA_{it} = (PROFIT_{it} - CFO_{it}) / A_{it-1} \quad \text{(Equation 2)}$$

Where:

TA_{it} corresponds to the total accruals of company *i* in period *t*;

A_{it} corresponds to the total assets of company *i* in period *t*;

ΔR_{it} corresponds to the variation in net revenues of company *i* in the period between *t* and *t-1*;

PPE_{it} corresponds to the fixed assets of company *i* in period *t*;

CFO_{it} corresponds to the operating cash flow of company *i* in period *t*;

$PROFIT_{it}$ corresponds to the result before extraordinary items and discontinued operations in company *i* in period *t*;

ε_{it} corresponds to the model residuals used as a proxy for EM for discretionary accruals.

Similar to Soschinski *et al*. (2021), CG information was collected in this study from the Refinitiv Eikon® database, which takes into account the number of CG mechanisms a company presents, such as those focused on management, shareholders, and integration strategies between economic, social, and environmental practices.

Soschinski *et al*. (2021) explain that these mechanisms are CG dimensions, in which the dimension related to management reflects a company's commitment and effectiveness in following what the database establishes as the best CG practices. For example, it assesses whether a company has a policy determining the functions of its audit board and committee, in addition to the independence level of its audit committee and board of directors.

The second mechanism concerns shareholders and reflects an organization's effectiveness in equally treating minority and majority shareholders (e.g., through shareholder engagement, equal voting rights policy, etc.). Finally, the third dimension concerning the integration of economic, social, and environmental practices reflects the adoption of practices designed to incorporate these into day-to-day organizational strategies and decision-making processes. For example, including the committee and sustainability report, the Global Reporting Initiative [EMI] guidelines, etc.).

Therefore, the database generates a final score ranging from 0 to 100 based on the number of mechanisms each company presents, which is used as general CG metrics. Table 3 presents the study variables.

Table 3
Metrics for calculating the study variables

Variable	Description	Metrics	Authors
		Dependent Variable	
Earnings Management (EM)	Discretionary accruals operationalized in absolute values (According to Eq. 1 and 2)	Pae's (2005) Model	–
		Independent Variable	
Corporative Governance (CG)	Measures the companies' CG level.	Refinitiv Eikon's ® methodology including mechanisms aimed at management, shareholders, and strategies.	Soschinski *et al*. (2021)
		Moderating independent variable	
Lifecycle Stages (D_LCS)	Represents the LCS under study	Dummy that corresponds to the company's LCS (initial stages, maturity, and final stages): 1 concerns the companies in the stage analyzed by the model, and 0 otherwise.	Dickinson (2011)
$CG_{it} \cdot D\_ECV_{it}$	Moderating variable	Represents the interaction between the CG and LCS under study.	
		Control Variables	
Size (SIZE)	Income natural logarithm (LN)	LN of total revenue	Haga *et al*. (2018); Soschinski *et al*. (2021)
Return on Assets (ROA)	Company's profitability	Operating Profit divided by Total Assets	Schuster and Klan (2019)
Debt (DEBT)	Company's debt level	Total liabilities divided by Total Assets	Morás and Klann (2020); Ribeiro *et al*. (2018)
Sales Growth (SG)	Sales growth due to variation in revenue	Percentage of change in sales	Costa Filho *et al*., (2018); Soschinski *et al*. (2021)
Year	Period of analysis: 2011 to 2021	Dummies for year	Haga *et al*. (2018)
Country		Dummies for country	–
Sector		Dummies for sector	Haga *et al*. (2018)

Source: developed by the authors.

3.3 Econometric Models

Heckman's (1979) correction model was used to estimate data. First, a binary variable (D_sample) was created, where 1 was assigned for the companies in the sample and 0 otherwise. Next, the first stage of the Heckman model was performed (which uses a logit estimation to perform the selection equation), the model of which is shown in Equation 3.

$$EM_{it} = \gamma_0 + \gamma_1 SIZE_{it} + \gamma_2 ROA_{it} + \gamma_3 DEBT + \gamma_4 SG_{it} + \gamma_5 D\_sample + \varepsilon_{it} \quad \text{(Equation 3)}$$

Then, the model in Equation 4 was estimated to analyze how different LCS affect the companies' EM; this relationship was controlled by different factors that may affect EM (as shown in Table 3). Note that this model is the second stage of the Heckman correction model.

$$EM_{it} = \delta_0 + \delta_1 D\_ECV_{it} + \delta_2 SIZE_{it} + \delta_3 ROA_{it} + \delta_4 DEBT + \delta_5 SG_{it} + \gamma Year_t + \alpha Country_t + \beta Sector_t + lambda + \varepsilon_{it} \quad \text{(Equation 4)}$$

Furthermore, in addition to the LCS analyzed in Equation 4, the other variables of interest (CG and interaction variables) and the variables that may affect EM (control variables, Table 3) were included in the model to check Hypothesis 1. This model, which is the second stage of the Heckman correction model, is presented in Equation 5.

$$EM_{it} = \beta_0 + \beta_1 CG_{it} + \beta_2 D\_ECV_{it} + \beta_3 CG_{it} \cdot D\_ECV_{it} + \beta_4 SIZE_{it} + \beta_5 ROA_{it} + \beta_6 DEBT + \beta_7 SG_{it} + \gamma Year_t + \alpha Country_t + \delta Sector_t + lambda + \varepsilon_{it} \quad \text{(Equation 5)}$$

Additionally, as a measure of robustness, a third model was estimated using multiple linear regression (ordinary least squares – OLS), with robust error correction for potential problems of autocorrelation, multicollinearity, and heteroscedasticity, and fixed effects of country, year, and sector, according to Equation 6.

$$EM_{it} = \alpha_0 + \alpha_1 CG_{it} + \alpha_2 D\_ECV_{it} + \alpha_3 CG_{it} * D\_ECV_{it} + \alpha_4 SIZE_{it} + \alpha_5 ROA_{it} + \alpha_6 DEBT + \alpha_7 SG_{it} + \gamma Year_t + \beta Country_t + \delta Sector_t + \varepsilon_{it} \quad \text{(Equation 6)}$$

4. Analyses and Discussion of Results

Initially, descriptive analysis was performed to verify how data behaved (Table 4). Note that the ROA, SG, and DEBT variables are presented in their winsorized values at the 1% and 99% levels to limit the presence of outliers.

An analysis of the absolute values of discretionary accruals proxy showed a variation indicating that the companies manipulated their results throughout the study period. As for CG, the results show that, on average, the companies presented approximately 49% of the mechanisms assessed by the database. Furthermore, the data presents a high standard deviation (22.75%), clearly discriminating the companies adopting few CG practices (according to the minimum value) from those adopting many practices (approximately 97%, based on the maximum value).

Data also shows a positive mean ROA, indicating that the companies were able to generate profits from their assets. Additionally, on average, the companies presented growing sales from one year to the next. There are both companies experienced a decrease in sales (minimum value) and those experiencing high growth (maximum value). Finally, it appears that companies have a relatively high level of debt.

Furthermore, an analysis of companies' LCS indicates that most (60%) were in the maturity phase, followed by those in the growth (22%), shake-out (10%), introductory (5%), and decline (3%) phases. Hence, most organizations are characterized by stability (Dickinson, 2011).

Table 4
Descriptive Statistics

Panel A – Descriptive statistics of the study variables						
	EM_{it}	**CG_{it}**	**ROA_{it}**	**SG_{it}**	**$SIZE_{it}$**	**$DEBT_{it}$**
Mean	0,04	49,18	0,07	0,03	21,28	0,61
Standard Deviation	0,05	22,75	0,08	0,32	1,65	0,21
Median	0,02	49,71	0,07	0,00	21,40	0,59
Minimum	0,00	0,25	-0,24	-0,67	16,10	0,13
Maximum	0,94	96,86	0,33	1,67	24,54	1,50
Observations			1.792			
Panel B – Distribution of observations according to life cycle stages						
	Frequency			**Relative Frequency**		
Introductory	83			5%		
Growth	401			22%		
Maturity	1.076			60%		
Shake-out	183			10%		
Decline	49			3%		
Observations	1.792			100,00%		

EM_{it} = discretionary accruals according to absolute values in the Pae's (2005) model; CG_{it} = Corporate Governance Score; ROA_{it} = return on assets; SG_{it} = sales growth; $SIZE_{it}$ = company's size; $DEBT_{it}$ = debt.

Source: study's data (2023).

Table 5 shows the results concerning the influence of LCS on the CG and EM relationship. The relationship between the LCS and the EM is shown in Heckman's model 1 to verify managers' opportunistic behavior throughout the LCS. Considering the final stages as a comparison category, the results show a negative and significant relationship between the initial and maturity stages and EM. This finding indicates that there is a lower level of EM in these stages than in the final stages of the life cycle, which is consistent with the notion that investors do not strongly pressure companies for a certain level of performance at the introductory stage. Likewise, growing companies are more at liberty to report losses without being severely penalized by the market. These aspects might minimize incentives for EM (Krishnan *et al.*, 2021; Roma *et al.* 2021), compared to the final stages of the life cycle.

Additionally, this result aligns with the literature in which mature companies experience considerably lower levels of uncertainty and risk regarding future profits and cash flows, which reduces the incentives for companies at this stage to manage results (Krishnan *et al.*, 2021).

Consequently, EM tends to be more pronounced in the final stages, considering there is a greater incentive to engage in EM practices due to financial difficulties (Souza & Moraes, 2019). Furthermore, there is increased uncertainty regarding a company's future performance and cash generation in the decline phase, giving incentives for opportunistic behavior and a search to hide potential financial difficulties (Hussain *et al*., 2020; Roma *et al*., 2021). Thus, the results of this study indicate that lower levels of EM are found in the initial and maturity stages compared to the final stages of the life cycle.

Note that the estimation using the Heckman model presented more robust results than those obtained by the OLS estimation, considering that the coefficient of the lambda variable proved to be statistically significant. In this sense, its inclusion in the model was relevant for correcting sample selectivity (Resende & Wyllie, 2006), decreasing potential biases in the estimated coefficients.

The other variables of interest were included in Heckman's model 2, i.e., the CG and the interactions between the LCS and the CG. The results show a significant negative relationship between CG and EM, indicating that CG represents an important tool for preventing managers' EM practices. It aligns with previous evidence and shows that CG contributes to decreasing opportunistic behavior, such as EM (Bao & Lewellyn, 2017; Correia *et al*., 2017; Bajra & Cadez, 2018; Soschinski *et al*., 2021).

These findings also enabled inferring that companies in the final stages (shake-out and decline) tend to engage more frequently in EM practices, corroborating the literature, which suggests that managers are more motivated to manage results in these life cycle phases to convince shareholders and other creditors of their companies' prospects (Hussain *et al*., 2020; Roma *et al*., 2021). Likewise, these confirm some of the results reported by Ribeiro et al. (2018) regarding the influence of the shake-out stage on earnings smoothing. Thus, the results align with those from previous research indicating the influence of LCS on EM (Choi *et al*., 2016; Costa Filho *et al*., 2018; Ribeiro *et al*., 2018; Souza & Moraes, 2019; Roma *et al*., 2021). Moreover, this and the previous estimation found a statistically significant coefficient of the lambda variable, suggesting that its inclusion in the model was necessary for correcting sample selectivity (Resende & Wyllie, 2006).

Table 5

Results regarding the life cycle influence on the relationship between corporate governance and earnings management

EM_{it}	Heckman 1	Heckman 2	OLS
CG_{it}		-0.000704***	-0.000692**
		(-2.85)	(-2.08)
$Intro\_Grow_{it}$	-0.009961***	-0.049553***	-0.049664**
	(-4.16)	(-3.23)	(-2.25)
$Maturity_{it}$	-0.013273***	-0.056898***	-0.056962**
	(-5.79)	(-4.09)	(-2.48)
$CG_{it} \cdot Intro\_Grow_{it}$		0.000630**	0.000623*
		(2.14)	(1.81)
$CG_{it} \cdot Maturity_{it}$		0.000743***	0.0007267**
		(2.78)	(2.17)
$SIZE_{it}$	-0.005778***	-0.008570***	-0.009314***
	(-12.52)	(-5.20)	(-3.13)
ROA_{it}	0.070969***	0.112017***	0.015906**
	(8.94)	(4.25)	(2.10)
SG_{it}	0.002433	0.007475	0.087010
	(1.14)	(1.18)	(1.25)
$DEBT_{it}$	0.058282***	0.066217***	0.063123***
	(25.12)	(8.33)	(3.07)
Lambda	0.047148***	0.088951***	
	(2.91)	(2.84)	
Constant	1.284505***	-14.0429***	0.219513***
	(32.59)	(-87.07)	(3.92)
Dummies for Country	Yes	Yes	Yes
Dummies for Year	Yes	Yes	Yes
Dummies for Sector	Yes	Yes	Yes
Observations		1,792	
Wald Chi^2 and F test (OLS)	1499.07***	243.20***	5.60***

EM_{it} = discretionary accruals in absolute values estimated by Pae's (2005) model; CG_{it} = Corporate Governance Score; $SIZE_{it}$ = log total income; ROA_{it} = return on assets; SG_{it} = sales growth; $DEBT_{it}$ = debt; Wald Chi^2 and F test (OLS) = model's significance. z (Heckman) and t (OLS) statistics between parentheses. ***, **, * = significant at 1%, 5%, and 10% levels, respectively.

Source: Study's data (2023).

An analysis of the moderating effect of LCS on the CG and EM relationship showed a positive and significant relationship at the 5% level for the initial stages and at the 1% level for the maturity stage. As for the initial stages, the sum of the interaction coefficient with the CG variable does not confirm this positive relationship (0.000630: -0.000704), indicating increased governance's ability in these stages to mitigate EM than in the final stages. These results align with theoretical arguments that the quality of governance increases in response to the need for external financing (Esqueda & O'Connor, 2020; Filatotchev *et al.*, 2006; O'Connor & Byrne, 2015). In this sense, as companies in the early stages have a greater need for external financing, a higher quality of CG is expected, which is a potential explanation for the ability of CG to reduce EM in these stages.

Likewise, a positive and significant influence was found on the CG and EM relationship for the maturity stage. The sum of the interaction coefficient with the CG variable ratifies this positive relationship (0.000743: -0.000704), suggesting that governance practices were not sufficiently compelling to prevent opportunistic behavior at this stage compared to the final stages. This result is likely explained by the fact that mature companies have fewer incentives for managers to engage in EM practices (Roma *et al*., 2021), meaning that governance mechanisms are not as required. Li and Zhang (2018) found that the size of the board of directors decreases as a company moves through the life cycle stages. Furthermore, mature companies generally require less external financing. Thus, according to the theoretical arguments previously discussed, the quality of CG may suffer (Esqueda & O'Connor, 2020; Filatotchev *et al*., 2006).

Hence, it appears that CG mechanisms are more effective in reducing EM in the final stages than in the maturity stage; hence, it fulfills its role of monitoring and mitigating behaviors not aligned with the principal's interests. It is so because, at these stages, managers are strongly motivated to get involved in EM (Krishnan *et al*., 2021) to convince stakeholders about the company's prospects (Hussain et al., 2020; Roma *et al*., 2021). Thus, as LCS appears to influence the relationship between CG and EM, H_1 fails to be rejected, at least in part, suggesting that the ability of CG to mitigate EM practices is enhanced in the initial and maturity stages compared to the final life cycle stages; such enhancement was found to occur only in the initial life cycle stages.

However, we must consider the magnitude of the coefficients found for the CG variable (-0.000704), for the moderating variable of the initial LCS (0.000630), and maturity (0.000743). As they presented values very close to zero, this may signal that LCS contributes little to enhancing or reducing a company's governance ability to mitigate EM practices, even if it presents a highly statistically significant relationship.

As for the control variables, size presented a negative and statistically significant relationship with EM, indicating that the larger a company, the lower the adoption of EM. Costa Filho *et al.* (2018), Roma *et al.* (2021), and Soschinski *et al.* (2021) found similar results. Likewise, the higher a company's profitability, the higher its EM tends to be, corroborating the findings by Morás and Klann (2020), Schuster & Klann (2019), and Souza & Moraes (2019). However, unlike previous evidence, no significant relationship was found between sales growth and EM (Costa Filho *et al*., 2018; Soschinski *et al*., 2021).

Debt was found to have a positive and statistically significant relationship with EM, suggesting that more indebted companies tend to engage in EM more frequently. This finding corroborates the literature, in which higher levels of leverage encourage managers to manage earnings to meet debt clauses (Gu & Rosett, 2005; Duarte, Galdi & Damasceno, 2020), generating a greater volume of financial expenses (discretionary) that allow manipulation (Souza & Moraes, 2019); corroborating evidence presented by Souza and Moraes (2019) and Morás and Klann (2020).

Finally, the results from the robustness analysis through OLS regression were similar to those found using Heckman's selection model; decreased statistical significance of the relationships was found only in one instance. Such a result is possibly explained by selection bias since the lambda variable in Heckman's model proved significant. Therefore, it appears that the influence of LCS on the relationship between CG and EM remains even when other econometric configurations are used in the analysis.

5. Final Considerations

This study aimed to analyze the influence of life cycle stages (LCS) on the relationship between corporate governance (CG) and earnings management (EM) among publicly held companies in Latin America. Thus, the hypothesis proposed was that the CG's ability to mitigate EM practices is enhanced in the initial and maturity stages compared to the final life cycle stages.

Data from 271 companies in Latin America from 2011 to 2021 show the CG's effectiveness in reducing EM. Moreover, evidence was found that in the initial (introductory and growth) and maturity stages, companies tend to manage their earnings less frequently than companies in the final stages (shake-out and decline), where a higher level of EM was found. Hence, this result suggests that the adoption of EM practices differs according to a company's LCS.

A positive and significant relationship was found in the analysis of the moderating effect of LCS on the CG and EM relationship for the initial and maturity stages. The sum of the interaction coefficient with the CG variable for the initial stages did not ratify a positive relationship, indicating an increase in the governance's ability to mitigate EM in the initial stages compared to the final ones. Thus, CG mechanisms proved to be more effective in the initial stages for aligning interests, monitoring, and, consequently, reducing opportunistic practices on the part of managers.

Likewise, a positive and significant influence of the maturity stage was found on the relationship between CG and EM. The sum of the interaction coefficient with the CG variable confirms this positive relationship. Therefore, governance's ability to mitigate EM is reduced at this stage compared to the final stages. Thus, LCS appears to influence the relationship between CG and EM, indicating that the objective of this study was achieved. Furthermore, the results suggest that governance effectiveness in reducing opportunistic practices may be enhanced or reduced at different stages of a company's development. Therefore, the hypothesis proposed here fails to be rejected, at least in part.

Nonetheless, it is important to consider the magnitude of the coefficients found for the CG variable (-0.000704) for the moderating variable of the initial (0.000630) and maturity (0.000743) stages, considering that both presented values close to zero. This fact suggests that LCS contributes little to enhancing or reducing governance's ability to mitigate EM practices, even if they present a statistically significant relationship.

Additionally, larger companies were found to manage results less frequently, and the companies' return on assets and debt are positively related to EM. Finally, no significant relationship was found between sales growth and EM.

Therefore, the evidence presented in this study contributes to the literature and supports a better understanding of how conflicts of interest and information asymmetry may be reduced in the contractual relationship throughout the OLC via CG practices, helping to explain the conflicting results of previous studies on the CG and EM relationship. Thus, organizations should pay attention to their LCS when refining control and risk management mechanisms, which might contribute to the effectiveness of these mechanisms in aligning interests within the company.

Furthermore, this study provides empirical and market-wise results using aggregated CG measures, given that previous studies analyzed these mechanisms in isolation, often making only dichotomous analyses. Additionally, our analyses do not focus on a specific scenario only (Bao & Lewellyn, 2017); instead, a broader context was considered, including emerging countries; such a perspective provides more robust results.

The theoretical and practical implications arising from this study's findings are significant for both companies and their respective stakeholders, as the results highlight the importance of CG as an effective mechanism for reducing EM in Latin American companies and reinforce the relevance of transparency, accountability, and control structures practices.

For companies, the findings suggest that implementing and improving CG practices might be effective strategies to mitigate managers' opportunistic practices. Such practices are especially relevant at a company's early stages when the relationship between governance and EM is more pronounced. Companies may use these results as a guide when adopting measures intended to ensure greater alignment of interests between shareholders, directors, and managers and better monitor management activities.

Stakeholders, including shareholders, investors, creditors, and regulators, can use this study's findings to indicate the effectiveness of CG practices in Latin American companies. Understanding that governance contributes to reducing EM might influence an organization's investment, financing, and monitoring decisions. Furthermore, the fact that a company's development stage might impact the relationship between its governance practices and EM shows the need for differentiated governance approaches at different stages of an organization's life cycle.

In the broader context, these results advance the literature on CG and EM, providing valuable insights into how these mechanisms interact at different stages of company development. Hence, these results can influence the formulation of public policies and regulatory guidelines, promoting more effective governance practices and encouraging a culture of transparency and responsibility among companies.

In summary, the results of this study provide theoretical contributions to the academic milieu and are also expected to benefit companies by implementing solid CG practices in different LCS. These findings can potentially guide business strategies and investment decisions, promoting greater trust and efficiency in Latin American financial and business markets.

Despite this study's contributions, some limitations must be considered. First, the CG proxy adopted here significantly diminished the study sample, considering many companies did not present CG scores. Additionally, EM was analyzed only from the perspective of discretionary accruals; other forms of EM, such as actual activities, were not analyzed. Likewise, only a single model estimated discretionary accruals. Nonetheless, the results were sensitive to the estimated model, considering that the OLS model was inferior to the Heckman model despite the relationships maintaining the same direction and statistical significance. Therefore, any generalizations based on the results of this study must consider such limitations.

Nevertheless, these limitations do not invalidate the findings; rather, future studies should consider them as a starting point. Therefore, further research could expand the sample and analyze countries with more developed economies, in addition to using other EM models and/or proxies for the quality of accounting information.

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Income smoothing and the market value of companies during the COVID-19 pandemic

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Abstract

Objective: To investigate the effect of the COVID-19 pandemic on the market value (MV) of companies listed on [B]3 in intentional income smoothing.

Method: The study sample comprised data from non-financial companies included in the Novo Mercado from 2017 to 2021. The models proposed by Lang et al. (2012) were adopted to calculate the intentional income smoothing variables. The estimations were performed using a dynamic panel with the Generalized Method of Moments Estimation.

Results: The COVID-19 pandemic negatively affected the companies' MV. The negative impact of general intentional smoothing was reduced during the pandemic though, while the negative effect of intentional smoothing using accruals was intensified. The results suggest that the companies' reduced level of operations during the pandemic more intensively influenced the effect of general smoothing and less intensively influenced intentional smoothing on the companies' value.

Contributions: The results of this study contribute to the literature on income smoothing in emerging countries during periods of uncertainty and alert to the effects of such practices on asset prices on the Brazilian stock exchange.

Keywords: Income Smoothing; COVID-19; Market Value; Intentional smoothing.

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1. Introduction

At the beginning of 2020, the World Health Organization (WHO, 2020a) received the information of several cases of pneumonia in Wuhan, China. Shortly afterwards, the global situation worsened as a new type of coronavirus was identified (Wu *et al*., 2020), leading the WHO to declare a state of Public Health Emergency of International Concern. The COVID-19 pandemic was an extraordinary event of public health risk for other states, due to its spread worldwide, which would potentially require a coordinated international response (Brazil, 2020; Wu *et al*., 2020).

In Brazil, the first case was identified at the end of February, and the first death occurred in March 2020 when community transmission was verified. Hence, countries had to adopt measures, including the shutdown of commercial establishments— the so-called lockdown— to contain the spread of the new coronavirus. According to Gomes et al. (2021), lockdowns have severe economic, financial, and social impacts. Hence, managers from the most diverse organizations implemented different strategies to mitigate such impacts and maintain their companies' good performance.

From an economic point of view, one of the first effects that may result from a pandemic is a decline in economic activity due to lockdowns imposed by health authorities. A potential consequence of reduced commercial activities is a decrease in the companies' market value. A publicly traded company's market value (MV) depends on many factors, including how accounting information is presented. In this sense, the users of accounting information rely on the results managers disclose through financial statements, in particular profits, to assess the effects of a crisis on an organization's activities and performance to make assertive investment decisions (Nicoleta-Cornelia *et al.*, 2012).

In turn, managers, aware of the relevance of the information provided in financial statements, use their discretionary power and subjectivity in which accounting standards may be applied to earnings management, showing a manipulated result, even if it does not reflect the organization's actual situation to gain benefits (Healy & Wahlen, 1999). This practice may be associated with the opportunistic perspective of manipulating accounting information, which results from managers taking actions to maximize their companies' MV to meet their interests to the detriment of the investors' interest (Beneish, 1997; Subramanyam, 1996; Watts & Zimmerman, 1986).

According to Paulo and Mota (2019), managers use their discretionary power to manage their companies' earnings during a crisis. They present evidence that managers tend to increase accrual levels when the economy slows down, whereas, in the recovery phase, they tend to reduce accrual levels. Other times, managers use operational activities to reduce management, aiming to smooth income for investors' analyses.

Such actions are possibly explained by the notion that managers are constantly adapting to the restrictions imposed by the business environment (Chandler Jr., 1962; Galbraith, 1973), such as the unpredictability of the actions of customers, suppliers, competitors, and regulators (Govindarajan, 1984). According to Ghosh and Olsen (2008), managers resort to flexibility and use their judgment to deal with uncertainties arising in the organizational environment, adopting different strategies. Uncertainty increases the risk associated with assessing future earnings, giving managers an incentive to use discretion to improve future reports' predictability and provide a more predictable stream of earnings (Ghosh & Olsen, 2008).

Avelar *et al.* (2021) note that during the pandemic, the managers attempted to influence the risk perspective of interested parties to avoid a significant drop in their organizations' MV. Thus, managers can use their decision-making power to decrease additional uncertainty by adopting income-smoothing practices.

The literature provides some definitions for income smoothing and its purposes. Gordon (1964) states that managers smooth their companies' accounting results because investors feel more comfortable investing in more stable companies. Copeland (1968) argues that income smoothing is related to managers' accounting choices intended to modify profit variation, making them more stable over time. Baioco *et al.* (2013) consider that the purpose of income smoothing is to reduce profit variability disclosed to the market and reflect more consistent results by intentionally smoothing them (Meli, 2015). In this sense, income smoothing allows managers to reduce the variability of profits over time, seeking a balance between very high and very low profits and showing the market a stable situation, therefore signaling low risk to shareholders.

In this context, this study aims to answer the following question: **What was the effect of the COVID-19 pandemic on the MV of [B]³ companies in the practice of intentional income smoothing?** Therefore, the objective is to investigate the effect of the COVID-19 pandemic on the practice of intentional smoothing on the MV of companies listed on [B]³ to verify the effect of intentional smoothing during times when businesses face uncertainty on the market value of these companies.

Economic instability is assumed to affect the organizations' MV, and intentional income smoothing is supposed to mitigate such an effect. Therefore, this study is based on the hypothesis that Brazilian non-financial companies changed their practices regarding income smoothing during the COVID-19 pandemic. Such uncertain context during the pandemic is assumed to have led managers to take actions to maintain their assets' market value by resorting to the management instruments available, including income smoothing.

Silva *et al.* (2014), Agrawal & Chatterjee (2015), and Fiehn & Struck (2011) investigated the effects of economic-financial instability on earnings management, and Shen *et al.* (2020) analyzed the impact of COVID-19 on the organizations' performance. This study contributes to the literature by addressing income smoothing in times of uncertainty, associating it to the market value of companies during the COVID-19 pandemic in an emerging country; Brazil is among the markets most strongly affected by the crisis caused by the coronavirus (Fernandes, 2020).

Considering the relevance of the companies' MV, this study's relevance lies in the social and economic-financial impact caused by the COVID-19 pandemic. Extreme events can potentially disclose behaviors that would go unnoticed in typical situations. In this sense, this study reveals to investors and market analysts the behavior of managers and the effects of the pandemic on the companies' MV and intentional smoothing. For society, this study's importance concerns the fact that the MV of organizations impacts the price and availability of goods and services.

A literature review is presented, including the studies with the most relevant discussions on the subject.

2. Literature Review

2.1 Impact caused by the COVID-19 pandemic

Since December 2019, with the new coronavirus outbreak in China, which caused a global state of emergency, several studies have addressed the COVID-19 pandemic and its social, economic, and financial impacts. WHO declared the pandemic on March 11, significantly aggravating the risk and uncertainty inherent to the global capital markets (Zhang *et al.*, 2020). Brazil was among the 25 countries most severely affected by the virus (Phan & Narayan, 2020), ranking among the ten stock markets with the worst performance, showing a drop of 48% (Fernandes, 2020).

Coelho and Rodrigues (2021) investigated the value relevance of accounting information during the coronavirus crisis. They used the adapted OJ model, associating net equity and net profit with the companies' market value. One of their findings showed that net equity supported decisions that negatively affected the companies' market value during the crisis (Coelho & Rodrigues, 2021), though the quality of information disclosed through accounting statements improved.

The results found by Shen *et al.* (2020) show that the pandemic had a significant negative impact on the performance of Chinese organizations, reducing investments and affecting revenue.

Ramelli and Wagner (2020) analyzed how economic agents, in particular investors, assessed the risks and consequences caused by the virus, indicating that the market reacted to the progression and consequences of the pandemic. Their findings showed that corporate value was affected depending on each country's situation. As countries managed to contain the virus spreading, the markets started correcting themselves. However, investors remained concerned about issues regarding high debt and the importance of the companies' financial position, which stood out due to the available resources that supported the companies' value.

Avelar et al. (2021) showed that the pandemic affected the organizations' economic-financial sustainability, as measures were taken to contain the spread of the virus, mainly social isolation, which caused significant losses in the value of the capital market, a systematic drop across the most varied economic-financial indicators, and a considerable increase in third-party fundraising during the period.

Still, according to the study above, managers tend to present opportunistic behavior to avoid disclosing losses, considering that the market responds quickly to the disclosure of adverse results, causing share prices to drop and, consequently, the company's MV (Walker, 2013). The results reported by Silva et al. (2014) show that managers change their behavior during economic instability, adopting or intensifying earnings management.

2.2 Relationship between income smoothing and the companies' market value

The concept of earnings management is broad and controversial. Some authors, like Healy and Wahlen (1999) and according to Schipper (1989), argue that this practice is used to manipulate accounting information in order to "deceive" external users. On the other hand, Dechow and Skinner (2000) understand that accounting choices are linked to the specificities of each type of business, which gives managers different motivations and not necessarily the intention to deceive interested parties. Among the earnings management practices in the literature, income smoothing is the most frequently used (Lopo Martinez, 2013). Studies addressing earnings management practices generally associate the opportunistic behavior of managers with another aspect of organizations to measure its impact, the most commonly adopted being income smoothing.

Ronen and Yaari (2008) show that earnings management through income smoothing is related to the fact that external users, such as investors, are averse to business risks. In this sense, as this practice is intended to reduce profit variation over time, avoiding highlighting extreme discrepancies in the behavior of results (Lopo Martinez, 2001; Ronen & Yaari, 2008), managers likely adopt this strategy to make investors feel more secure about investing in an organization, as such a practice shows more consistent results (Meli, 2015).

Eckel (1981) observes that income smoothing may be divided into two types: natural and intentional smoothing. Lopo Martinez (2001, 2006) notes that intentional smoothing may be further subdivided into actual and artificial. A point highlighted in the literature is that some smoothing occurs naturally, considering that organizations use the accrual basis. The problem is when managers use their discretionary power to manipulate results though, aiming to avoid revealing their companies' actual results, which is a harmful practice (Eckel, 1981).

According to Almeida *et al.* (2011), by considering incentives such as reporting profits close to analysts' forecasts on earnings per share, sustaining recent performance or income smoothing, or publishing positive earnings, companies seek to have their MV above the book value, to create expectations on its shareholders and stakeholders toward future cash flows. The findings of the previous study suggest that companies with a market-to-book ratio above 1 (one) have incentives to manage results and maintain their MV.

Avelar *et al.* (2021) consider that managers tended to influence the risk perspective of investors and analysts to avoid a more significant drop in the organizations' MV during the pandemic. Studies indicate that managers often exhibit opportunistic behavior to prevent disclosing losses, given a perception that the market responds quickly to the disclosure of adverse results, causing share prices to drop (Paulo & Mota, 2019; Walker, 2013). From this perspective, Silva et al. (2014) found that Brazilian companies listed on the stock exchange tended to adopt earnings management practices during economic crises, with managers changing their behavior.

The study by Avelar *et al.* (2021) showed that the COVID-19 pandemic affected the economic-financial sustainability of organizations. The authors found that the measures to contain the spread of the virus, mainly social isolation, and changes in consumption habits, caused significant losses in the capital market value and a systematic drop in economic-financial indicators, in addition to an increase in raising third-party resources during the period. The pandemic generated uncertainties that directly impacted companies' earnings, increasing risks and making investors more cautious, especially the most conservative and risk-averse.

Michelson *et al.* (1995) showed that smoothing organizations present a significantly lower average return and a higher MV than non-smoothing organizations. Another piece of evidence is that the level of smoothing is more noticeable in larger companies, which present lower returns and lower risks, indicating that its practice reduces asset risk and improves investors' perception.

As for emerging countries, Agrawal and Chatterjee (2015) addressed Indian companies and found that incentives to manage earnings are linked to an organization's level of financial difficulty. Investors and creditors must be more cautious when evaluating companies during an economic recession because managers are predisposed not to disclose their organizations' actual financial situation, impacting the reliability of accounting information.

Silva *et al.* (2014) studied the effect of global crises, such as the bursting of the American real estate bubble, and found that managers change their behavior during economic crises. Based on B^3 companies, the study above identified a significant relationship between economic crises and earnings management among the Brazilian companies in their sample.

Abogun *et al.* (2021) addressed Nigerian companies and found that most were smoothing companies, a practice that significantly reduced their MV. They also found evidence that market risk affects the companies' MV. When the market is regulated, as is the case in Nigeria, the value of companies is negatively affected by income smoothing. In this case, the above authors highlight that smoothing is perceived as an attempt to mislead investors when assessing the value of companies.

The literature presents different results depending on the type of crises faced. Another factor influencing the studies' results is the degree of market regulation and the level of investor confidence in each context. This study assumes that the COVID-19 pandemic unusually affected the companies' MV though, considering that it is deemed the most significant health, social, and economic crisis in history, as its impact was intensified by the characteristics of the contemporary world, with the globalization of social interactions, communication, and market integration (Souto & Silva, 2021).

3. Method

3.1 Study Design

This study population comprised 414 companies listed on B^3. Its scope is restricted to companies in the *Novo Mercado*, as the main characteristics of this segment include greater transparency in the disclosure of financial information and lower volatility in share prices compared to other organizations listed on the Brazilian stock exchange (Carvalho *et al.*, 2017); desirable aspects to meet this study's objective. Note that, according to B^3, the creation of particular segments, *Novo Mercado* being one of them, was intended to promote the growth of the Brazilian capital market, encourage a trading environment conducive to the interests of investors, and the appreciation of organizations, improving their valuation. Hence, these companies show highly differentiated corporate governance standards, expressing the transparency investors expect (B3, 2018).

According to Srour (2005), in periods of crisis, the companies listed in this differentiated governance segment present higher returns and higher profits distributed as dividends. Additionally, *Novo Mercado* is a listing segment intended for trading shares issued by companies that voluntarily commit to advanced corporate governance practices and disclose information beyond what is required by legislation (Arruda et al., 2008; Fonseca et al., 2016). Such an aspect aims to encourage performance and the creation of value (Pace et al., 2003), influenced by the security and quality of the information that companies present, to offer more reliable and transparent information disclosure (Dalmácio et al., 2013).

Furthermore, financial institutions were not included in the sample, given the particularity of this sector, with rules regulated by the Central Bank, which restricts the manipulation of accounting reports and income smoothing. Furthermore, the companies missing data concerning the study variables in any period were excluded to ensure data consistency. Hence, 99 companies were included in the final sample and analysis.

Data were collected from the financial statements of companies listed on B3 from 2017 to 2021, available in the Economática® database. Note that a long period is needed to measure intentional smoothing (Sousa et al., 2020), 11 quarters prior to the period for which the measure is calculated.

This study had to adjust the period due to the COVID-19 pandemic though, an interactive variable between income smoothing and the companies' MV; hence, only six quarters could be analyzed while the pandemic was in effect. Hence, data concerning the third quarter of 2021 and the five previous quarters were used, comprising data from the second quarter of 2018 to the third quarter of 2021. As a result, data were obtained for 14 quarters, seven of which included the COVID-19 pandemic and seven before the pandemic (WHO/WHO, 2020b). It is worth noting that the last semester was not included due to the intention of measuring income smoothing in equal periods; hence, seven periods were analyzed within and seven before the pandemic. Ramelli and Wagner (2020) assert that, as of January 20, 2020, managers and analysts were already concerned about the potential impacts the disease outbreak would cause. The model by Lang et al. (2012), based on the metrics proposed by Leuz et al. (2003), was adopted to meet this study's objective of verifying intentional income smoothing. These measures allow adjusting volatility arising from decision-making through operations.

According to Lang *et al.* (2012), these metrics allow measuring income smoothing. Smoothing 1 (*SMTH1*) enables capturing the general income smoothing while Smoothing 2 (*SMTH2*) measures income smoothing only by *accruals*. SMTH1 is defined by the ratio between the standard deviation of net profit divided by the standard deviation of operating cash flow (Sousa *et al.*, 2020), both scaled by average total assets (Lang *et al.*, 2012). The logic explained by Leuz *et al.* (2003) is that this measure allows for controlling performance volatility. Based on these studies, we have Equation 1:

$$SMTH1 = \frac{\sigma(LL/TA_{average})}{\sigma(OCF/TA_{average})} \quad (1)$$

Where:

SMTH1 = general income smoothing;
$\sigma(LL/TA_{average})$ = standard deviation of net profit divided by average total assets;
$\sigma(OCF/TA_{average})$ = standard deviation of operating cash flow divided by average total assets.
Six quarters for each period were considered to calculate standard deviations.

Likewise, SMTH2 was calculated to verify income smoothing through accruals using Equation 2:

$$SMTH2 = \rho[(OCF/TA; Accruals/TA)]\text{--}1 \quad (2)$$

Where:

SMTH2 = income smoothing through accruals;
OCF = operating cash flow;
TA = total assets;
Accruals = total accruals.
Six quarters for each period were considered to calculate the correlations.

SMTH2 results from the correlation between operating cash flow and total accruals, scaled by total assets. Six quarters were considered for the calculation of correlations. As Lang et al. (2012) and Leuz *et al*. (2003) present a negative coefficient of this measure, it is an indication that the company has its results more frequently smoothed by accruals, as the metrics indicate that due to their discretionary power, managers intensify the use of accruals, and manage earnings when profits decrease. Therefore, this measurement must be multiplied by minus one so that its analysis becomes more intuitive, indicating that the higher its value, the more frequent the adoption of smoothing.

The econometric model proposed by Lang et al. (2012) was adopted to obtain intentional smoothing. Submitting SMTH1 to a regression allows identifying general intentional income smoothing, while submitting SMTH2 to the same regression equation shows intentional smoothing by accruals. Therefore, Equation 3 was adopted:

$$SMTH_{it} = \alpha_{it} + \beta_1 SIZE_{it} + \beta_2 DEBT_{it} + \beta_3 MTB_{it} + \beta_4 SDREVENUE_{it} + \beta_5 PERC\_PREJ_{it} + \beta_6 CYCLE_{it} + \beta_7 CRESCREC_{it} + \beta_8 IMOB_{it} + \beta_9 FLOW_{it} + \beta_{10} TEMP_{it} + \beta_{11} SECTOR_{it} + \varepsilon_{it} \quad (3)$$

Where:

$SIZE_{it}$ = logarithm of total assets at the end of the year of company *i* in period *t*;
$DEBT_{it}$ = total debt (loans and short- and long-term financing) at the end of the year divided by total assets at the end of the year of company *i* in period *t*;
MTB_{it} = market-to-book at the end of the year of company *i* in period *t*;
$SDREVENUE_{it}$ = standard deviation of the year's net revenue, considering the current quarter and the five previous quarters of company *i* in period *t*;
$PERC\_PREJ_{it}$ = proportion of the analysis periods in which there is a negative net result for company *i* in period *t*;
$CYCLE_{it}$ = logarithm of the operational cycle at the end of the year of company *i* in period *t*;
$CRESCREC_{it}$ = growth in revenue for the year of company *i* in period *t*;
$IMOB_{it}$ = fixed assets at the end of the year divided by the total assets at the end of the year of company *i* in period *t*;
$FLOW_{it}$ = average operating cash flow divided by total assets at the end of the year of company *i* in period *t*;
$TEMP_{it}$ = quarterly periods, from June 2018 to September 2021;
$SECTOR_{it}$ = represents the Bovespa economic sector of company *i* in period *t*.

Finally, the residuals from estimating SMTH1and SMTH2 models based on Equation 3 consisted of the values of the variables of intentional earnings smoothing (SMTH1) and intentional smoothing by accruals (SMTH2), used in the final econometric model.

Following the empirical model adopted by Abogun et al. (2021), the functional adapted version of the econometric model is specified as shown in Equation 4:

$$MV_{it} = \beta_0 + \beta_1 MV_{it-2} + \beta_2 SMTH_{it} + \beta_3 COVID_{it} + \beta_4 SMTH{\cdot}COVID_{it} + \beta_5 ROA_{it} + \beta_6 SIZE_{it} + \beta_7 ALAVEF_{it} + \beta_8 INC\_SMOOTH + \varepsilon_{it} \quad (4)$$

The measurement of the variables used in the empirical model was performed using the panel data method, with the dynamic model using the Generalized Method of Moments (GMM) by Blundell and Bond (1998). In order to obtain consistent and unbiased estimators in a dynamic model, regressors are differenced and used as instruments in a GMM estimation approach. Such an estimation approach is valid only when variables are strictly exogenous though, and thus, idiosyncratic errors are not autocorrelated and uncorrelated with the lagged dependent variable. Otherwise, the estimation should not be carried out using the Blundell and Bond (1988) approach.

Blundell and Bond's (1988) approach obtains efficient estimators of the parameters by imposing additional moment conditions, which can be tested and permit joint estimation of the equations in levels using lag-differenced variables as instruments. This estimation approach is commonly called system GMM. These additional moment conditions were tested using the Sargan Test, which has the null hypothesis that moment conditions are valid. Further, following the literature (Blundell & Bond, 1998; Lucinda & Meyer, 2013), testing for second-order serial correlation AR(2) of the model error is necessary. The null hypothesis of no serial correlation AR(2) aligns with the maintained assumptions validating the use of lagged variables as instruments. If the null hypothesis is rejected, additional lags of the dependent variable need to be included.

MV was based on the price of shares on *B3*. Chen et al. (2017) and Yu et al. (2018) note that a company's share price directly consists of its MV. Hence, it was multiplied by the number of shares available on Economática on the last day of the month at the end of each quarter. Note that some financial statements may not yet be available when we consider the end date of each quarter as the last day of the month of the quarter.

Intentional income smoothing (*SMTH1*) and intentional income smoothing by accruals (SMTH2) were based on the metrics of Leuz et al. (2003), according to the model adopted by Lang et al. (2012).

COVID-19 is a dummy variable, where 1 (one) indicates the presence of the pandemic and 0 (zero) otherwise. As suggested by Baron and Kenny (1986), the interaction between intentional income smoothing and COVID-19 (SMTH1*COVID) and intentional smoothing by accruals and COVID-19 (SMTH2*COVID) were included in the model to moderate inconsistency between variables. Additionally, the *INC_SMOOTH* variable, obtained by the coefficient of variation proposed by Eckel (1981) and subsequently adapted by Bao and Bao (2004), was also included in the model. It takes on 1 (one) when the company is considered to have adopted smoothing strategies and 0 (zero) otherwise in each period analyzed.

Eckel (1981) considers that the coefficient is based on the principle that if any variation in profits is greater than the variation in revenue, the company does not adopt smoothing strategies, while the opposite characterizes smoothing companies. The coefficient was adapted by Bao and Bao (2004), who defined the interval to classify companies into smoothing and non-smoothing; smoothing companies are classified with a Smoothing Index (SI) below 0.9, while an index above 1.1 concerns non-smoothing firms. Those that fell within the "gray area" range were excluded from the sample.

Thus, we have Equation 5:

$$SI = (smoothing)\ 0.9 < \left| \frac{CV\ \Delta\%\ Profits}{CV\ \Delta\%\ Sales} \right| < 1.1\ (non\text{-}smoothing) \quad (5)$$

Where:

SI = Smoothing Index;
CV Δ% Profits = coefficient of variation of profit variations obtained by the standard deviation of profit variation divided by the average profit variation;
CV Δ% Sales = coefficient of variation of sales variation obtained by the standard deviation divided by the sales variation's average.

The modeling adopted by Abogun *et al.* (2021) considers the lagged dependent variable (VMit-1) as one of the explanatory variables. The existence of this lagged dependent variable, γ_(t-1), becomes a valid instrument to control the effects corresponding to previous periods. According to Gujarati and Porter (2011), if the model considers the inclusion of past values of the dependent variable among its explanatory variables, it is classified as an autoregressive model, i.e., a dynamic model that describes how the dependent variable changes over time, based on its previous values. The instruments' validity and consistency were tested in addition to second-order autocorrelation. In cases where the null hypothesis was rejected, another lag was added to the dependent variable. Therefore, a panel data model requires two global variables (Wooldridge, 2016): a variable that identifies each company in the sample (id Space) and a variable that indicates the time (id Time), covering the temporal space. Furthermore, Gujarati and Porter (2011) believe that the impact of the independent variables (X) on the dependent variable (Y) does not always occur immediately since the response of Y at time "t" is not solely influenced by what occurred in X at time "t-0", but also by past observations of X, such as "t-1", "t-2" and so on, which leads to an understanding that there is a relationship considering the lagged periods.

In addition to the variables of interest presented earlier, the following control variables were included: Return on Assets (ROA), Asset Size (SIZE) obtained through the natural logarithm of total assets, and Leverage (ALAVEF). The definition of the Return on Total Assets (ROA) was included in the model because it considers that there is a positive relationship between a company's market value and its profitability. Therefore, ROA was obtained by dividing net profit by total assets, as Fiehn and Struck (2011) and Huang (2011) did.

Although there is no consensus in the literature on the relationship between the quality of accounting information and an organization's size (Cvetanovska & Kerekes, 2015; Fiehn & Struck, 2011; Rountree et al., 2008), Andrade et al. (2009) argue that larger and consolidated companies have more significant potential for appreciation in the stock market. Therefore, the size of companies, measured by the logarithm of total assets, was inserted into the model.

Finally, another control variable (Leverage [ALAVEF]) was included based on studies reporting a relationship between a company's value and leverage (Aggarwal & Zhao, 2007; Bao & Bao, 2004; Fiehn & Struck, 2011). It was developed using the ratio between long-term loans and financing, and total assets.

As a result, a positive and significant relationship is expected between ROA, SIZE, and MV (Andrade et al., 2009). A negative relationship is expected between ALAVEF and MV during the COVID-19 pandemic though (Fiehn & Struck, 2011), and as for income smoothing, a negative relationship is expected when it is intentional (Huang et al., 2009).

All the variables are presented in Table 1, as follow:

Table 1

Description of variables

Variable	Description	Operationalization	References
		Dependent Variable	
MV	MV is based on the share price on B3	Share price multiplied by the number of shares, both available on the Economática database on the last day of the final month of each quarter.	Abogun et al. (2021), Chen et al. (2017) e Yu et al. (2018)
		Independent variables of interest	
SMTH1	General intentional smoothing	Residual from the following regression: $SMTH1_{it} = \alpha_{it} + \beta_1 SIZE_{it} + \beta_2 DEBT_{it} + \beta_3 MTB_{it} + \beta_4 SDREVENUE_{it} + \beta_5 PERC\_PREJ_{it} + \beta_6 CYCLE_{it} + \beta_7 CRESCREC_{it} + \beta_8 IMOB_{it} + \beta_9 FLOW_{it} + \beta_{10} TEMP_{it} + \beta_{11} SECTOR_{it} + \varepsilon_{it}$	Lang et al. (2012)
SMTH2	Intentional smoothing by *accruals*	Residual from the following regression: $SMTH2_{it} = \alpha_{it} + \beta_1 SIZE_{it} + \beta_2 DEBT_{it} + \beta_3 MTB_{it} + \beta_4 SDREVENUE_{it} + \beta_5 PERC\_PREJ_{it} + \beta_6 CYCLE_{it} + \beta_7 CRESCREC_{it} + \beta_8 IMOB_{it} + \beta_9 FLOW_{it} + \beta_{10} TEMP_{it} + \beta_{11} SECTOR_{it} + \varepsilon_{it}$	Lang *et al.* (2012)
		Interactive Variables	
SMTH1·COVID	Obtained by the interaction between SMTH1 and COVID-19	SMTH1·COVID19	Developed by the authors
SMTH2·COVID	Obtained by the interaction between SMTH2 and COVID-19	SMTH2·COVID19	Developed by the authors
		Control Variables	
Return on assets (ROA)	Obtained by the ratio between the company's net profit and its total assets	ROA = LL/TA	Fiehn and Struck (2011), Cvetanovska and Kerekes (2015)
Size (SIZE)	The company's total assets transformed into its logarithmic base	Natural logarithm of Total Assets	Moses (1987)
Leverage (ALAVEF)	Obtained by the ratio between the company's long-term loans and financing by Total Assets	ALAVEF = LT Loans + financing / Total Assets	Aggarwal and Zhao (2007), Bao and Bao (2004), and Fiehn and Struck (2011)
COVID	COVID-19	Dummy takes 1 when the period was during the COVID-19 pandemic and 0 otherwise.	Developed by the authors
INC_SMOOTH	Obtained by the coefficient of variation proposed by Eckel (1981)	Dummy takes 1 when the company is classified as smoothing and 0 otherwise.	Bao and Bao (2004) and Eckel (1981)

Source: Study data.

The models were estimated using a dynamic panel with the System GMM estimator, which considers asymptotic variance and autocorrelated errors, which makes it more effective and enables a more assertive investigation of variations that may not be found in a cross-sectional or longitudinal section. Hence, it contributes to mitigating bias and having more degrees of freedom, controlling for unobserved heterogeneity, endogeneity, omitted variable bias, and heteroscedasticity (Wooldridge, 2016).

4. Results

4.1 Descriptive Statistics

Descriptive statistics are presented to characterize data (Table 2). Because MV, the dependent variable, is represented in monetary units, it presents high asymmetry and kurtosis, which requires logarithmic transformation (Andrade et al., 2009) to stabilize data variance and resemble a normal distribution with constant mean and variance (Wooldridge, 2016).

Table 2

Descriptive Statistics*

Var./Est.	Mín.	1° Quartil	Mediana	Média	3° Quartil	Máx.	DP	Assimetria	Curtose
MV	4002.1	1117080.8	4121847.3	14535951.4	14593555.9	570520998.6	38079304.3	8.0	83.4
NL_MV	8.3	13.9	15.2	15.1	16.5	20.2	1.9	-0.4	0.2
INC_SMTH	0	0	0	0.35	1	1	0.5	0.6	-1.6
SIZE	10.4	14.5	15.4	15.6	16.7	20.0	1.5	-0.1	0.5
ROA	-0.9	-0.004	0.01	0.01	0.04	0.4	0.1	-3.9	41.1
ALAVEF	0.01	0.2	0.4	0.4	0.5	2.3	0.2	1.0	7.5
COVID	0	0	0.5	0.5	1	1	0.5	0	-2.0
SMTH1	-4.6	-0.2	0	0.00	0.1	9.5	0.8	3.1	33.5
SMTH2	-1.7	-0.04	0.0	0.00	0.1	0.8	0.3	-1.7	7.7
SMTH1_ COVID	-4.6	0	0	0.00	0	9.5	0.7	3.5	48.2

Note. *Number of observations 1,386.

Source: study data.

Table 2 shows that the variables MV, ROA, ALAVEF, SMTH1, SMTH2, SMTH1*COVID, and SMTH2*COVID presented asymmetry differences from zero and kurtosis below or above three (Morettin & Bussab, 2017), indicating strong volatility, which may harm the model's consistency. A potential explanation for this significant volatility is associated with the size of the companies in the sample, which presented a minimum of 10.4 and a maximum of 20.

As regression analysis is sensitive to the presence of extreme values (Hair Jr. et al., 2009), tests were performed to detect outliers for the regression analysis using quartiles, maximum values, minimum values, box-plot graphs, and histograms, techniques based on exploratory data analysis (Wooldridge, 2016). Problems with dispersion, asymmetry, and kurtosis in the data can generate high variability in the model, which is undesirable. Hence, data were "winsorized" based on 1% of the centiles of the variables with corrected extreme values to avoid such problems (Hastings Jr., 1947).

4.2 Analysis of the regression models and discussion of results

Table 3 presents the results estimated by the System GMM method. Two lags were performed in the dependent variable to correct the second-order autocorrelation problem, which was detected through the Blundell-Bond test. Initially, SMTH1 and SMTH1*COVID were analyzed, in addition to their relationship with the dependent variable (MV). Next, the model was applied using SMTH2 and SMTH2*COVID to verify its relationship with the dependent variable. Although they are complementary, SMTH1 and SMTH2 behave differently within the same time frame. Zang (2012) explains that this occurs because, in a given period, income smoothing may be the manager's accounting choice, while in another period, the decision may be to smooth income through accruals; hence, the choice depends on the year's results. For this reason, these variables were analyzed separately (Sousa et al., 2020). See Table 3.

Table 3

Analysis of the models' coefficients using general intentional smoothing (SMTH1) and intentional smoothing by accruals (SMTH2) on Market Value (MV)

Estimate Coefficient	SMTH1	SMTH2
VM_{t-1}	0.555***	0.566***
	(-40.3)	(-67.45)
VM_{t-2}	0.304***	0.301***
	(-50.24)	(-48.55)
INC_SMOOTH	-0.050***	-0.060***
	(-7.26)	(-5.41)
COVID	-0.130***	-0.128***
	(-44.63)	(-30.71)
SMTH	-0.091***	0.171***
	(-6.53)	(-3.45)
SMTH*COVID	0.067***	-0.254***
	(-5.01)	(-4.01)
SIZE	0.185***	0.177***
	(-12.84)	(-11.55)
ROA	1.703***	1.721***
	(-13.01)	(-19.67)
ALAVEF	0.045***	0.315***
	(-6.08)	(-5.24)
Constant	-0.719***	-0.713***
	(-3.71)	(-4.00)
Observations	1,188	1,188
Number of groups	99	99
Number of Instruments	562	562
Wald-χ^2	24,972.63	42,868.39
Sargan test	95.96	96.47
Order 1 Endogeneity Test	-6.81***	-6.89***
Order 2 Endogeneity Test	-0.19	-0.19

Note. The results between parentheses refer to "z" statistics. The significance of the variables' coefficients is represented by asterisks, as follows: *Significance at 10%, ** Significance at 5%, *** Significance at 1%.

Source: Study data.

The analysis of the model's global statistics shows that the Wald-χ^2 statistics was statistically significant at 1%, indicating that all GMM models were globally significant, i.e., at least one of the instrumented coefficients was different from zero. There were 99 groups of companies and 1,188 observations in all the models.

The values of the dependent variable lagged in two periods were positively significant for the current market value in the models with SMTH1 and SMTH2. This result indicates that previous market values are positively and significantly associated with the MV values of the companies in the sample.

The results of the GMM showed that general intentional smoothing (SMTH1) was negatively associated with the companies' market value, with a coefficient of -0.091. A similar result was found for the COVID dummy variable, with a coefficient of -0.130. The result concerning the interaction of the general intentional smoothing variable with the variable representing the pandemic (SMTH1*COVID), however, was a coefficient of 0.067 concerning the companies' market value. Therefore, the effect of general intentional smoothing during the COVID-19 pandemic on market value has the opposite effect of the period before the pandemic (-0.091). This result shows that the negative effect of general intentional smoothing on market value was reduced during the pandemic. Thus, SMTH1 negatively impacted the companies' market value during and before the pandemic.

General intentional income smoothing (SMTH1) was negatively associated with the companies' value in the period before the COVID-19 pandemic. A potential explanation for this result is that income smoothing, in general, is perceived as harmful to the entities' performance, as it comprises smoothing through accruals and smoothing through actual operations. Consequently, the companies' market value is negatively affected by this discretionary behavior of managers, as it may increase the risks for investors (Susanto & Pradipta, 2019; Yu *et al.*, 2018). Even though the negative effect of general smoothing remained during the pandemic, it was lower than in the previous period. The level of income smoothing through actual activities possibly fell due to the companies' less intense level of operations caused by the pandemic restrictions. Nonetheless, such a result must be interpreted cautiously, considering it relates to extraordinary events in the period addressed here. This finding is similar to that of Fiehn and Struck (2011), who closely examined results during financial crises and observed that the volatility coefficients of cash flow and profits showed an interesting behavior. While the cash flow volatility coefficient shows a significant negative association (-0.0371), indicating an inverse relationship between this indicator's volatility and financial performance, the previously negative earnings volatility coefficient currently reveals a positive association (0.0391). The authors above recognize that these coefficient changes may be motivated by exceptional circumstances that occurred during economic instability.

A coefficient positively associated with the companies' value (0.171) was found before the pandemic for intentional smoothing by accruals (SMTH2). In contrast, a negative coefficient (-0.0128) was found for the variable representing the pandemic (COVID). However, the result concerning the interaction between the intentional smoothing variable by accruals with the variable representing the pandemic (SMTH2*COVID) showed a negative coefficient (-0.254). A coefficient of -0.083 was obtained by adding the coefficients of the SMTH2 variable (0.171) with the coefficient of the interactive variable (-0.254), indicating that the effect of intentional smoothing by accruals during the pandemic reduced the market value and surpassed the positive influence that accruals smoothing produced in the period before the pandemic.

Therefore, intentional smoothing by accruals (SMTH2) showed a positive relationship with companies' value in the non-pandemic period, suggesting that a higher level of income smoothing by accruals is not perceived as harmful by investors, producing a positive effect on the companies' market value, similar to that obtained by Fiehn and Struck (2011). Nonetheless, considering the companies' decreased operations during the pandemic, the adoption of income smoothing by accruals seems to assume greater prominence among smoothing practices, drawing the attention of investors and producing a negative effect on the companies' market value. This finding is consistent with the results presented by Rountree et al. (2008), who, despite not finding a relationship between income smoothing and managers' competence, show that part of the market acknowledged the importance of consistent and predictable cash flows. This finding suggests that investors value stable cash flows, contributing to a company's value.

As for the effect of the dummy variable INC_SMOOTH, which shows whether a company adopted smoothing practices within each period, both models showed a negative effect on the market value. This result confirms the relevance of the classification proposed by Bao and Bao (2004) and Eckel (1981) for the market value of Brazilian companies.

The COVID-19 (COVID) variable negatively affected the companies' value in both models (SMTH1 and SMTH2). These results are consistent with those reported by Shen *et al.* (2020), in which COVID-19 negatively impacted company performance, i.e., a time of economic uncertainty imposing high risks, showing how MV is affected by income smoothing (Yang & Zhu, 2014).

The control variables, SIZE, ROA, and ALAVEF, positively affected the companies' value in both models. This study's results concerning leverage (ALAVEF) are contrary to previous studies (Bao & Bao, 2004; Fiehn & Struck, 2011; Sousa et al., 2020) showing a significant negative relationship with MV. In this study, the ALAVEF variable presented positive coefficients, indicating that the greater the leverage, the greater the company's MV. This finding corroborates the results by Stulz (1990), who reported a positive relationship between debt and company valuation.

5. Final Considerations

This study aimed to investigate the effect of the COVID-19 pandemic on the MV of companies listed on [B][3] in the adoption of intentional income smoothing. The results showed the effect of intentional smoothing in times of uncertainty in the business context of Brazilian companies. The models proposed by Lang et al. (2012) were used to estimate intentional income smoothing and the companies' market value based on data collected from the Economatica database.

Considering the estimates based on a dynamic panel, intentional income smoothing was found to have a moderating effect between the companies' market value and the pandemic.

The results of this study reveal that the negative impact of general intentional income smoothing on market value was reduced during the pandemic. On the other hand, intentional smoothing through accruals, which in the period before the pandemic positively affected the companies' value, had a negative and greater effect on market value during the pandemic than smoothing in general.

Additionally, the results show that the negative effect of intentional income smoothing in general (including the transactions based on adjustments by the accrual accounting system (accruals) and those resulting from actual operations, which affect the companies' cash flows) on market value was reduced during the pandemic. On the other hand, intentional smoothing through accruals, which in the period before the pandemic was positively associated with the companies' value, presented a more intense and negative effect on market value during the pandemic than smoothing in general.

These results align with those of Ghosh and Olsen (2008), in which managers exercise their decision-making power to reduce uncertainty arising from turbulent periods. Hence, managers more frequently adopt smoothing practices through accruals to prevent disclosing information that shows uncertainty when facing evident risk. Paulo and Mota (2019) corroborate this study's results, as they consider that managers use their discretionary power to manage their companies' results in times of crisis, making adjustments through accruals, while management in recovery is intended to reduce such adjustments.

Overall, these results show that the General Intentional Smoothing in (the effects of actual transactions in companies whose level of operations was significantly reduced during the pandemic) also led to equally reduced opportunities to carry out these transactions aiming for income smoothing. On the other hand, in order to compensate for the opportunities for decreased actual transactions due to the companies' lower operational levels during the pandemic, managers may have increased the practice of smoothing through the more intense use of accruals, which did not directly affect cash flows, and depend less on organizations' level of operations. Hence, smoothing practices did not affect the companies' market value because investors did not identify effects on cash flows.

Furthermore, the results show that income smoothing is a practice that may elicit investor distrust. Given the market efficiency hypothesis, investors identified the risk of managers attempting to provide misleading information and disregarded some information for self-protection. Therefore, investors prefer non-smoothing organizations, information that is in line with Fiehn and Struck (2011), whose results do not indicate that investors value earnings smoothing, as opposed to the results found by Rountree et al. (2008).

Because the results originated from aggregated data and the companies express characteristics that are inherent to the sectors to which they belong, future studies are suggested to disaggregate the companies, considering the particularities of each sector, involving other segments, considering that the health crisis affected all sectors, even if differently. One of this study's limitations is that only the companies in the *Novo Mercado* segment were included in the sample.

Another limitation is that we could not address the entire period of the COVID-19 pandemic because the WHO did not disclose an official declaration of the end of the pandemic before this study's conclusion. Thus, given that investors' perspectives change according to extraordinary economic events, future studies might cover the period before the pandemic, during the pandemic, and even post-pandemic to assess its impact over time between income smoothing and market value. Future studies can obtain the market variable (MV) calculation considering the base date of data collection as the date on which the financial statements were released.

Another point that deserves to be highlighted is that this study was based on the capital market in Brazil, which is an emerging country. Considering the global reach of COVID-19 spreading, new studies might investigate the impact of the pandemic on the market value and income smoothing of capital markets in countries similar to Brazil and make comparisons.

The results of this study contribute to the literature by associating the business environment of an emerging country with the most significant current sanitary and economic crisis. By presenting results showing that intentional income smoothing often negatively affects companies' market value, this study might serve as a warning to managers. The results show that income smoothing behaves differently depending on economic turbulence, and investors may be suspicious of such a practice. An alternative for managers to create value is to be cautious when adopting income smoothing using practices that alter cash flow. Such a practice does not always improve a company's value, and using cash flow is seen as a risk management strategy.

Agrawal and Chatterjee (2015) report a similar understanding that the market perceives earnings management during a crisis to be opportunistic and does not value it. Hence, this study draws investors' attention, suggesting they perform more accurate analyses to identify the companies presenting reliable accounting reports, with or without income smoothing, protecting themselves, and investing in companies considered safe.

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Relationship between the accounting asset informativeness and Brazilian companies' systematic risk

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Abstract

Objective: This study analyzed a potential relationship between accounting asset informativeness and Brazilian companies' systematic risk. The research hypothesis assumes that factors restricting uncertainty, including better-quality information, decrease investors' risk perception.

Method: Regressions were estimated with panel data, using data concerning 2010 to 2021 from 186 companies. In addition to overall asset informativeness, the analysis included informativeness resulting from the companies' choices (discretionary portion) and informativeness inferred from related companies in the same sector (non-discretionary portion).

Results: Asset informativeness proved relevant and negatively associated with the Brazilian companies' systematic risk, with its non-discretionary portion having a more intense effect on systematic risk than the discretionary portion.

Contributions: This study's results are relevant for users of accounting information, those who prepare accounting reports, and regulators as it contributes to the discussion on the quality of accounting information, highlighting its relationship with the systematic risk of companies through a measure focused on assets, and suggesting metrics that can assist in the estimation of the companies' value, besides providing evidence of the economic consequences of accounting choices.

Keywords: Asset informativeness; Economic capital; Quality of accounting information; Systematic risk; Capital cost.

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1. Introduction

Relevant accounting information concerns the ability to support decision-making. Therefore, financial reporting aims to provide users with helpful information about economic phenomena. Thus, quality accounting information is supposed to contribute to estimating a company's intrinsic value and, as a natural consequence, assist in companies' efficient resource allocation (International Accounting Standards Board [IASB], 2018; Chen *et al.*, 2022). Hence, the quality of accounting information can influence the cost of capital by decreasing investors' uncertainty regarding companies' cash flows (Hribrar & Jenkis, 2004; Aboody *et al.*, 2005; Lambert *et al.*, 2007; Francis *et al.*, 2008; Dechow *et al.*, 2010).

The seminal works by Ball and Brown (1968) and Beaver (1968) initiated studies that observed investors' reactions to accounting information through variations in share prices due to aggregate decisions to buy and sell assets. This line of research remains in current days; however, when observing the development of the literature on the effect of the quality of accounting information on the cost of capital, it appears there are opportunities to continue developing in the field, especially considering the effects of information accuracy and the marginal contribution of each proxy quality in this context (Dechow *et al.*, 2010).

When we look at the limitations of research on the quality of accounting information and cost of capital, specifically observing systematic risk, the literature seems even less extensive, despite evidence indicating a negative relationship between the quality of accounting information and systematic risk (Francis *et al.*, 2005; Ma, 2017; Xing & Yan, 2019).

Lambert *et al.* (2007) explain that the cash flows of individual companies are correlated with those of the market. In this context, the quality of accounting information influences investors' assessments of the covariance of the companies' cash flows with the market. Therefore, as defined by the Capital Asset Pricing Model (CAPM), the quality of accounting information influences a company's systematic risk.

The association of information quality with systematic risk is motivated by the fact that diversifying the portfolio does not eliminate systematic risk; hence, it is decisive for investments' minimum return rate. In this case, the expected association between the quality of information and a company's systematic risk is inversely proportional: i.e., more significant risks are associated with lower-quality information.

Accounting information quality depends on a company's financial performance and the accounting system measuring it. The most commonly used measures are related to accounting results, focusing on properties other than profits, which cannot replace each other, such as persistence of results, income smoothing, timely recognition of losses, benchmarking models, investor response coefficient to results, and external indicators of profit distortions; hence, we cannot state which is the best proxy for the quality of information.

However, quality accounting information contained in a profit report must reflect current performance accurately, indicate future performance, and provide a useful summary, enabling one to assess the company's value (Dechow *et al.*, 2010).

Another line of research concerns value relevance models, which seek to measure the ability of financial statements to explain a company's value, analyzing how accounting profits impact returns, with the empirical model developed by Ohlson (1995) being widely used in this type of research (Holthausen & Watts, 2001; Barth *et al.*, 2001).

Research has shown that accounting information, mainly profits, has lost informative relevance though. Barth *et al.* (2023) oppose this notion, arguing that what is actually occurring is a transition from an industrial economy to a new economy based on services and information technology. Thus, it is not that accounting information is losing relevance but that its value may be more related to intangible assets, growth opportunities, and alternative measures of organizational performance.

Nonetheless, it is beneficial to expand and deepen the possibilities in this field of research. In this sense, the asset informativeness measure (AI) proposed by Chen *et al.* (2022) can be applied in the Brazilian market. Asset informativeness measures the ability of accounting to reveal a company's economic capital value. Note that economic capital concerns the capital stock and its productivity, which determine future cash flows and, therefore, the intrinsic value of companies. Economic capital is not directly observable though. Thus, asset informativeness can be calculated by regression of the economic profit as a function of the lagged accounting asset. In this sense, the coefficient of determination of this regression for each company represents how much the accounting capital stock informs about the economic capital.

Nevertheless, even though accounting assets can measure the value of a company's economic capital, this measurement incorporates noise that is due both to the accounting measurement system and to the company's specific accounting choices (Kanodia *et al.*, 2005; Dutta & Nezlobin, 2017).

Thus, unlike the best-known profit measures, asset informativeness focuses more on the balance sheet, involving aspects related to the measurement and recognition of operational assets (Chen *et al.*, 2022).

The accounting literature on earnings management shows that profits are divided into two: cash flow and accruals, which are adjustments that depend on the accrual basis (Healy, 1985; DeAngelo, 1986; Jones, 1991). Dechow *et al.* (1995), based on Jones' (1991) model, show techniques to isolate the discretionary component of accruals, separating it from its innate part. Similarly, the informativeness of accounting assets can be measured by a company's discretion in determining which information to present to its investors. Thus, asset informativeness can be decomposed into a discretionary portion determined by a company's choices and a non-discretionary portion related to the company's sector.

This study aims to fill a gap concerning asset informativeness, a concept seldom explored. Asset informativeness is a measure recently developed and tested in the American market but not in Brazil due to a lack of knowledge about the association of this variable with the cost of capital. Even though the literature advocates a negative association between the quality of accounting information and the cost of capital, the relationship between the informativeness of Brazilian companies' assets and systematic risk remains unknown. Furthermore, there is no evidence concerning the separation of asset informativeness into two portions: a non-discretionary, inherent to an industry's behavior, and a discretionary portion, which reflects a company's accounting choices. Additionally, there is unprecedented evidence of the relationship between non-discretionary and discretionary asset informativeness and the systematic risk of Brazilian companies.

Therefore, this study analyzes whether investors perceive the quality of accounting information measured according to asset informativeness, priced through systematic risk, a component of the cost of capital. Hence, this study aims to analyze the effect of accounting asset informativeness on systematic risk based on the following research problem: **Is the informativeness of accounting assets relevant to a company's systematic risk?**

Therefore, this study analyzes these issues in depth, with the fundamental hypothesis that there is a negative association between accounting asset informativeness and Brazilian companies' systematic risk.

Therefore, 186 companies from nine different economic sectors, with shares traded on the Brazilian stock market, and information available for calculating the study variables were addressed. Quarterly data from 2010 to 2021 were used. Regression models suitable for panel data analysis were performed; four systematic risk models were estimated according to asset informativeness and its discretionary and non-discretionary portions. The control variables included asset productivity, size, growth, tangibility, operating cycle, and profit volatility.

The results indicate the relevance of the relationship between asset informativeness and Brazilian companies' systematic risk, confirming the expected negative association and corroborating this study's fundamental hypothesis.

This study is expected to contribute to the literature on the relationship between the quality of accounting information and the cost of capital applied to the Brazilian market. Additionally, this study contributes to the literature by exploring the effects of specific company characteristics on systematic risk.

This is a relevant topic to academia, as it contributes to the discussion of the quality of accounting information by highlighting its relationship with the systematic risk of companies through a measure focused on assets. Accounting information is relevant, notably for investors, when analyzing how the quality of information can affect their decisions to the extent that the minimum return required by shareholders is related to company information. For those preparing accounting reports and regulators, this study provides evidence of the economic consequences of accounting choices related to accounting asset measurement, recognition, and disclosure.

2. Theoretical Framework

2.1 The informativeness of accounting assets

A company's capital stock is typically associated with fixed or operating assets, a more comprehensive classification than fixed assets. According to Soliman (2008), these assets are calculated by subtracting available amounts and short-term investments from total assets. In this context, capital stock is related to a company's productive capacity and, consequently, to future cash flows. Capital stock can also influence future investments. For this reason, capital stock is also known as economic capital, though economic capital is not directly observable (Chen *et al.*, 2022; Kanodia *et al.*, 2005).

Tobin (1969) developed the investment theory q (or Tobin's q), which predicts the relationship between the value of firms and their rates of reinvestment or asset replacement. In a simplified manner, the Q theory of investment is specified as follows:

$$\frac{I_t}{K_{t-1}} = \alpha + \beta q_{t-1} + \varepsilon_t, \quad (1)$$

Where: t indicates unit of time; I is the capital investment in the following period; K is the capital stock at the beginning of the period; and q is the quotient of the companies' market value (deducted from financial assets and inventories) over existing capital.

According to the q theory of investment, whenever q is greater than 1, indicating that the company's market value is greater than the value of the existing capital stock, the company's value would be oversized and, consequently, there would be incentives for the company to invest in itself.

On the other hand, with its value oversized, the potential return on a company's shares due to capital investments would be limited. Thus, according to Xing (2008) and Hou *et al.* (2015), a negative relationship exists between investments and the return on a company's shares. Considering this relationship, Wu *et al.* (2010) state that accepting new capital investments in companies with high minimum attractiveness rates could be justified by adjusting the disclosure of expected profits *vis-à-vis* cash flows, i.e., by recording accruals.

According to Andrei *et al.* (2019), the *Q* theory of investment has recently begun to show relevant results, not corroborating the vast literature showing poor performance in previous years. The best fit of the *q* investment model is related to the substantial growth in spending on research and other intangibles in the aggregate economy. The model has obtained better results in the case of research and development-intensive companies, different from those more intensive in fixed capital, for which the model was developed in the past. Therefore, the *q* investment model has worked well to capture characteristics related to corporate innovations and learning and can be a proxy for investment opportunities in R&D-intensive sectors.

The findings of Andrei *et al.* (2019) are corroborated by Barth *et al.* (2023), who, contradicting previous research that stated that accounting information had lost relevance over time, argue that what has occurred is a change in the economy that transitioned from a strongly industrial characteristic to being more intensive in services and technology. Indeed, Barth *et al.* (2023) argue that there is a greater relevance of items related to intangible assets, growth opportunities, and new alternative measures of organizational performance to explain a company's value. Thus, the relevance of accounting information has evolved, presenting a differentiated, non-decreasing relationship between the price of shares and accounting information that reflects the new economy.

Dutta and Nezlobin (2017) identified that accounting disclosures about future capital stock and future cash flow act as substitutes. The reason is that more accurate disclosures about future cash flows reduce the positive effects of future capital stock disclosures on investment efficiency and, consequently, on investors' well-being.

A company's value is determined by its investment decisions in the current period (I_t) and the capital stock that already existed in the previous period (K_{t-1}), given the productivity of capital and the cost of investments (Hayashi, 1982; Bai *et al.*, 2016). Equation (2) describes this rationale:

$$V_{ijt}\left(I_{ijt}, K_{1j,t-1}\right) = \left(1 + \tilde{g}_{ijt}\right)\left(K_{ij,t-1} + I_{ijt}\right) - \left(I_{ijt} + \frac{\gamma_{ijt}}{2K_{ij,t-1}} I_{ijt}^2\right), \quad (2)$$

Where: V_{ijt} is the value of the company; $K_{1j,t-1}$ represents the value of the capital stock at the beginning of the period, I_{ijt} is capital investment added to the initial stock; Υ_{ijt} represents an implicit cost adjustment to the investment, a component of the total capital adjustment cost; $\frac{\gamma_{ijt}}{2K_{ij,t-1}} I_{ijt}^2$; $\tilde{g}_{ijt}$ is the given parameter of marginal productivity of the capital stock at *t*, which has endogenous components (inherent to the company's management) and exogenous components (unrelated to the company's management, but which affects its productivity), and is not completely known; *i* is the company; *j* is the sector in which the company operates; *t* is the current moment.

Therefore, before making additional investments (*I*), companies observe a set of private information (*f*) about expected productivity (*g*). Thus, according to Chen *et al.* (2022), the optimal investment, which maximizes the value of a firm is described by Equation (3):

$$\frac{I_t^*}{K_{t-1}} = \frac{1}{\Upsilon} \mathrm{E}(\tilde{g}|f). \quad (3)$$

Hence, a company's value is greater when the capital stock (K) is more productive and when information about productivity is less uncertain. Therefore, information about capital is important for investors to form more accurate expectations about a company's value. However, economic capital is related to the capital stock associated with a given marginal rate of capital productivity that is not completely known, differing to some degree from the value of accounting assets.

The challenge is whether (and how) accounting assets could measure economic capital in a way relevant to the decision-making of accounting information users. If there were no inaccuracies in measurement, the capital stock considered in the previous equations could be replaced by the accounting asset and considered useful information for users seeking information about the value of a company's economic capital.

For Dutta and Nezlobin (2017), once a company makes investments to adjust its capital stock over time, the disclosure of accounting information can affect the efficiency of this investment and the investor's well-being. If more accurate, accounting information mitigates current owners' underinvest incentives, reducing uncertainty and better supporting assessments and decision-making. Such an effect depends on how accounting disclosures report on a company's future capital stock (balance sheet) or future operating cash flows (profits).

Accounting measurements of investments contain a certain degree of imprecision, as they depend on many subjective judgments, estimates, and simplistic conventions due to the difficulty of separating investments (tangible and intangible) from operating cash flows. This does not mean that inaccuracies reduce a firm's value, as they can even increase it (Kanodia et al., 2005).

According to Chen *et al.* (2022), there are at least four reasons why accounting assets may contain measurement inaccuracies concerning economic capital: (i) the sale price of an asset captures its exit value and not its value in use; (ii) the value of a company represents the combination of all its assets and not the sum of the values of each specific asset; (iii) comparative advantages and disadvantages (in terms of production) that a company faces related to other companies can affect its value, as well as its accounting ability to measure its actual productive capacity and that of each asset; and (iv) the standardization of international accounting standards may introduce some noise, due to restricted recognition and measurement criteria, in addition to the need for professional judgment in their application.

Since investments may not be fully reported or reported inaccurately, differences between accounting assets and economic capital may be represented by Equation (4) (Kanodia *et al.*, 2005; Chen *et al.*, 2022):

$$A_t = K_t + \varepsilon_t, \tag{4}$$

where: A_t is the accounting asset, which represents the history of investments and their accounting measurements; K_t is the stock of economic capital, including its productivity; and ε_t is the term that captures noise in accounting measurement, including the cumulative effect of errors in accounting measurements conducted over time, relating to investment.

Thus, accounting asset informativeness (IA) is defined as the ability of A_t (deduced from the error ε_t) to explain K_t. In this context, IA can be represented by the uncertainty that remains about the value of economic capital (K_t) after observing the accounting asset (A_t), measured as a proportion of the uncertainty that existed before observing A_t, according to Equation (5):

$$IA_t = \frac{Var\,(K_t) - Var\,(K_t|A_t)}{Var(K_t)} \quad (5)$$

Where: var (K_t) is the *ex-ante* uncertainty; var ($K_t|A_t$): *ex-post* uncertainty, after observing accounting assets.

Equation (5) indicates that IA_t depends on the ratio between accounting noise and *ex-ante* uncertainty, so that asset informativeness is high when accounting assets reduce uncertainty in relation to the value of economic capital.

2.2 Companies' systematic risk

The Capital Asset Pricing Model (CAPM) relates the volatility of a company's stock returns to the fluctuations of a completely diversified theoretical portfolio representing the market. The specific sensitivity of a company's returns to variations in the market risk premium (excess of market return over the return of a risk-free asset) is known as systematic risk and is determined by a company's specific characteristics relating to its business. In the CAPM model, systematic risk is represented by the beta parameter β_{it} (Sharpe, 1964; Lintner, 1965; Mossin, 1966).

There is evidence that the effect of the information available about a given company or the uncertainty investors face is reflected in the market risk premium, regardless of whether the calculation considers the company's leverage. Thus, even with marginal effects that are different in magnitude, estimating the relationship between the quality of accounting information and systematic risk must be similar using leveraged and unleveraged beta (Hugges *et al.,* 2007; Armstrong *et al.*, 2013).

According to Xing and Yan (2019), the effect of the quality of accounting information on the cost of capital could occur in three ways: the quality of accounting information could be an additional systematic risk factor distinct from other already known factors; the quality of accounting information could not be a risk in itself but affect other known factors; or the quality of accounting information could be related to the systematic risk factor.

This third possibility, less frequently studied, is theoretically supported since it has already been demonstrated that a firm's accounting information can affect investors' views on other economically related companies, on the aggregate economy, and the covariance of the firm's cash flows with the market as a whole (Xing & Yan, 2019; Lambert *et al.*, 2007; Ma, 2017; Patton & Verardo, 2012).

Specific research shows a negative relationship between accounting information quality and systematic risk. Corroborating studies on the *q* theory, it would be possible to argue that high investment rates would be related to greater asset informativeness and, in turn, to lower systematic risk due to lower uncertainty (Chen *et al.*, 2022; Ma, 2017; Xing & Yan, 2013; Francis *et al.*, 2005).

3. Methodological Procedures

3.1 Sample

The sample comprised all companies with shares traded on B3 and data available for calculating the selected variables, except those belonging to the financial sectors and segments designated as "other," according to the classification provided by B3. The companies in the financial sector were excluded from the sample due to the specific characteristics of this sector, such as accounting complexity, unique risk and return characteristics, differentiated regulation, specific modeling and evaluation of assets and liabilities, and, most importantly, the greater relevance of available assets and short-term investments, *vis-à-vis* operational assets, in company decisions. Those classified as "others" include companies with different economic activities that violate the criterion of belonging to the same industry. The sample comprised 186 companies belonging to nine sectors: industrial goods, communications, cyclical consumer, non-cyclical consumer, oil, gas and fuels, health, basic materials, telecommunications, and public utilities.

Quarterly accounting data from 2010 to 2021 were extracted from the Economática® platform. These years concern only the period after Brazil converged with international accounting standards. Moving windows of 20 quarters were used to calculate the asset informativeness variable; hence, the estimation period is from 2015 to 2021, and, considering missing data, the sample is composed of 4,654 company-quarter observations.

3.2 Econometric Model

The base model tested is described in Equation (6):

$$\beta_{it+1} = \alpha_{it} + \beta_1 IA_{it} + \lambda_1 Theta_{it} + \lambda_2 TAM_{it} + \lambda_3 B2M_{it} + \lambda_4 TANG_{it} + \lambda_5 CO_{it} + \lambda_6 \sigma RNOA_{it} + \varepsilon_{it} \quad (6)$$

Where: β_{it+1} represents the systematic risk of company *i* in relation to the market index (Ibovespa), measured according to the traditional CAPM model, with a quarterly moving window of beta calculated using a 60-month series, starting in the 60th month prior to the month of July of year t+1, after the base date for calculating asset informativeness in period t; IA_{it} asset informativeness; $Theta_i$: asset productivity, measured by the slope coefficient of the asset informativeness regression (R^2_{ijt}); TAM_{it} is the company's size, calculated by the natural logarithm of Total Assets; $B2M_{it}$ measures the relationship between net equity and market capitalization (book-to-market); $TANG_{it}$ is the asset's tangibility, calculated as a proportion of fixed assets over total assets; CO_{it} is the operating cycle, measured by the natural logarithm of the sum of accounts receivable days and inventory maintenance days; $\sigma RNOA_{it}$ is the volatility of profitability, measured by the standard deviation of the profitability of operating assets.

In this study, the variable of interest IA_{it} is measured in four different ways, as described in Table 1.

3.2.1 Variable of Interest: Asset Informativeness

Accounting profit concerns the comparison of revenues, expenses, and consumed costs, recorded, measured, and evidenced by usually accepted accounting principles. Economic profit is the increase in the present value of net worth and involves subjective aspects (Fuji, 2004).

The empirical model that measures the informativeness of accounting assets is based on the premise that accounting profit can capture economic profit by providing an estimate of the company's value (Black, 1980).

Based on the premise that accounting assets are relevant to informing about a company's economic capital, asset informativeness can be measured by the explanatory power of a profit regression as a function of lagged assets. This is so because if the capital stock determines economic income, the greater the regression's explanatory power, the greater the informativeness of the asset regarding economic capital (Chen *et al.*, 2022):

$$NOPAT_{ijt} = \alpha_{i,0} + \alpha_{i,1} NOA_{ijt-1} + \varepsilon_{ijt} \quad (7)$$

Where: is the economic profit of company i in sector j, measured by operating profit after taxes; represents the operating assets used in long-term operations of company i in sector j, measured by the initial balance of net operating assets, calculated by the difference between operating assets and operating liabilities. Following Soliman (2008), operating assets are calculated by total assets minus cash and cash equivalents and short-term investments, and operating liabilities are calculated by total assets minus short- and long-term debt and equity.

The coefficient of determination (R^2) of the regression conducted according to Equation (7), for each company i in sector j, which corresponds to the quadratic value of the correlation coefficient between the current economic profit (E_t) and the capital stock of the beginning of the period (A_{t-1}), represents accounting asset informativeness (net operating asset) in relation to economic capital. According to the literature, especially regarding Equation (5), informativeness consists of the part of NOPAT portion explained by NOA estimated by the coefficient of determination in Equation (7).

Four models were considered, each with a measure of asset informativeness as an explanatory variable of interest. The coefficient of determination (R^2) of the regression performed according to Equation (7) is the variable of Model 1 (IA_{ijt}). From this coefficient, the other measures were calculated (Table 1).

Table 1

Asset informativeness measures

Model	Variable of interest Asset informativeness	Calculation	Reference
1	Asset informativeness Global (IA_{ijt})	$IA_{ijt} = R^2_{ijt} = \frac{Cov^2\,(NOPAT_t, NOA_{t-1})}{Var\,(NOPAT_t)Var\,(NOA_{t-1})}$	Chen *et al.* (2022)
2	Asset informativeness: Non-discretionary ($IA_{ind,t}$)	$IA_{ind,t} = R^2_{ind,t} = \frac{e^{\hat{\phi}_{it}}}{1 + e^{\hat{\phi}_{it}}}$, , em que $\widehat{\phi_{it}} = \frac{1}{N_{it}} \sum_{i=1}^{N_{it}} \left(\ln \frac{R^2_{ijt}}{1 - R^2_{iit}} \right)$ of all companies i in the j sector in quarter t.	Chen *et al.* (2022)
3	Asset informativeness: Discretionary portion - Option 1 ($IA_{firm1,t}$)	$IA_{firm1,t} = R^2_{firm1,t} = \frac{R^2_{ijt} - R^2_{ind,t}}{1 - R^2_{ind,t}}$	Chen *et al.* (2022)
4	Asset informativeness: Discretionary portion – Option 2 ($IA_{firm2,t}$)	$IA_{firm2,t} = R^2_{firm2,t} = \sqrt{\left(R^2_{ijt} - R^2_{ind,t}\right)^2}$	Developed by the authors

Source: developed by the authors.

For Model 1, a moving window was adopted to generate an IA_{ijt} for each additional company-quarter from March 2015 to December 2021, and this series was considered as an independent variable. This measure is called Global IA.

Subsequently, based on the of each company-sector-quarter, the non-discretionary and discretionary components were calculated. Following the specifications highlighted in Table 1, non-discretionary informativeness $(IA_{ind,t})$ represents the average effects of all companies in the industry, being the variable of interest included in Model 2.

The discretionary portion of asset informativeness $(IA_{firm1,t})$ is the variable of interest in Model 3. These variables are calculated according to Chen *et al.* (2022).

Additionally, this study presents an alternative measure for the discretionary portion of asset informativeness $(IA_{firm2,t})$. The metric suggested by Chen *et al.* (2022) - $(IA_{firm1,t})$, presented a high dispersion in relation to the difference between the Global AI (IA_{ijt}) and its innate part $(IA_{ind,t})$. Thus, the square root of the difference between the Global AI and its non-discretionary part was adopted for the discretionary portion, as described in Table 1. This variable of interest was inserted in Model 4.

As Chen *et al.* (2002) did to overcome the problem of small samples in the regressions for each company, only 12 quarters were chosen for using quarterly windows from t-3 to t, generating considerably larger samples.

3.2.2 Control variables

Control variables were selected following Chen *et al.* (2022), but focusing on their relationship with systematic risk.

Since greater asset productivity would lead to greater profitability, the relationship with systematic risk is expected to be negative. This premise is based on the literature on asset profitability, understanding that both deal with a correlated phenomenon (Sarmiento-Sabogal & Sadeghi, 2015).

Considering that larger companies would be less risky as they can access better conditions to develop their operations, such as credit and suppliers, a negative relationship between size and systematic risk is expected (Beaver *et al.,* 1970; Castagna & Matolcsy, 1978; Atiase, 1985). Some research, however, indicates a positive relationship due to risks that these companies would face, for example, higher R&D expenses (Koussis & Makrominas, 2015; Wiyono & Mardijuwono, 2020).

Companies with a low book-to-market (B2M) ratio are considered to have more significant growth potential, and companies with high B2M are companies of value, as their net equity is closer to or greater than the market value. The relationship between systematic risk and companies with low B2M is expected to be negative (Koussis & Makrominas, 2015). Note that the negative relationship does not mean lower risk. On the contrary, because these are companies possibly related to technology, Internet, or R&D-intensive activities, they are perceived as more risky. For these companies, the market would fail to understand accounting information adequately, assigning greater risk to spend on R&D or intangible assets, which are not recognized for their ability to generate future gains but for increasing the unpredictability of future cash flows, giving the impression that these expenses would be bad for a company (Mohanram, 2005; Kothari et al., 2002).

On the other hand, a positive relationship with systematic risk is expected for companies with high B2M. These companies are considered more risky because they tend to present financial difficulties as they have less access to disclosure channels and less analyst coverage (Piotroski, 2000).

There are two aspects of tangibility: the level of fixed capital in relation to total assets. The first considers that the variable would have a positive relationship with systematic risk due to the greater exposure that large capital expenditures associated with increased operating leverage would cause (Lev, 1974; Jose & Stevens, 1987). The other view considers that capital-intensive companies with high tangibility are likely to exercise monopoly power, which would reduce their exposure to systematic risks (Subrahmanyam & Thomadakis, 1980; Barton, 1988).

The relationship between the operating cycle and beta is expected to be positive, as the shorter the cycle, the greater the availability of resources and the lower the risk arising from mismatching flows of current assets and current liabilities, which is current liquidity. The current liquidity level negatively relates to systematic risk (Beaver et al., 1970; Castagna & Matolcsy, 1978).

Earnings volatility and systematic risk are expected to be positively related (Beaver *et al.*, 1970; Hong & Sarkar, 2007). This relationship corroborates an understanding that earnings volatility is a measure of uncertainty, negatively associated with earnings predictability, and can be determined both by economic factors represented in the market risk premium and by accounting factors determined by the company itself or by the accounting measurement system (Dichev & Tang, 2009).

Finally, it should be noted that the selection of control variables observes the principle of parsimony to keep the model as small as possible. As will be seen later, these control variables are sufficient to obtain models that do not violate the regression assumptions.

4. Presentation and Discussion of Results

Table 2 presents the descriptive statistics of the variables considered in this study. Note that most series are asymmetric to the left, with a median lower than the mean. The largest amplitude is earnings volatility (σRNOA), which has the highest standard deviation. Concerning systematic risk (β_{it}), the mean and median are close to 1, which means the average risk of companies is close to that of the market. Average asset informativeness equal to 0.30 means that for this sample and period, 30% of the profit is explained by the lagged asset.

Table 2

Asset informativeness measures

	β_{it}	IA_{ijt}	$IA_{ind,t}$	$IA_{firm1,t}$	$IA_{firm2,t}$	*Theta*	*TAM*	*B2M*	*TANG*	*CO*	*σRNOA*
Mean	0,848	0,299	0,183	0,139	0,219	0,056	15,038	0,862	0,229	4,803	0,289
Median	0,781	0,225	0,165	0,061	0,157	0,062	15,131	0,585	0,201	4,765	0,057
Maximum	3,392	0,946	0,548	0,940	0,844	0,952	19,149	5,902	0,825	7,896	19,73
Minimum	-1,103	0,000	0,001	-0,887	0,000	-3,873	9,626	0,000	0,000	2,049	0,008
Standard Deviation	0,656	0,269	0,088	0,331	0,184	0,280	1,782	0,959	0,192	0,859	1,213
Asymmetry	0,498	0,653	1,021	0,458	1,111	-3,308	-0,224	2,138	0,723	0,490	8,967
Kurtosis	3,321	2,223	4,092	2,481	3,423	44,549	2,685	8,374	2,832	3,848	104,3

Source: developed by the authors.

Tests were performed before the estimations to verify data robustness. The explanatory variables were tested for their multicollinearity with the others using the variance inflation factor (VIF). According to the VIF test, the other variables did not show signs of multicollinearity.

Bartlett, Levene, and Brown-Forsythe tests were performed, which suggested that the hypothesis of homoscedasticity of the residuals should be rejected. Furthermore, the Durbin-Watson and Wooldridge (2010) tests suggest positive autocorrelation of the residuals.

For this reason, all estimations were performed with robust standard errors using the Cross-Section Seemingly Unrelated Regression (SUR) method with Panel-Corrected Standard Errors (PCSE) to avoid heteroscedasticity and serial autocorrelation of residuals. Furthermore, fixed effects were adopted, corroborated by rejecting the redundancy hypothesis of these effects. Furthermore, corroborating Chen *et al.* (2022), regressions with fixed effects generated models with greater explanatory power than those with grouped data. The Hausman test enables a comparison between fixed and random effects; however, the assumptions of the variance calculation of the Hausman test may not be consistent with adopted robust standard errors (Li & Wibbens, 2023). For this reason, random effects estimations were not performed.

The estimates' results are presented in Table 3. As expected, the quality of accounting information measured by global asset informativeness (IA_{ijt}) is statistically significant and has a negative relationship with the systematic risk of companies traded on the Brazilian stock market, corroborating both studies on the quality of accounting information and the *q* investment theory (Francis *et al.,* 2005; Ma, 2017; Xing & Yan, 2019; Chen *et al.,* 2022). Such a result indicates that investors consider information about assets as qualified to measure economic capital in their assessments of companies.

Non-discretionary asset informativeness (IA_{ind}), an indicator related to factors that are outside management's control that are characteristic of the industry, business model, operating environment, and accounting rules, is relevant and negatively associated with systematic risk, with its effect being more intense than the global measure and discretionary components. These results may be related to the relevant effects of peers on the companies' systematic risk, an externality already documented in the literature (Ma, 2017).

The discretionary portion of asset informativeness (IA_{firm1}), as proposed by Chen *et al.* (2022), is also negatively associated with systematic risk. However, its coefficient is only 40% of the coefficient of the measure proposed in this study (IA_{firm2}); such a finding is an additional contribution of this study to the development of related literature.

Table 3

Result of estimations

Base Model

$$\beta_{it+1} = \alpha_{it} + \beta_1 IA_{it} + \lambda_1 Theta_{it} + \lambda_2 TAM_{it} + \lambda_3 B2M_{it} + \lambda_4 TANG_{it} + \lambda_5 CO_{it} + \lambda_6 \sigma RNOA_{it} + \varepsilon_{it}$$

	Model 1		Model 2		Model 3		Model 4	
Const.	-0,452		-0,568		-0,407		-0,399	
	(0,354)		(0,356)		(0,363)		(0,357)	
$IA_{it}^{(\alpha)}$	-0,093	***	-0,248	**	-0,051	***	-0,129	***
	(0,021)		(0,123)		(0,018)		(0,027)	
$THETA_{ij}$	-0,032		-0,045		-0,037		-0,035	
	(0,031)		(0,029)		(0,031)		(0,03)	
TAM_{ij}	0,110	***	0,119	***	0,106	***	0,106	***
	(0,024)		(0,025)		(0,025)		(0,025)	
$B2M_{ij}$	-0,075	***	-0,074	***	-0,074	***	-0,075	***
	(0,017)		(0,017)		(0,018)		(0,017)	
$TANG_{ij}$	-0,396	***	-0,404	***	-0,397	***	-0,404	***
	(0,099)		(0,093)		(0,099)		(0,099)	
OC_{ij}	-0,031		-0,031		-0,030		-0,029	
	(0,022)		(0,022)		(0,022)		(0,022)	
$RNOA_{ij}$	-0,014	*	-0,013	*	-0,014	*	-0,015	**
	(0,007)		(0,007)		(0,007)		(0,007)	
R^2 *Aj.*	0,678		0,677		0,678		0,678	
Est. F	47,38	***	47,59	***	47,34	***	47,36	***
Nº Obs.	4612		4654		4612		4612	

Note: IA_{it} represents the asset informativeness as shown in Table 1 - in Model 1, the global informativeness (discretionary and non-discretionary parts) of assets (IA_{ijt}); in Model 2, the informativeness (non-discretionary part) of assets ($IA_{ind,t}$); in Model 3, the informativeness (discretionary part) of a company's assets ($IA_{Firm1,t}$) calculated according to Chen et al. (2022); and, in Model 4, informativeness (discretionary part) of a company's assets ($IA_{Firm2,t}$) calculated as proposed by the authors. The values in parentheses are the standard deviations of each estimate, where ***, **, * concerns the significance level of the parameters at 1%, 5%, and 10%, respectively.

Source: developed by the authors.

The results reveal that a company's idiosyncratic characteristics implicit in the recorded assets - the result of accounting choices and management's daily decisions regarding short-term operations and investment - are helpful as a measure of the quality of accounting information, although with lower sensitivity than non-discretionary effects on systematic risk.

When moving on to the control variables, size appears positively related to systematic risk, corroborating studies reporting that these companies face more risks, especially those related to higher R&D expenses (Koussis & Makrominas, 2015; Wiyono & Mardijuwono, 2020).

The B2M variable showed a negative relationship with systematic risk. This result has two potential interpretations. Companies with high B2M (high value) are considered to have lower systematic risk, possibly due to investors' reassessment of potential past overvaluation. Investors may use relevant historical information to eliminate companies with poor prospects from their portfolios. There are benefits related to a more in-depth analysis of financial statements, especially in the case of small and medium-sized companies, companies with low share turnover, and companies without analyst monitoring, which may be the case (Piotroski, 2000).

The negative relationship would be analyzed from the perspective of companies with low B2M (growth opportunity) based on the hypothesis that the market would fail to adequately understand accounting information, attributing greater risk due to R&D expenses or intangible assets that are not recognized for their future earning capacity (Mohanram, 2005).

The tangibility variable was negatively and significantly related to systematic risk. Such a result corroborates the understanding of Barth *et al.* (2023) as, with the world's transition to a new economy, measures based on fixed assets may be less relevant concerning measures that consider intangible assets, growth opportunities, and alternative performance measures. Therefore, the risk inherent to fixed costs or the positive effects of a monopolistic position would be negatively associated with systematic risk in the context of the new economy, updating, for the Brazilian case, the findings of past research such as Lev (1974), Jose and Stevens (1987), Subrahmanyam and Thomadakis (1980) and Barton (1988).

The companies' volatility results are negatively associated with systematic risk, diverging from related literature in which this variable represents uncertainty regarding the company's future, possibly a consequence of both economic and accounting situations (Beaver *et al*., 1970; Hong & Sarkar, 2007; Dichev & Tang, 2009).

The productivity and operating cycle variables were not relevant to systematic risk in the Brazilian context.

5. Complementary Tests

Additional tests were performed to validate the study's results. The control variables from the primary model were kept in all tests described in this section. First, the primary model's dependent variable, leveraged beta, was replaced by unleveraged beta. The negative association of asset informativeness measures with systematic risk was maintained but with less intensity in all its variations.

To deepen the robustness tests, regressions with dummy variables were estimated for 2016 to 2021 to represent macroeconomic events that could affect the explanatory variables and mitigate potential endogeneity problems. For example, 2019 marked the period when the International Financial Reporting Standard 16 – IFRS 16 entered into effect concerning the accounting of leases. This standard no longer allows operating leases to be kept off the balance sheet, which forced accounting for right-of-use assets and lease liabilities, which may have worsened many companies' financial indicators, and 2020 and 2021 marked the COVID-19 pandemic.

The results confirmed the statistical relevance, as all years are significant and positively associated with systematic risk. Furthermore, when years are added to the regression, the non-discretionary informativeness variable loses statistical relevance, indicating some simultaneous macroeconomic effect on this sector indicator in the case of the five-year beta window and asset informativeness variables.

Additionally, tests were performed with 3-year (12 quarters) and 7-year (28 quarters) windows to estimate the beta and asset informativeness, different from the primary model that adopted five years or 20 quarters.

For the three-year windows, the results with the leveraged beta are analogous to those of the primary model, confirming the importance of asset informativeness and its negative relationship with systematic risk. In the case of unleveraged beta, the relevance of non-discretionary informativeness *(IA_{ind})* and discretionary informativeness proposed by this study *(IA_{firm2})* was observed, with the expected negative sign.

However, when dummies for 2014 to 2021 are added, only IA_{Firm2} is significantly and negatively associated with systematic risk when leveraged, again indicating a potential simultaneous effect of macroeconomic variables on informativeness variables calculated with three-year windows. Such results make sense, considering the macroeconomic environment can affect assets and results. As for the relevance of the years included, except 2014 and 2015, all are positively related to systematic risk.

In the case of seven-year windows, the expected negative relationship with systematic risk remains significant, but only for global *(IA_i)* and discretionary *(IA_{Firm1}; IA_{Firm2})* informativeness in the case of leveraged beta, and non-discretionary *(IA_{ind})*, in the case of unleveraged beta.

When 2018 to 2021 are added, they appear positively related to leveraged beta, but only 2019 to 2021 remain relevant when the beta is deleveraged. Including the years in the regression revealed that global and non-discretionary informativeness *(IA_i and IA_{ind})* are related to leveraged beta, but only non-discretionary informativeness *(IA_{ind})* matters with the unleveraged beta, with a negative association.

Thus, tests with windows larger and smaller than the primary regression indicate that the most appropriate size is the 5-year window (20 quarters) and that with different windows, the non-discretionary informativeness *(IA_{ind})*, which indicates the sector characteristics overlap with the other measures in terms of relevance, both for leveraged and unleveraged beta, corroborating the existence of externalities of the industry's effect on systematic risk (Ma, 2017).

Furthermore, the interference of the macroeconomic environment becomes evident when observing the results after the inclusion of annual dummies. However, the negative association does not change, and the statistical significance of asset informativeness can sometimes alternate in relation to the study's four measures, but it still reveals its importance.

Additionally, tests were conducted to verify potentially differentiated behaviors by the economic sector, using a five-year window for beta, asset informativeness, and ERC.

For the industrial goods sector, a higher IA_{ind} is associated with greater systematic risk (leveraged or otherwise). IA_{Firm1} maintains the expected negative direction of its relationship with risk, but only when leveraged.

In the public utilities sector, while IA_{ind} presents a negative sign in the relationship with systematic risk, IA_{Firm1} and IA_{Firm2} present a positive sign, possibly revealing the investors' poor assessment of the discretionary choices of companies in this sector.

In the healthcare sector, all asset informativeness measures are associated with greater risk (except IA_{ind}, for unleveraged beta), not corroborating previous literature. Conversely, in the cyclical consumer sector, all measures of asset informativeness corroborate the expected negative sign concerning systematic risk, leveraged or otherwise (except IA_{Firm1}, for the unleveraged beta).

The non-cyclical consumer, regardless of whether the beta is leveraged, is one sector in which asset informativeness does not matter for systematic risk. In turn, the basic materials and oil, gas, and fuel sectors converged with a negative and significant relationship between *IA* and IA_{Firm} with beta. In the case of basic materials though, higher IA_{ind} is associated with higher systematic risk.

The asset informativeness of companies in the communications sector corroborates the literature, showing a negative relationship with leveraged systematic risk, but only when measured by global IA or IA_{ind}. When beta is deleveraged, only IA_{Firm1} has a significant and positive relationship.

Additionally, although this study's objective is to propose using asset informativeness as a measure of information quality, it was compared with earnings informativeness, known as Earnings Response Coefficient (ERC), measured according to Dechow *et al.* (2010). This variable was not relevant in any of the initial regressions, with neither leveraged nor unleveraged beta.

However, tests by sector highlighted the statistical significance of the ERC variable for the public utilities and communications sectors, in which the relationship is negative, with the beta leveraged or otherwise. The relationship is positive for the basic materials and non-cyclical consumer sectors and only occurs when beta is leveraged.

Dechow *et al.* (2010), despite presenting several measures of earnings quality, including the ERC, state that these indicators measure different earnings properties. Corroborating this notion, the results indicate that the ERC is not comparable to asset informativeness.

Therefore, it appears that when the relationship between asset informativeness or profit by sectors is observed in greater detail, the relationships vary depending on the measure used and whether financial leverage affects the beta.

6. Conclusions

This study analyzed the effect of accounting asset informativeness on systematic risk. Asset informativeness is a measure of the quality of accounting information, which concerns the ability of accounting operational assets to inform the value of a company's economic capital.

Using four models estimated by ordinary least squares, with cross-sectional panel data and data from 2010 to 2021 of Brazilian companies traded on B3, it was analyzed how asset informativeness influences systematic risk. In addition, the influences of each portion of the asset informativeness, company-specific (discretionary) and sector-typical (non-discretionary), on the company's systematic risk were analyzed. An alternative measure was proposed in this study for the discretionary portion in addition to the measure provided in the literature. The models also considered control variables: asset productivity, size, growth, tangibility, operating cycle, and profitability volatility.

The results reveal that asset informativeness is relevant and negatively associated with the systematic risk of Brazilian companies in any of the four measures used in this study. Therefore, it is a useful alternative measure for users who wish to estimate companies' intrinsic value.

When the non-discretionary portion is observed separately, its intensity is close to one standard deviation higher than the effects of global and discretionary informativeness. This result indicates a potential effect of externalities from the industry's effect on systematic risk, as Ma (2017) suggested.

The discretionary portion measured according to Chen *et al.* (2022) is relevant. Its intensity is only 40% of the factorial load of the measure proposed by the authors though, which is a contribution of this study to the development of related literature. Such findings show that the specific characteristics of companies related to their accounting choices and their daily management decisions regarding operations and investments are relevant but with less intensity on the effects of the industry.

The growth opportunity, tangibility, and profit volatility control variables showed a negative relationship with systematic risk, while the size variable showed a positive association. The productivity and operating cycle variables were not statistically significant.

The following complementary tests were performed: regressions using unleveraged beta to measure systematic risk; comparisons of IA variables with the earnings response coefficient (ERC); inclusion of dummy variables representing years and macroeconomic effects in the models; larger and smaller windows were used for estimating the beta and asset informativeness; and tests of IA interactions according to economic sectors.

The tests generally corroborate the results that asset informativeness is negatively associated with systematic risk. The inclusion of years revealed potential endogeneity in the informativeness measures, and the separation by sectors indicated differentiated behavior, both in terms of statistical significance and the direction of the relationship, depending on the case. Furthermore, only by deepening the analysis was it possible to identify the relevance of the ERC variable, representing the informativeness of profits.

This study's main limitation is related to the quantity of data due to the size of the Brazilian stock market and the relatively short period after Brazil converged with international accounting standards.

This study contributes to the literature on the quality of accounting information, primarily based on accounting results, and the literature on determinants of the cost of capital. This topic is relevant for users of accounting information, notably investors, as it suggests a source of relevant information for estimates of a company's value and consequent capital allocation. It is also relevant for those preparing accounting reports and regulators, as it provides evidence of the economic consequences of accounting choices related to the measurement, recognition, and disclosure of accounting assets.

An opportunity for future research would be verifying whether asset informativeness changes according to accounting standards issued by regulators, identifying whether the determinants of asset informativeness are the same for other quality measures of accounting information, and demonstrating potential determinants of variations between sectors and even countries.

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The Repercussions of Restated Financial Statements on Audit Contracts and Auditor Remuneration Among Listed Brazilian Companies

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Abstract

Objective: The objective was to analyze whether companies that restated Financial Statements (FS) experienced changes in auditor fees and replaced the audit firm the year after the event.

Method: Data from 323 non-financial companies listed in B3 were analyzed, totaling 2,712 observations (companies/year) between 2010 and 2020. Data were collected from the websites of the Securities and Exchange Commission of Brazil (CVM), ComDinheiro, and the Perlin data repository (2020). Descriptive statistics, the test for difference between means, and regression with panel data were adopted.

Results: The companies that restated financial statements paid higher auditor fees in the year after the event and were more likely to replace the audit firm.

Contributions: This study is relevant for auditors and members of audit and governance committees as it provides evidence that can support decisions on hiring and dismissing independent auditors. Additionally, it shows that higher fees may compensate for perceived risk while replacing an audit firm after a restatement is a form of punishment and is intended to protect a company's reputation.

Keywords: Restatement of financial statements; Audit fees; Auditor replacement.

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1. Introduction

The primary purpose of financial information is to mitigate information asymmetry and allow timely and assertive decisions (Qasem *et al*., 2020). In this sense, auditors play a crucial role in ensuring the quality and integrity of disclosed information (Reid *et al.,* 2019). As highlighted by Velte (2022), the restatement of financial statements (FS) stands out among the various proxies of the quality of financial information.

The restatement of financial statements concerns the revision of previously disclosed information. Albring *et al.* (2013) note that the amendments implemented during this process may harm a company's growth, leading to uncertainties that may affect contractual relationships and hinder fund-raising. Hennes *et al.* (2014) note that associated costs, such as cost of capital increases, division clauses violations, and shareholder litigation, may reach considerable amounts.

The discussion of losses resulting from restatements is intrinsically linked to market confidence. Information users interpret restatements as a sign of deficient internal controls and financial problems that may ultimately lead to a company's discontinuation (Gertsen *et al*., 2006).

In this context, the need to restate FS indicates that vital issues may have been neglected, which may lead to the dismissal of internal auditors, audit committee members, and external auditors (Hennes *et al*., 2014). A company's initiative to lay off employees is likely a strategy to safeguard its reputation, considering that changing the official audit firm is a form of punishment intended to mitigate adverse market reactions.

The literature indicates that restatements increase reputation and litigation risks for the audited company and its audit firm as the market starts questioning its ability to detect errors (Bankley *et al*., 2012; Liu *et al*., 2009). This may lead auditors to charge higher fees to compensate for perceived risks (Feldmann *et al*., 2009).

The discussion on the restatement of financial statements in the Brazilian context considers different perspectives, including audit firm rotation, earnings management (Martinez & Reis, 2010), the impact on share prices (Netto & Pereira, 2011), an association between the companies' characteristics and the restatement of financial statements (Marques et al., 2016), the relationship between restatement and earnings management practices (Cunha et al., 2017), audit fees, tax aggressiveness (Ávila et al., 2018), the effect of a Big4 on auditor's opinion (Marques et al., 2018), the impact of replacing auditors on audit fees (Dantas & Ramos, 2019), and the influence of auditor litigation risk on audit and non-audit fees (Giordani et al., 2020).

No previous studies were found in the Brazilian context on the relationship between the restatement of financial statements, audit fees, and auditor replacement though, indicating that these aspects are seldom analyzed (Marques et al., 2017). Therefore, this study aims to expand evidence on the implications of restatements of FS on audit fees and the replacement of auditing firms and examine the significance of these associations in emerging markets such as Brazil. In this context, Velte (2022) highlights that the literature on the restatement of financial statements, fees, and subsequent replacement of auditors remains inconclusive, demanding in-depth investigations.

Given the previous discussion and to fill this gap, this study addresses the following problem: **What is the association between the restatement of financial statements, audit fees, and the replacement of auditor firms among companies listed on B3?** The objective was to analyze whether companies restating financial statements experience changes in auditor fees and replace the auditing firm in the year following the event. Data concerning 323 non-financial companies (2,712 firm observations/year) listed on Brasil, Bolsa, and Balcão (B3) from 2010 to 2020 were analyzed using descriptive statistics, the test of the difference between the means, and regression with panel data.

This study's contribution concerns its analysis of the potential implications of restatements on auditor fees and the replacement of audit firms in the Brazilian context. It also provides empirical evidence that contributes to competitiveness in the audit market. Such findings are relevant for firms and audit committees, presenting relevant factors that influence auditor fees and the maintenance and prospecting of contracts. They also support audited companies by providing an understanding of the fee pricing process and client/auditor reputation costs, thus assisting in negotiations.

This study also offers perspectives to investors and other external users of FS, considering that restatements signal low-quality accounting information (Velte, 2022; Zhizhong *et al.*, 2011). This understanding improves decision-making, as FS are crucial sources for evaluating a company's current and potential performance (Chang et al., 2016; Dantas et al., 2011). Furthermore, the results contribute to the academic community as they expand evidence on the implications of restatements for auditor fees and the replacement of audit firms, aspects seldom explored in the Brazilian context and which require further investigation (Velte, 2022).

2. Literature Review and Formulation of Hypotheses

2.1. Relevance and quality of accounting information: Why does a restatement matter?

Information asymmetry between managers and external users is common in corporate environments, requiring incentives and monitoring to mitigate agency problems (Jensen & Meckling, 1976). Considering that managers are "maximizers", they may be encouraged to adopt financial information manipulation practices, leading to the possibility of restating financial statements (Flanagan et al., 2008). Restatements are associated with several risks, such as devaluation of companies, increased capital costs, and damage to the reputation of managers and audit firms, affecting investor credibility (Hennes *et al.*, 2014; Salehi et al., 2017).

The quality of financial information is compromised when financial statements are restated, as it indicates that the initial objective of providing reliable information for decision-making was not initially achieved (Salehi et al., 2017). The likelihood of restatements in the Brazilian context is associated with specific characteristics, such as company size, assets growth, whether the company adopts IFRS international accounting standards, and whether one of the Big4 is auditing the company (Marques *et al.*, 2017).

Recent research suggests that companies restating FS face consequences such as the dismissal of auditors, unusually high audit fees, abnormal turnover of managers, and inferior performance than competitors (Hennes *et al.*, 2014; Salehi *et al.*, 2017; Li *et al.*, 2018; Moon *et al.*, 2019). The implications of restatements on audit contracts still require more investigation, considering controversial results and the need for further evidence (Velte, 2022).

2.2. Audit quality and auditor remuneration

An auditor's fundamental role is to independently ensure the conformity of a company's financial statements (Hennes *et al.*, 2014). Salehi *et al.* (2017) emphasize that auditing plays a crucial role in controlling agents' behaviors, and their fees are a determining factor in effective functioning. Implementing robust controls decreases the chances of errors, as inadequacies are identified before reports are released, thus avoiding the need for restatements.

From this perspective, audit fees are intrinsically linked to the degree of risk auditors perceive. Feldmann *et al.* (2009) note that auditors may classify a company as a high-risk client if it has restated statements in the previous period, considering it may threaten its reputation. Blankley *et al.* (2012) argue that a restatement possibly indicates an inadequate assessment of audit risk and auditors' low effort in preparing restatements.

Previous studies highlight a positive association between restatements and auditor fees. Kinney et al. (2004) mainly found this association among smaller clients, suggesting auditors' more significant effort and greater risk. Blankley et al. (2012) found a negative association though, indicating that companies are pressured to make the work more profitable, resulting in low fees and excessive reliance on internal controls, possibly leading to neglectful internal controls.

Bédard and Johnstone (2004) provided evidence that deficient internal controls increase auditors' effort; i.e., increased inherent and control risks demand more hours, effort, and personnel, resulting in higher fees (Chen *et al.*, 2019).

Factors such as audit fees, the size of the audited company, the number of subsidiaries, whether there is an audit committee, and whether a Big4 company was hired influence the fees paid in the Brazilian context (Brighenti *et al.*, 2016). Castro *et al.* (2015) highlight the positive influence of variables related to the client's size and complexity on increased fees. Additionally, they identify differences in how auditors' risk perception influences the fees auditors charge from small and large companies. This finding suggests that auditors tend to charge less from clients with higher leverage and risk, indicating that companies facing financial difficulties tend to request lower auditing costs prices.

Considering that restatements indicate risk (Feldmann et al., 2009) and auditors are encouraged to perform more specialized work (Giordani *et al.*, 2020) when facing high litigation risks, we propose the first hypothesis.

H_1: The restatement of financial statements is positively associated with subsequent auditor remuneration.

Hence, this study investigates how the FS variable behaves and whether independent auditing firms are replaced when companies restate their financial results. The objective is to deepen the discussion on the price of audit fees after restatements (Feldmann *et al.*, 2009; Hennes *et al.*, 2014). On the one hand, the new audit firm is expected to charge higher fees due to reputation and litigation risks associated with restatements. However, market competitiveness may lead audit firms to charge lower fees, even from high-risk clients, to win them over initially (Castro *et al.*, 2015). Therefore, examining how these variables interact (restatements and audit firm replacement) affects the pricing of auditor fees.

2.3 Audit quality and auditor firm's replacement

Although auditing strengthens the credibility of accounting information, audit firms are often held responsible in the case of financial statements being restated, raising questions about the auditor's ability to monitor the disclosure of financial information, especially when distortions have not been previously identified (Hennes *et al.*, 2014; Liu *et al.*, 2009). In this context, restatements indicate the quality of accounting information and auditing (Chen *et al.*, 2019; Dechow & Schrand, 2010).

Given the substantial costs associated with companies restating financial statements, mainly due to a loss of market confidence (Gertsen *et al.*, 2006), some companies decide to replace the auditing firm as a corrective measure to regain credibility and reputation; theoretically, they transfer responsibility to the audit firm. In cases of restatements due to fraud, companies face more severe consequences, including subsequent auditors refusing to serve them, even though the risk of litigation concerns information certified by the previous audit firm (Mande & Son, 2013; Thompson & McCoy, 2008; Ma *et al.*, 2015).

Hennes *et al.* (2014) note that corrections are more severe when the audit firm is not one of the Big4—together with the company's size and its operational complexity, having a Big4 as the audit firm decreases the likelihood of it being replaced, possibly due to the high costs and few replacement options. However, restatements pose a risk to both the audited company and the audit firm, which may lose market share due to the potential risk of being dismissed after the event (Swanquist & Whited, 2015). Evidence on the subsequent costs of restatements and the role of independent auditing suggests that dismissing auditors is a punitive measure to mitigate the negative impact of restatements and preserve the company's reputation (Hennes *et al.*, 2014). Therefore, the second hypothesis follows.

H_2: The restatement of financial statements is positively associated with the subsequent replacement of the audit firm.

Although replacing the audit firm is expected after a restatement, companies may weigh the cost of reputation against that of replacement and decide to maintain the contract with the independent auditor (Mande & Son, 2013). Furthermore, Rocha *et al.* (2016) highlight that hiring non-specific audit services strengthens the ties between the auditor and the client and may negatively impact the decision to switch auditors. Therefore, analyzing how these variables (restatement and audit fees) interact is vital to verify whether companies paying higher fees are less likely to switch audit firms after a restatement than companies paying lower fees.

3. Methodological Procedures

3.1 Sample, data collection and analysis techniques

The sample comprised 323 non-financial companies listed on B3 that released at least one annual financial report restatement from 2010 to 2020, motivated by quantitative or a combination of quantitative and qualitative reasons concerning their financial statements.

The reasons for restatements were classified according to Marques *et al.* (2016). Restatements due to quantitative reasons involved numerical changes to the financial statements, explanatory notes, interest on equity, dividends, unit of measurement, number of shares, or capital budgets. Representations due to qualitative reasons included textual changes in financial statements, explanatory notes, auditors' reports, management reports, updating/correcting registration data, presentation of a new disclosure channel, changing disclosure, report of standardized financial statements from previous years, or resending due to errors in the submission process.

Data on restatements and auditor opinions were obtained from Standardized Financial Statements available at the Brazilian Securities and Exchange Commission (CVM) website, and information on audit fees was collected from the Reference Forms. The other variables were collected from the *ComDinheiro* website and Perlin's (2020) data repository. Data were Winsorized between 1% and 99% to treat outliers and analyzed using descriptive statistics, test of differences between means, and regression with panel data.

The sample started with 3,511 observations; those missing data in the CVM Reference Form or restatements due to qualitative or unidentified reasons were excluded; hence, 2,712 observations remained in the final sample.

Hypotheses 1 and 2 were analyzed, and regression analysis techniques were used with panel data using Ordinary Least Squares (OLS) and Logistic regression (Logit), respectively. The Chow, Breusch-Pagan, and Hausman tests were used to choose the type of panel (Pooled, fixed effects, or random effects). The regression was estimated to have robust standard errors to mitigate potential problems.

Additionally, a Logit regression was estimated for hypothesis 2 (H_2), interpreting the Odds Ratios to analyze the likelihood of companies restating FS to replace independent auditors in the subsequent year compared to those that did not restate FS.

3.2 Models and variables

Models 1 and 2, controlling for sector and year, were used to analyze the hypothesis that there is an association between the restatement of financial statements and the remuneration of subsequent auditors (H_1). The models were adapted from Blankley *et al.* (2012), Cahan and Sun (2015), Castro *et al.* (2015), Chen *et al.* (2019), Dantas and Ramos (2019), Feldmann *et al.* (2009), Marques *et al.* (2017), Marques *et al.* (2016), and Salehi *et al.* (2017).

$$\text{Audfees}_{it+1} = \beta_0 + \mathbf{D_1Reapr_{it}} + \mathbf{D_2AudRep_{it+1}} + \sum_{k=1}^{16} \beta_k \, \text{Controls}_{it} + \varepsilon_{it} \quad (1.1)$$

$$\text{Totalfee}_{it+1} = \beta_0 + \mathbf{D_1Reapr_{it}} + \mathbf{D_2AudRep_{it+1}} + \sum_{k=1}^{16} \beta_k \, \text{Controls}_{it} + \varepsilon_{it} \quad (1.2)$$

$$\text{Audfees}_{it+1} = \beta_0 + \mathbf{D_1Reapr_{it}} + \mathbf{D_2AudRep_{it+1}} + \mathbf{D_3Reapr_{it}} * \mathbf{AudRep_{it+1}} + \sum_{k=1}^{16} \beta_k \, \text{Controls}_{it} + \varepsilon_{it} \quad (2.1)$$

$$\text{Totalfee}_{it+1} = \beta_0 + \mathbf{D_1Reapr_{it}} + \mathbf{D_2AudRep_{it+1}} + \mathbf{D_3Reapr_{it}} * \mathbf{AudRep_{it+1}} + \sum_{k=1}^{16} \beta_k \, \text{Controls}_{it} + \varepsilon_{it} \quad (2.)$$

This study's explained variable is the audit fee paid in the year following a restatement. Operationalization, according to Blankley *et al.* (2012), Chen *et al.* (2019) and Salehi *et al.* (2017), involved calculating the logarithm of the amounts paid, deflated by the annual inflation index to reduce variability due to the inflationary effect. The dependent variable was operationalized in two ways: (i) total specific fees for audit services *(Audfees$_{it+1}$)*; and (ii) total fees paid to the audit company, including consulting/advisory services and others not related to auditing *(Totalfee$_{it+1}$)*.

According to Chen *et al.* (2019), Feldman *et al.* (2009), and Marques *et al.* (2016), the explanatory variable of interest in models 1 and 2 is a dummy (Restate$_{it}$) assuming 1 when the company restated FS due to a quantitative reason related to the financial disclosure and 0 otherwise.

Models 3 and 4 were used to analyze Hypothesis 2 to verify the association between restatements and a subsequent auditor replacement. Following Hennes *et al.* (2014), Ma *et al.* (2015), and Mande and Son (2013), the dependent variable was Auditor Replacement in the subsequent year.

$$\text{AudRep}_{it+1} = \beta_0 + \mathbf{D_1Resta_{it}} + \mathbf{\beta_1 Audfee_{it+1}} + \sum_{k=1}^{16} \beta_k \, \text{Controls}_{it} + \varepsilon_{it} \quad (3.1)$$

$$\text{AudRep}_{it+1} = \beta_0 + \mathbf{D_1Resta_{it}} + \mathbf{\beta_1 Totalfee_{it+1}} + \sum_{k=1}^{16} \beta_k \, \text{Controls}_{it} + \varepsilon_{it} \quad (3.2)$$

$$\text{AudRep}_{it+1} = \beta_0 + \mathbf{D_1Resta_{it}} + \mathbf{\beta_1 Totalfee_{it+1}} + \sum_{k=1}^{16} \beta_k \, \text{Controls}_{it} + \varepsilon_{it} \quad (4.1)$$

$$\text{AudRep}_{it+1} = \beta_0 + \mathbf{D_1Resta_{it}} + \mathbf{\beta_1 Audfee_{it+1}} + \mathbf{\beta_2 Resta_{it} * Audfee_{it+1}} + \sum_{k=1}^{16} \beta_k \, \text{Controls}_{it} + \varepsilon_{it} \quad (4.2)$$

The explanatory variable in models 3 and 4 was dummy *AudRep$_{it+1}$*, which indicates whether the company replaced auditors in the year following a restatement due to quantitative reasons concerning financial statements (Hennes *et al.*, 2014; Ma *et al.*, 2015; Mande & Son, 2013).

CVM Resolution No. 23, effective February 25, 2021, provides that the maximum time allowed for an audit firm to serve the same client is five consecutive years. This time may be extended to 10 years when there is a Statutory Audit Committee. Observations concerning the rotation of auditors according to the guidelines were excluded, so only voluntary replacements were considered.

Like models 1 and 2, the explanatory variable of interest was dummy Restate$_{it}$, indicating whether the companies restated financial statements due to a quantitative reason related to financial standards (Chen *et al.*, 2019; Hennes *et al.*, 2014; Marques *et al.*, 2016).

Control variables, recognized in the literature for their association with audit fees (H_1), and auditor replacement (H_2), were used to mitigate endogeneity problems and the omission of variables (Blankley *et al.*, 2012; Castro *et al.*, 2015; Chen *et al.*, 2019; Dantas & Ramos, 2019; Feldmann *et al.*, 2009; Hennes *et al.*, 2014; Ma *et al.*, 2015; Mande & Son, 2013; Marques *et al.*, 2017; Marques *et al.*, 2016; Rocha *et al.*, 2016; Salehi *et al.*, 2017). These variables include:

- Company size: associated with higher fees and a lower probability of auditors being replaced (Chen *et al.*, 2019; Hennes *et al.*, 2014).
- Liquidity: indicates the audited company's payment ability. It was linked to lower risk for the auditors and reflected a lower probability of auditor replacement (Castro *et al.*, 2015; Hennes *et al.*, 2014).
- ROE volatility: it is considered an indicator of risk for the auditor and is positively associated with auditor fees and replacement due to the need for more specialized audits (Qasem et al., 2020).
- Debt, losses, and sales growth: Leveraged companies with sales losses and growth were identified as more likely to replace auditors and were also associated with higher fees (Jaggi & Lee, 2002; Mande & Son, 2013; Rocha *et al.*, 2016).
- Modified opinion and a Big4 auditor: associated with higher fees and lower probability of auditor replacement (Jaramillo *et al.*, 2012; Rocha *et al.*, 2016; Hennes *et al.*, 2014).
- Audit committees: are associated with higher fees but also act as an anti-replacement mechanism, decreasing the probability of auditor replacement (Abbott *et al.*, 2003; Waresul & Moizer, 1996; Carcello & Neal, 2003).

Economic variables, such as life cycle stage, corporate governance segment, economic sector, and year, were used to capture economic aspects. Table 1 lists the control variables, how they were operationalized, and previous studies supporting the expected relationships with the variables explained in models (1), (2), (3), and (4).

Table 1

Operationalization of control variables

Acronym	Description	Operationalization	Expected signs		Previous studies
			$Audfees_{it+1}$	$AudRep_{it+1}$	
$Size_{it}$	Size	Natural Logarithm of AT_{it}	(+)	(-)	Chen et al. (2019), Hennes et al. (2014), Rocha et al. (2016)
LC_{it}	Current liquidity	$\frac{AC_{it}}{PC_{it}}$	(-)	(-)	Castro et al. (2015), Chen et al. (2019), Salehi et al. (2017)
CR_{it}	Proportion of Accounts Receivable and Inventory	$\frac{CR_{it} + Est_{it}}{AT_{it}}$	(+)	(+)	Blankley et al. (2012), Chen et al. (2019), Landsman et. al (2009), Salehi et al. (2017)
σ $(ROE)_{it}$	Coefficient of variation of Return on PL	$\frac{\sigma(ROE_{it})}{\mu(ROE_{it})}$	(+)	(+)	Salehi et al. (2017)
$Debt_{it}$	Debt	$\frac{EmprFinC_{it} + EmprFinNC_{it}}{AT_{it}}$	(+)	(+)	Castro et al. (2015), Chen et al. (2019), Mande and Son (2013)
$Grow_{it}$	Sales Growth	$\frac{RL_{it} - RL_{it-1}}{RL_{it-1}}$	(+)	(+)	Cahan e Sun (2015); Rocha et al. (2016)
$Prej_{it}$	Accumulated loss	Dummy assumes 1 if the company presents accumulated losses in the period, and 0 otherwise	(+)	(+)	Blankley et al. (2012); Brighenti et al. (2016), Mande and Son (2013)
$Opin_{it}$	Auditor Opinion	Dummy assumes 1 for modified opinion, and 0 otherwise	(+)	(+)	Brighenti et al. (2016) Mande e Son (2013), Rocha et al. (2016), Salehi et al. (2017)
$Auditor_{it}$	Not Big4	Dummy assumes 1 if the company was not audited by a Big4 (DTT, EY, PwC or KPMG), and 0 if audited by a Big4.	(-)	(+)	Castro et al. (2015), Chen et al. (2019), Hennes et al. (2014)
$CAUD_{it}$	Auditor Committee	Dummy assumes 1 when there is an audit committee, and 0 otherwise.	(+)	(-)	Carcello and Neal (2003), Rocha et al. (2016)
ECV_{it}	Life Cycle Stage	Dummy assumes 1 for the i^{th} internship in year t, and 0 otherwise.	(+/-)	(+/-)	Dickinson (2011)
$SEGM_{it}$	Economic segment	Dummy assumes 1 for the i^{th} segment in year t, and 0 otherwise.	(+)	(-)	Bortolon et al. (2013), Dantas e Ramos (2019), Marques et al. (2017)
$Sector_{it}$	Economic sector	Dummy for the i^{th} sector in year t, and 0 otherwise.	(+/-)	(+/-)	Reid et al. (2019)
$Year_{it}$	Year	Dummy assumes 1 for year t, and 0 otherwise.	(+/-)	(+/-)	Marques et al. (2017)

Note: $AT_{i,t}$ – Total Assets; $AC_{i,t}$ – Current Assets; $PC_{i,t}$ – Current Liabilities; $CR_{i,t}$– Accounts Receivable; $Est_{i,t}$– Stock; $EmprFinC_{i,t}$– Loan and Current Financing; $EmprFinNC_{i,t}$– Loan and Non-Current Financing; $RL_{i,t}$ – Firm's Net revenue/year; $RL_{i,t-1}$ – Firm's Net Revenue of the firm in the previous year; *DTT*: companies audited by Deloitte; *EY*: companies audited by Ernst Young; *KPMG*: companies audited by KPMG; *PWC*: companies audited by PriceWaterHouseCoopers.

4. Data analysis and results

4.1 Descriptive analysis of the quantitative variables

The descriptive statistics (Table 2), based on the *t-test* for differences between the means of the restatement and no restatement groups, approximately 16.85% of the total observations in the sample comprised data from companies that restated FS in the period.

Table 2
Descriptive statistics of quantitative and qualitative variables used in the model

	N	No restatement N = 2.255[1]	Restatement N = 457[1]	p-value
$Audfees_{it+1}$	2,393	12.73 (1.41)	12.95 (1.42)	0.00**
$Totalfee_{it+1}$	2,393	12.80 (1.45)	13.03 (1.46)	0.00**
$Size_{i,t}$	2,712	21.17 (1.97)	21.52 (1.93)	0.00***
$LC_{i,t}$	2,705	2.03 (3.16)	1.86 (2.75)	0.30
$Debt_{i,t}$	2,712	0.35 (0.35)	0.32 (0.29)	0.08.
$\sigma ROE_{i,t}$	1,849	51.29 (45.92)	50.45 (44.57)	0.80
$CR_{i,t}$	2,712	0.24 (0.22)	0.23 (0.21)	0.70
$Grow_{i,t}$	2,306	0.09 (0.39)	0.23 (0.50)	0.00***
$AudRep_{it+1}$	2,321			0.14
Did not replace		1,453 (75%)	276 (72%)	
Replaced		482 (25%)	110 (28%)	
$Auditor_{it}$	2,653			0.00***
NBIG4		669 (30%)	107 (24%)	
DTT		354 (16%)	76 (17%)	
KPMG		438 (20%)	81 (18%)	
PWC		327 (15%)	83 (18%)	
EY		414 (19%)	104 (23%)	
$Prej_{it}$	2,712			0.07.
No		1,481(66%)	320(70%)	
Yes		774 (34%)	137 (30%)	
$Opin_{it}$	2,708			0.60
No		2,093 (93%)	422 (92%)	
Yes		158 (7.0%)	35 (7.7%)	
$CAUD_{it}$	2,712			0.20
No		1,842 (82%)	361 (79%)	
Yes		413 (18%)	96 (21%)	
ECV_{it}	2,623			0.00**
Grow		513 (23%)	138 (32%)	
Decl		142 (6.5%)	18 (4.1%)	
Intro		252 (12%)	58 (13%)	
Matur		1,078 (49%)	182 (42%)	
Turb		202 (9.2%)	40 (9.2%)	
$SEGM_{it}$	2,712			0.01**

	N	No restatement N = 2.255[1]	Restatement N = 457[1]	p-value
TRAD		1,300 (58%)	227 (50%)	
L1		137 (6.1%)	39 (8.5%)	
L2		89 (3.9%)	21 (4.6%)	
NM		729 (32%)	170 (37%)	

Notes: [1]Mean (Standard deviation); n (%). [2]T-test for the quantitative variables. Kruskal-Wallis Test for the qualitative variables*** p < 0.001; ** p < 0.01; * p < 0.05; . p < 0.10. ***Audfee***$_{it+1}$: Logarithm of the values paid, deflated according to the inflation index observed in year t+1; ***Totalfee***$_{it+1}$: Logarithm of the values paid, deflated according to the inflation index observed in year t+1; ***Size***$_{i,t}$: Company's size/year; ***LCit***: Company's current liquidity/year; ***Debt***$_{i,t}$: Firm leverage/year; ***σROE***$_{i,t}$: Volatility of the firm's Return on Equity/year; ***CR***$_{i,t}$: Firm's Proportion of Accounts Receivable and Inventory/year; ***Grow***$_{i,t}$: Variation of company's net sales/year. ***AudReplace***$_{i,t+1}$: *Dummy* assumes 1 when the audit firm was replaced on the subsequent year, and 0 otherwise; ***Auditor***$_{i,t}$: *Dummy* assumes 1 if the company was not audited by a Big4 (*DTT, EY, PwC or KPMG*), and 0 if it was audited by a Big4 in year t; NBIG4: Companies not audited by a Big4 in year t. ***Prej***$_{i,t}$: *Dummy* assumes 1 when company recorded a loss/year, and 0 otherwise. ***Opin***$_{i,t}$: Dummy assumes 1 when the company received a modified opinion, and 0 otherwise; ***CAUD***$_{i,t}$ Dummy assumes 1 when the company has an audit committee, and 0 otherwise; ***ECV***$_{i,t}$: Dummy assumes 1 for the ith stage in year t, and 0 otherwise (Growth, Decline, Introduction, Maturity, and Turbulence); ***SEGM***$_{i,t}$: *Dummy* assumes 1 if company is Level 1 (L1), 2 if Level 2 (L2), 3 if Novo Mercado (NM), and 0 if Traditional.

The companies that restated their FS reported significantly higher audit fees than their counterparts that did not restate FS, which corroborates previous studies (Chen *et al*., 2019; Feldmann *et al*., 2009). This relationship is explained by the low quality of accounting information and ineffective internal controls associated with restatements (Gertsen *et al.,* 2006). As auditors perceive these companies to impose a higher risk, they charge higher fees to compensate for litigation and reputation risks (Chen *et al*., 2019; Feldmann *et al*., 2009).

As for the control variables, company size *(Size*$_{it}$*)* and sales growth *(Grow*$_{it}$*)* are statistically associated with restatements (Cunha *et al*., 2017; Huang & Nardi, 2020; Landsman *et al*., 2009; Marques *et al*., 2017; Soares *et al*., 2018; Stice, 1991), a finding that is in line with previous studies. Due to greater operational complexity, larger companies are more likely to present errors in their financial reports, justifying the need for restatements (Marques et al., 2016). Growing companies face management challenges associated with greater audit risk and, consequently, higher fees (Stice, 1991).

In the context of audit firms, despite the statistically significant differences between the groups, most companies are audited by a Big4, which reflects market concentration, also found by previous studies (Chen *et al*., 2019; Hennes *et al*., 2014; Marques *et al.,* 2016; Marques *et al*., 2017; Huang & Nardi, 2020). The prevalence of companies audited by the Big4 possibly explains a search for independent and transparent audit firms. However, such a concentration suggests potential sample bias.

As for accumulated losses, companies that did not restate FS but had accumulated losses surpassed those that restated FS. Companies reporting losses were expected to be more susceptible to restatements. However, the analysis shows divergent results, indicating that companies may voluntarily restate FS to adjust or improve their financial statements, avoiding adverse reactions from the market.

Regarding life cycle stages, the highest frequency of restatements occurred among companies in the Maturity and Growth stages, partially contradicting expectations. Companies in the extreme stages would be expected to restate financial statements, but the results did not fully corroborate such an expectation.

Regarding governance levels, companies in the Traditional segment presented the highest number of restatements, followed by the *Novo Mercado* segment. Such a result contradicts the expectation that companies with higher levels of governance would incur in fewer errors and, therefore, fewer restatements (Salehi et al., 2017). However, in accordance with previous studies, the demand for higher-quality audits in large companies using one of the Big4 may increase the likelihood of restatements (Marques *et al.*, 2017).

4.2 Association between restatements and independent auditors' fees

Regression analysis with panel data (robust standard errors) was used to analyze Hypothesis 1 (H_1), which predicts a positive association between restatements and the subsequent increase in auditor fees. In addition to providing associative evidence, the techniques adopted here were intended to solve heteroscedasticity and autocorrelation problems in the model. Table 3 addresses two analyses, the first (1), constructed through regression with specific audit fees *(*$Audfees_{it+1}$*)*, and the second (2), having total fees as the explained variable *(*$Totalfee_{it+1}$*)*.

Table 3

Regression statistics to analyze the association between audit fees (specific/total) and restatements ***(H$_1$)***

	Mod.1.1	Mod.2.1	Mod.1.2	Mod.2.2
Intercept	1.35 * (0.62)	1.37 * (0.62)	1.38 * (0.63)	1.40 * (0.63)
$Restate_{it}$	0.07 (0.04)	0.12 * (0.05)	0.03 (0.04)	0.08 (0.05)
$AudRep_{it+1}$	-0.12 *** (0.03)	-0.09 * (0.04)	-0.11 ** (0.03)	-0.08 * (0.04)
$Restate_{it}$ * $AudRep_{it+1}$		-0.19 * (0.09)		-0.18 * (0.09)
DTT_{it}	0.27 *** (0.07)	0.26 *** (0.07)	0.25 *** (0.07)	0.25 *** (0.07)
$KPMG_{it}$	0.09 (0.07)	0.09 (0.07)	0.10 (0.07)	0.10 (0.07)
PWC_{it}	0.21 ** (0.07)	0.20 ** (0.07)	0.22 ** (0.07)	0.22 ** (0.07)
EY_{it}	0.26 *** (0.07)	0.25 *** (0.07)	0.28 *** (0.07)	0.27 *** (0.07)
$Size_{it}$	0.54 *** (0.03)	0.54 *** (0.03)	0.55 *** (0.03)	0.55 *** (0.03)
LC_{it}	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
$Debt_{it}$	0.09 (0.10)	0.09 (0.10)	0.09 (0.11)	0.10 (0.11)
σROE_{it}	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
CR_{it}	-0.20 (0.18)	-0.20 (0.18)	-0.23 (0.18)	-0.23 (0.18)
$Grow_{it}$	0.06 (0.04)	0.06 (0.04)	0.08. (0.04)	0.07. (0.04)
$Prej_{it}$	0.02 (0.05)	0.02 (0.05)	-0.02 (0.05)	-0.02 (0.05)
$Opin_{it}$	-0.01 (0.05)	-0.01 (0.05)	-0.01 (0.05)	-0.01 (0.05)
$CAUD_{it}$	0.03 (0.06)	0.04 (0.06)	0.00 (0.06)	0.01 (0.06)
$Intro_{it}$	-0.01 (0.06)	0.00 (0.06)	-0.02 (0.06)	-0.01 (0.06)
$Matur_{it}$	0.02 (0.04)	0.02 (0.04)	0.02 (0.04)	0.02 (0.04)
$Turb_{it}$	-0.07 (0.06)	-0.06 (0.06)	-0.07 (0.06)	-0.06 (0.06)
$Decl_{it}$	0.01 (0.08)	0.01 (0.08)	0.03 (0.08)	0.03 (0.08)
$L1_{it}$	0.22 * (0.10)	0.22 * (0.10)	0.24 * (0.10)	0.24 * (0.10)
$L2_{it}$	-0.36 * (0.15)	-0.36 * (0.15)	-0.42 ** (0.15)	-0.42 ** (0.15)
NM_{it}	-0.02 (0.18)	-0.02 (0.18)	0.04 (0.19)	0.04 (0.19)
N	1.382.00	1.382.00	1.382.00	1.382.00
R^2	0.72	0.72	0.71	0.71
Adjusted R^2	0.71	0.71	0.70	0.70
p-value	0.00	0.00	0.00	0.00
Panel type	EA	EA	EA	EA
Year control	Yes	Yes	Yes	Yes
Sector control	Yes	Yes	Yes	Yes

*** p < 0.0001; ** p < 0.01; * p < 0.05. Clustered robust standard errors.

The results summarized in Table 3 indicate significant associations between variables related to restatements and audit contracts. According to previous studies, the main variable ($Restate_{it}$) presents a significant positive association at 5% with specific fees ($Audfees_{it}$), supporting H_1 (Chen *et al.*, 2019; Feldmann *et al.*, 2009). Companies restating FS tend to pay higher fees for audit services in the following year, which reflects the auditors' perceived risk and level of specialization (Bedard & Johnstone, 2004; Giordani et al., 2020; Mayoral & Segura, 2007).

The replacement of the audit firm ($AudRep_{it+1}$) is significantly and negatively associated (at 5%) with both specific fees and total fees, corroborating previous studies (Castro et al., 2015; Dantas & Ramos, 2019; Feldmann et al., 2009). Such an association persists after a restatement, as evidenced by the significant negative coefficient on the interaction variable $Restate_{it}$*$AudRep_{it+1}$. Decreased fees may be explained by several factors, such as the transition from a Big4 to a non-Big4 audit, the audit firms' strategy of charging lower fees at the beginning of a relationship with a company, and the company's desire to cut costs.

Companies audited by one of the Big4 show a significant positive association (at 0.1% and 1%) with specific and total fees, compared to companies not audited by a Big4, reflecting the notion of premium quality (Brighenti et al., 2016; Castro *et al.*, 2015; Hennes *et al.*, 2014). The variable $Size_{it}$ shows a significant positive association, at 0.1%, with specific and total fees, indicating that larger companies tend to pay higher fees, also in agreement with previous studies (Brighenti et al., 2016; Castro et al., 2015; Chen *et al.*, 2019; Dantas & Ramos, 2019).

Different levels of corporate governance influence audit fees in different ways, such as increasing or decreasing fees. This finding aligns with the notion that higher levels of governance are costly but possibly reflect a higher quality of reports and internal controls, leading auditors to charge lower fees (Griffin et al., 2008). Sales growth ($Grow_{it}$) presents a significant positive association (at a 10% level) with total fees ($Totalfee_{it+1}$), reflecting the difficulty in controls and the risk of restatement associated with sales growth (Kryzanowski & Zhang, 2013; Landsman et al., 2009; Stice, 1991). Other variables were not statistically significant, and the global model shows an R^2 of approximately 72% for specific fees and 71% for total fees after the inclusion of control variables. These findings contribute to understanding the dynamics between restatements, audit fees, and the replacement of audit firms.

4.3 Association between restatements and the replacement of audit firms

The Logit approach with robust standard error was adopted to analyze hypothesis 2 (H_2), controlling for year, sector, and the obligation to replace the audit firm. The results presented in Table 4 (odds ratio), indicate that companies that restate financial statements are more likely to replace auditing firms, regardless of whether the contract involves specific audit fees only ($Audfees_{it+1}$) or includes additional services ($Totalfee_{it+1}$). These findings support H_2 and align with previous studies, such as Hennes et al. (2014), Ma *et al.* (2015), and Mande and Son (2013), who highlighted that restatements reflect low-quality financial information and impose significant repercussions, especially for auditors, who face the loss of reputation due to a failure in timely detecting errors. Hence, companies may voluntarily terminate the contract with an audit firm to mitigate adverse market reactions, indicating that corrective measures were intended to exempt them from the responsibility for failure and restore investor confidence (Hennes *et al.*, 2014; Ma *et al.*, 2015).

Table 4

Logistic regression to analyze the association between the replacement of the audit firm and restatements (H_2)

	$AudRep_{it+1}$			
	Mod. 3.1	**Mod. 4.1**	**Mod. 3.2**	**Mod. 4.2**
$Restate_{it}$	1.01 (0.19)	55.52 * (103.18)	1.01 (0.19)	38.66 * (69.14)
$Audfees_{it+1}$	0.77 ** (0.06)	0.82 * (0.07)		
$Restate_{it} \cdot Audfees_{it+1}$		0.74 * (0.10)		
$Totalfeeit_{+1}$			0.82 * (0.67)	0.87 (0.77)
$Restate_{it} \cdot Totalfeeit_{+1}$				0.76 * (0.10)
DTT_{it}	1.49 (0.37)	1.50 (0.37)	1.44 (0.35)	1.45 (0.36)
$KPMG_{it}$	1.48. (0.36)	1.46 (0.35)	1.45 (0.35)	1.42 (0.34)
PWC_{it}	0.95 (0.25)	0.94 (0.25)	0.93 (0.25)	0.92 (0.25)
EY_{it}	0.99 (0.24)	0.96 (0.24)	0.99 (0.24)	0.95 (0.24)
$Size_{it}$	1.12 (0.08)	1.12 (0.08)	1.09 (0.08)	1.08 (0.08)
Lc_{it}	1.01 (0.04)	1.01 (0.04)	1.01 (0.04)	1.01 (0.04)
$Debt_{it}$	0.69 (0.24)	0.67 (0.24)	0.70 (0.24)	0.68 (0.24)
σROE_{it}	1.00. (0.00)	1.00. (0.00)	1.00. (0.00)	1.00. (0.00)
CR_{it}	1.37 (0.53)	1.33 (0.51)	1.33 (0.51)	1.29 (0.50)
$Grow_{it}$	0.99 (0.20)	0.96 (0.19)	1.00 (0.20)	0.96 (0.19)
$Prej_{it}$	0.94 (0.17)	0.94 (0.17)	0.92 (0.17)	0.93 (0.17)
$Opin_{it}$	1.09 (0.26)	1.08 (0.26)	1.09 (0.26)	1.09 (0.26)
$CAUD_{it}$	0.95 (0.17)	0.95 (0.17)	0.94 (0.17)	0.93 (0.16)
$Intro_{it}$	0.75 (0.20)	0.74 (0.20)	0.75 (0.20)	0.74 (0.20)
$Matur_{it}$	1.36. (0.24)	1.33 (0.24)	1.35. (0.24)	1.32 (0.24)
$Turb_{it}$	1.52 (0.41)	1.50 (0.40)	1.53 (0.41)	1.50 (0.40)
$Decl_{it}$	0.89 (0.32)	0.92 (0.33)	0.89 (0.32)	0.91 (0.33)
$L1_{it}$	1.03 (0.17)	1.03 (0.17)	1.02 (0.16)	1.02 (0.16)
$L2_{it}$	1.10 (0.25)	1.05 (0.24)	1.12 (0.26)	1.08 (0.25)
NM_{it}	1.00 (0.27)	0.99 (0.27)	1.01 (0.28)	1.01 (0.28)
N	1.277	1.277	1.277	1.277
GL	40.00	41.00	40	41
AIC	1,371.99	1,369.15	1,376.10	1,373.8
LogLik	-645.99	-643.58	-648.04	-645.90
Sensitivity	0.57	0.60	0.67	0.70
Accuracy	0.70	0.69	0.61	0.61
Year Control	Yes	Yes	Yes	Yes
Sector Control	Yes	Yes	Yes	Yes

*** p < 0.001; ** p < 0.01; * p < 0.05; . p < 0.10. Clustered robust standard errors.

Regarding specific audit fees ($Audfees_{it+1}$), a significant association was found, indicating that higher fees are less likely to influence the replacement of audit firms than lower fees. Two aspects possibly explain this relationship: (i) high fees possibly provide auditors with better working conditions, enabling them to allocate additional resources and specialize their teams to minimize adverse risks (Chen et al., 2019; Harahap et al., 2018); (ii) however, excessively high fees may make auditors susceptible to their clients' undue influence on the audit firm's opinion, undermining the integrity of the financial statements (Setyawati et al., 2023), as suggested by the Agency Theory proposed by Jensen and Meckling (1976). Nevertheless, no statistical significance was found for the relationship between total fees ($Totalfee_{it+1}$) and the decision to replace the audit firm.

The interactions $Restate_{it}$*$Audfees_{it+1}$ and $Restate_{it}$*$Totalfee_{it+1}$ were statistically significant. Companies that restated FS and paid higher fees were less likely to replace the audit firm after a restatement. This finding suggests that, even though negotiation of new contracts may be harmed after a restatement and consequent loss of reputation, companies paying higher fees are less likely to replace the audit firm due to high replacement costs and the limited availability of audits of comparable quality (Hennes *et al.*, 2014; Mande & Son, 2013). Furthermore, new auditors may demand even higher fees than the previous ones to compensate for the risk of litigation and loss of reputation (Chen *et al.*, 2019; Giordani *et al.*, 2020). Thus, maintaining the current contract may be an acceptable alternative, considering the importance of organizational reputation and market implications (Swanquist & Whited, 2015).

Additionally, companies with volatile ROE are more likely to replace the audit firm than those with stable ROE. This variable is a risk proxy and reflects how the market assesses a company. Companies with highly volatile ROE may prefer more specialized auditors due to business uncertainties and complexity (Qasem et al., 2020).

As for the other control variables, no significant associations were found to influence the voluntary decision to replace the audit firm.

5. Conclusion

The impact of restating financial statements (FS) on audit contracts was investigated from 2010 to 2020 in a sample of 323 non-financial companies listed on B3. We used statistical methods and panel regressions to examine the relationship between restatements and audit fees (H_1) and the likelihood of companies replacing the audit firm (H_2).

The results show that companies restating FS tend to pay higher fees the following year, which supports H_1. This finding aligns with the literature suggesting that the remuneration of audit contracts increases due to perceived risk. However, when the audit firm is replaced after a restatement, fees tend to decrease, possibly due to a transition from a Big4 to a non-Big4 audit firm (Feldmann *et al.,* 2009) or due to efforts to reduce costs (Dantas & Ramos, 2019).

Additionally, companies restating FS are more likely to voluntarily change the audit firm, confirming H_2. It indicates that audited companies seek punishment to exempt themselves from the responsibility for the failure and regain investor confidence. Auditors and audited companies seek to mitigate the adverse impacts of restatements, with new auditors incorporating litigation and reputation risk into their fees and companies blaming the former auditors for the restatement, replacing the audit firm.

These results provide a relevant contribution to stakeholders involved in audit contract negotiations, including auditors and audit and governance committees. Such evidence supports decisions concerning the hiring of independent audit firms and strengthens Jensen and Meckling's Agency Theory (1976) by highlighting empirical evidence related to the costs imposed by conflicts of interest between agents.

Nonetheless, some of this study's intrinsic limitations must be acknowledged. Based on data from non-financial companies listed on B3, the results do not allow for the generalization of results to different sectors or countries. A lack of specific analysis regarding which financial indicators were changed during restatements may have influenced the results. The low occurrence of quantitative and *ex officio* restatements also limits the analysis of the effects of such an event despite its potential impact on the replacement of audit firms and changes in auditors' fees.

Future analyses are suggested to address these limitations and consider factors not explored here, such as regulatory and corporate governance elements, possibly influencing the companies' decisions regarding audit contracts after restatements. Applying the Difference in Differences (DiD) approach may help examine the pre- and post-restatement effects on the replacement of audit firms and fee changes. A more in-depth analysis of the negotiation process between the parties involved is a relevant variable to explore, considering the specific type of restatements.

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Alternative analysis of transparency in sustainability reports: a critical literature review

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Abstract

The concept of transparency is widely used in accounting literature; its general use has caused information confusion and opacity when it concerns sustainability reports though. Given the complexity of measuring sustainability information, the use of this construct may not be the most appropriate. Researchers may be using the concept of transparency in a way aligned with its use in financial accounting, regardless of its particularities. Hence, we critically analyze whether scholars share the same understanding of the transparency concept within the scope of sustainability reports and the implications of this construct for accounting. This literature review comprises studies published from 2018 to 2022. The main result reveals that the studies presented different understandings regarding the transparency of sustainability reports. Given the complexity surrounding sustainability information, other alternative concepts could contribute to understanding these reports. The objective is to present a reflection and encourage such a discussion, considering that expectations about the scope of transparency can be mistaken. Contributions are concerned with encouraging a discussion in the academic community, reporting organizations, and regulators about some key aspects.

Keywords: Transparency; Sustainability report; Socio-environmental disclosure; Standardization of sustainability reports; Critical review of the literature.

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1. Introduction

Sustainability Reports (SR) are a mechanism that enables companies to report and communicate information on sustainability issues to all those with whom these organizations interact (Laine, Tregidga, & Unerman, 2021). Although SR do not address all corporate complex interactions, such reports are expected to increase transparency, revealing corporate actions, interactions, and strategies related to social, environmental, and economic impacts (Gray & Bebbington, 2001; Owen, Gray, & Adams, 2014).

An increasing number of companies have voluntarily published SR in recent years (Larrinaga *et al.*, 2020; Larrinaga & Bebbington, 2021). This increase results from different stakeholders pressuring for greater corporate transparency so that sustainability disclosure has become a norm for a specific group of organizations (Larrinaga & Senn, 2021). Additionally, researchers have documented that such a disclosure has become an institutionalized business practice among large companies (Higgins & Larrinaga, 2014; Cho *et al.*, 2015; Larrinaga *et al.*, 2020).

Corporate social and environmental information disclosure may take many forms because there are no standards for such reports (Laine, Tregidga, & Unerman, 2021; Larrinaga & Senn, 2021). In countries where this practice is voluntary, organizations may choose how to report according to their interests and target audiences. Moreover, they may determine the content and extent to which information will be disclosed according to their criteria and judgment (Machado *et al.*, 2021).

The disclosure model developed by the Global Reporting Initiative (GRI) is the most frequently used and has influenced others, such as IR (Integrated Reporting), for example (Larrinaga & Bebbington, 2021). GRI suggests key themes for reports to address: materiality (analysis of the importance of the topic to be disclosed), stakeholder inclusion, context, completeness, quality of reports such as balance, comparability, precision, timeliness, reliability, and clarity (GRI, 2015; Calabrese *et al.*, 2019; Melquiades Soares, 2022). However, such an initiative does not cover all corporate interactions, such as those financially immeasurable and complex, such as biodiversity, human rights, and impacts on future generations and, consequently, not subject to auditing or assurance (Boiral & Heras-Saizarbitoria, 2020).

Because it concerns a voluntary report and a certain degree of subjectivity is implied when analyzing the materiality of the information to be disclosed, the credibility and transparency of RS are usually disputed (Puroila & Mäkelä, 2019; Laine, Tregidga, & Unerman, 2021). The reason is that these reports may present an optimistic structure, possibly containing impression management (Greenwashing) to distract the public from irresponsible or unsustainable practices (Neu *et al.*, 1998; Owen, Gray, & Adams, 2014; Macellari *et al.*, 2020; Boiral & Heras-Saizarbitoria, 2020; Machado, Dias & Fonseca, 2021; Crous *et al.*, 2021).

Despite GRI's suggestions for sustainability content to be disclosed in corporate reports, disclosed information also depends on aspects intrinsic to each organization's individual or local context (Chung & Cho, 2018; Ionașcu *et al.*, 2020), which implies different impacts and visibility. Some of these aspects may be, for example, the company's size (Ionașcu et al., 2020; Melquiades Soares, 2022), its operating sector (Crous et al., 2021; Machado et al., 2021), social conflicts and environmental issues (Sarmiento & Larrinaga, 2021), regulation, the costs involved, and other factors related to the interests of information users. Thus, due to the heterogeneity involved, transparency in RS is a challenge to tackle collectively (Laine, Tregidga, & Unerman, 2021; Quattrone, 2022).

Although there has been significant progress in the development of standards to guide sustainability reports, contributing to social awareness, corporate accountability, and decision-making, it remains unclear how it is possible to produce transparent sustainability reports given the inherent complexity of these documents and the different demands and expectations involved (Boiral & Heras-Saizarbitoria, 2020).

Originally, in physics, transparency is linked to an optical property of matter. A material is considered transparent when natural light passes through it; thus, one can see through it. An analogy is possible when it concerns corporate socio-environmental disclosures: reports may present some level of transparency if they allow us to see through an organization beyond its report, i.e., not just what they say but what they do in practice and their relationship with stakeholders (Ionașcu *et al*., 2020; Tang & Higgins, 2022).

Transparency, within the scope of sustainability disclosures, implies that as relationships, interactions, and external demands increase and become more widely incorporated and accommodated within an organization's context, the flexible membrane that delimits the organizational body and its external environment, expands, becoming increasingly thinner and thus more transparent (Llewellyn, 1994; Gray, 1992; Gray *et al.*, 1995). Therefore, Accounting is responsible for managing the boundaries of what is part of an entity's constellation and what is not (Burchell *et al*., 1985; Gray *et al*., 1995).

The process of increasing the level of transparency may not be the same or linear for all organizations in different national and market contexts; hence, there is an emerging paradox regarding the standardization of reporting and sustainability disclosure. On the one hand, corporate autonomy in choosing the topics to be disclosed and the restricted possibilities of auditing these social and environmental disclosures may encourage companies to manage their image and reputation by strategically using these reports (Neu *et al*., 1998) to communicate with their most relevant audiences, but using parsimonious language (Boiral & Heras-Saizarbitoria, 2020; Crous et al., 2021). However, this potential for misrepresentation leads to public scrutiny and decreases stakeholders' trust in voluntary disclosure. It may also increase costs, considering that companies may manage disclosed information without necessarily changing their *modus operandi* or leaving relevant aspects invisible to less attentive users (Neu *et al*., 1998; Chung & Cho, 2018; Quattrone, 2022).

On the other hand, internationally standardized disclosure may ignore important local/contextual aspects of a company's activities and interactions with its stakeholders. Such aspects, which are often immeasurable, must be highlighted in RS to ensure that the actions and deficiencies of sustainable corporate management are transparent (Larrinaga & Bebbington, 2021). The absence of such information also negatively affects RS transparency.

In this sense, if a standard, mandatory structure is available and relevant specific contextual aspects are not incorporated into it because they do not fit into the context experienced in other countries or companies, RS will fail to be transparent for not reliably or fully depicting the companies' context (Laine, Tregidga, & Unerman, 2021). Consequently, information users' decisions based on incomplete or misleading information may affect social well-being since imposing corporate responsibility for natural resource management and social impacts may affect organizational performance and the entire society and economy.

Despite the obstacles inherent to sustainability disclosures, several international standardization initiatives have been discussed and implemented to increase RS transparency. The International Financial Reporting Standards (IFRS) worldwide and the Corporate Sustainability Reporting Directive (CSRD) for the European Union are examples of this emerging movement. The premise of IFRS is that standardization can provide comparability between companies over time, meet the demands of the most critical stakeholders, and mitigate the practice of camouflaging, adulterating, or omitting information about the actual impacts of corporate activities (greenwashing and bluewashing). However, the demand and interests of users of accounting information are heterogeneous and cannot be based on a supposed homogeneity between developed and developing countries (Neu *et al.*, 1998; Laine, Tregidga, & Unerman, 2021).

The heterogeneous and complex characteristics of RS motivate this discussion, which aims to critically address the following question: **To what extent do researchers investigating the transparency of sustainability reports share a common vision of the definition, function, and implications of this construct in the international standardization of sustainability reports?** The answer to this question demands identifying the concepts adopted as being synonymous with corporate transparency, in addition to identifying which stakeholders are influencing such a concept and its attributes: power, legitimacy, and urgency (Michell *et al.*, 1997). This study aims to critically analyze whether academic researchers share a common understanding of the concept of transparency and the implications of this construct for sustainability reports. The expectation is that researchers will use this concept similarly to financial accounting for measurable information.

We reinforce the question concerning the extensive use of concepts arising from financial accounting in sustainability disclosures by proposing an alternative analysis to the usual and optimistic narrative of transparency in sustainability reports. This study's findings allowed us to infer that most studies reviewed here did not consider the distinction between the characteristics of sustainability information and financial information. Such a fact may drive the demands for standardization to promote comparability. Therefore, the heterogeneity and complexity of measurements are relevant for the broader scope of RS transparency and incomparability (Quattrone, 2022). Hence, the results found here are relevant to the scientific literature, considering that concepts are analyzed in addition to contextual factors on transparency and aspects of relative legitimacy.

2. Literature review

The literature review on the transparency of sustainability reports focuses on some central points of the discussion proposed here: i) discussing the heterogeneity and influence of RS stakeholder groups, which aimed to minimize the chance of ignoring groups or individuals who characterize the pressure that can give the notion of completeness or transparency of sustainability disclosures; ii) discuss the complexity of sustainability information and how this affects the disclosure of SR; iii) identify the accounting constellation of RS: groups that directly influence RS content; and iv) encourage a discussion about the effects that international RS standardization initiatives in the context of accounting may have on the level of these disclosures transparency.

2.1 Stakeholders and heterogeneity inherent to sustainability reports

As a corporate instrument for communicating with stakeholders, RS is also an accountability tool (Nijhof et al., 2019; Calabrese et al., 2019). However, different stakeholders may present different demands and interests, leading organizations to deal with different dilemmas when disclosing SR (Adel et al., 2019). Individuals and groups inside and outside organizations have different perceptions, values, and knowledge originating from different contexts. Hence, it implies that neither stakeholders nor information is uniform or homogeneous (Michell *et al.*, 1997; Neu *et al.*, 1998; Laine, Tregidga, & Unerman, 2021).

Considering that corporate activities and decisions may promptly affect stakeholders, these may seek to influence the disclosure of sustainability reports to obtain the information they want. However, a group's level of influence differs and depends on three main aspects: i) the power they hold to influence companies; ii) the legitimate nature of their relationship with companies (e.g., contractual); and iii) the urgency of these stakeholders' demands (Freeman, 1984; Mitchell et al., 1997). This typology contributes to understanding the stakeholders to whom managers tend to pay more attention or give priority.

As for the first attribute, power, we depart from the Weberian concept, which states that an individual (or group) can fulfill his/her own will despite potential resistance. In other words, the concept can be rewritten to reflect the ability of those with the power to bring about the desired results (Salancik & Pfeffer, 1974; Michell *et al*., 1997). This attribute may include the demand of investors, considered a priority, to whom standardization of disclosures may be of the highest interest (IFRS, 2021). Investors are concerned about corporate, financial, and market performance and may demand management changes to facilitate access and comparability of information.

In practice, the existence of virtual channels for accessing information to strengthen a company's relationship with investors or potential investors indicates the importance of this group of stakeholders (capital suppliers) for entities (Tang & Higgins, 2022). Power may be further strengthened by conditions that manifest in the other two attributes of the relationship: legitimacy and urgency. In other words, power alone does not ensure the preponderance of one stakeholder over another. However, power gains authority through the legitimacy of demands and is exercised through the urgency of such demands (Freeman, 1984; Mitchell *et al*., 1997).

The second attribute is the legitimacy of the relationship between an organization and its stakeholders. One group may have a legitimate (legal, contractual) demand on a company; however, unless it has the power to impose its will on the relationship or show the urgency of its demand, it will not receive due attention from the company's managers. Some examples might be local communities directly affected by corporate activities but which do not have the power to influence corporate decisions and operations, small suppliers or service providers with contracts with an organization that cannot influence a company, and public interest groups who defend a cause related to an organization, but lack the practical capacity to influence its decisions (Freeman, 1984; Mitchell *et al*., 1997; Laine, Tregidga, & Unerman, 2021).

The third attribute is urgency. It represents the degree to which stakeholders require immediate action. In this attribute, stakeholders' perceptions of a company are relevant, i.e., when a given stakeholder considers its demand or relationship with the company critical or significant. Ownership (owners and shareholders), sentimental value (family), expectations (employees and collaborators), and exposure (risk involved) are characteristics that reinforce the emerging attribute of the relationship. However, urgency alone is insufficient to ensure that a stakeholder group is more prominent than another. The relationship is strengthened and can receive greater attention from managers when urgency is combined with at least one of the former attributes (Mitchell *et al*., 1997).

Therefore, stakeholders may comprise different individuals, groups, or organizations that vary according to the context and over time (Gray, 1992; Laine, Tregidga, & Unerman, 2021). Stakeholders may be capital providers (investors and creditors), legal representatives, regulators, governments, customers, suppliers, communities in which the company operates, employees, consumers, Non-Governmental Organizations (NGOs), activist groups, academic communities, society, environment, and future generations (Gray, 1992; Calabrese *et al*., 2019; Sarmiento & Larrinaga, 2021; Laine, Tregidga, & Unerman, 2021). Future generations will be impacted, considering corporate actions, especially in more sensitive sectors, impact the planet's sustainability regarding potential pollution, dam collapse, or others (Neu *et al*., 1998).

In general, the presence of the attributes previously listed – power, legitimacy of the relationship between the organization and stakeholder, and urgency – reveal that the concept of stakeholders is broad, including different groups that impact or are impacted by organizations in different ways (Freeman, 1984; Laine, Tregidga, & Unerman, 2021). Those with the greatest power to impose their influence, due to their demands' legitimacy and urgency, will be prioritized. Each attribute has dynamic characteristics that may vary across relationships between participants and managers or within a single relationship over time. Furthermore, the three attributes are the result of a perceptual social construction and may be correctly or falsely perceived by participants, managers, and others in the company environment (Mitchell *et al*., 1997).

Figure 1 presents the classification of different groups of stakeholders together with a combination of the attributes of power, legitimacy, and urgency

Group	Typology	Stakeholders	Attributes	Characteristics
1	Dominants	Investors Employees Top executives Managers Main customers Unions Creditors	Stakeholders with a high level of power, legitimacy, and urgency	Highly influential stakeholders with legitimate demands and urgent needs. These stakeholders are generally the most important to the organization and require immediate attention.
2		Government Standard setters Regulators NGOs Consumers	Stakeholders with high levels of power and legitimacy but low levels of urgency	Highly influential stakeholders with a legitimate relationship with the company but whose demands do not require immediate attention.
3		Competitors Suppliers Environment	Stakeholders with a high power level, low legitimacy, and urgency.	Highly influential stakeholders but lack a legitimate basis for their urgent demands or needs
4	Dependents	Local communities Native people Small suppliers Service providers Activists Society	Stakeholders with a low level of power, high legitimacy, and low urgency	Stakeholders have a low influence level, though with legitimate demands. These stakeholders generally have legitimate interests in the organization but are not highly influential.
5	Critics (counter-accounts)	Media NGOs Organized activists Scientific community	Stakeholders with a high level of power, a low level of legitimacy, and a high level of urgency	Highly influential stakeholders who lack a legitimate relationship with the company; their demands require immediate attention

Source: adapted from Freeman, 1984; Michell et al.,1997; Neu et al., 1998; Laine, Tregidga, & Unerman, 2021).

Figure 1. Typology with a combination of stakeholders' attributes

According to the attributes a group possesses, we may assume that some groups also have a greater capacity to influence corporate decisions regarding the disclosure of sustainability information. For example, certain groups' demand for the international standardization of sustainability reports tends to favor some groups to the detriment of other less influential stakeholders. Despite the absence or under-representation of some stakeholders, the optimistic discourse of RS is, over time, accepted by individuals as transparent and may even influence the local or global academic community (Gómez-Villegas & Larrinaga, 2022).

The standardized disclosure of RS homogenizes different contexts to promote greater transparency and comparability of disclosures for investors. The standardization of reports may limit transparency though, as it may not consider the specificities of organizations' actions and their impacts on other less influential groups despite their relevance in the decision-making process, such as investments. Hence, RS reveals the heterogeneity of different stakeholders, demands, ability to influence, and the different characteristics of the institutional contexts in which these reports are disclosed. The following section discusses the theoretical and conceptual aspects of sustainability information to address the complex characteristics affecting RS transparency.

2.2 The complexity of sustainability reports

There is a natural limitation in the conceptual discussion of RS transparency, which is concerned with its complexity. Different dimensions of sustainable development would need to be translated and incorporated. These dimensions are not readily adaptable to quantifiable indicators (Guix et al., 2019; Larrinaga, 2023), so they are left out of the report or not fully addressed. This complexity produces a lack of integration that hinders the ability of reports to achieve their multiple objectives, such as improved performance, accountability, and transparency (Larrinaga & Bebbington, 2021), highlighting the need for more flexible reports (Băndoi *et al*., 2021).

Some examples concern climate change, biodiversity loss, human rights, and impacts on future generations. Some challenges concerning the measurement of this type of information must be overcome before it can be addressed according to a standard procedure in sustainability reports (Larrinaga & Bebbington, 2021; Sarmiento & Larrinaga, 2021; Laine, Tregidga, & Unerman, 2021), which restricts the scope and transparency of RS.

Transparency is a key concept addressed in guidelines and frameworks guiding the disclosure of accounting reports (Higgins, Tang & Stubb, 2020; Tang & Higgins, 2022). According to CPC 00 (R2) - Conceptual Framework for Financial Reporting (2019), the fundamental qualitative characteristics of accounting information are relevance (which covers materiality) and reliable representation. The characteristics of improved information are comparability, verifiability, timeliness, and comprehensibility, attributes that ensure the usefulness of disclosed information. Such characteristics become abstract and even conflicting though if analyzed within the conceptual scope of RS transparency. Virtually all of them are contradicted in the organizational practice of preparing sustainability reports, considering the complexity and heterogeneity inherent to these reports.

Thus, the use of the concept of transparency naturally implies that this characteristic can be fully achieved, which, however, does not match the context of sustainability reports, whose specific aspects are incompatible with financial reports. Transparency refers to access to all practices and the potential and diverse impacts (social, environmental, and economic) that organizations promote, both locally and globally, based on their decision to assume such practices, incorporating and publicizing them, regardless of whether they lead to good or bad news (Llewellyn, 1994; Gray *et al*., 1995).

Within the scope of initiatives concerning sustainability disclosure, we should note that proposing which topics need to be disclosed is not a bad thing, as it contributed to this important theme being incorporated by organizations and becoming known by stakeholders over time (Laine, Tregidga, & Unerman, 2021). However, restricting disclosures to some aspects, which in some way encompass all realities, may compromise RS transparency. Implicitly, this behavior may lead to the mistaken idea that disclosing only these topics would be sufficient to attribute a "transparency seal" to any entity disclosing them, regardless of other impactful contextual information not reported in the RS (Laine, Tregidga, & Unerman, 2021; Hamilton & Waters, 2022).

Disclosing a minimum standard according to a standardized logic may not be the best option for any context. In practice, contextual logic reveals many other possibilities for relevant corporate interactions that would remain unreported (Sarmiento & Larrinaga, 2021; Quattrone, 2022). In this context, SR result from an action demanding entities to adapt to existing institutionalized standards, rules, and norms shared by the organizational field, though often thought of in contexts that are entirely different from those of developing countries (Meyer & Rowan, 1977; Cho et al., 2015; Hamilton & Waters, 2022).

The conceptual discussion in the next section focuses on the groups that most directly influence RS disclosures and others that can contribute to greater RS transparency.

2.3 Practical and discursive functioning of sustainability reports

Disclosed sustainability information is influenced by the stakeholders' demands and the social context in which they operate, including the behavior of other surrounding organizations – organizational field (Laine, Tregidga & Unerman, 2021; Tang & Higgins, 2022). The deliberate choice to serve some groups and meet their demands to the detriment of others negatively interferes with RS transparency and is in line with the stakeholder theory (Freeman, 1984; Roberts, 1992; Michell *et al.*, 1997).

As previously discussed (see topic 2.1), entities tend to disclose information that is of greatest interest to an organization's most relevant stakeholders (Michell et al., 1997) and, at the same time, meet institutional expectations such as regulation, for instance (Higgins & Larrinaga, 2014). In this sense, the accounting constellation (Burchell et al., 1985) is a way to visualize the practical and discursive functioning of sustainability report transparency, considering these are partial reports (Crous et al., 2021; Tang & Higgins, 2022) and tend to maintain optimistic and proactive standards, ignoring less powerful audiences, whistleblowers, and/or critics of corporate activities (Michell *et al.*, 1997; Neu *et al.*, 1998; Ionaşcu *et al.*, 2020).

By bringing the focus of RS to respond to specific demands and interests of some groups, RS may not clearly present the contextual reality of corporate operations (such as multinationals) in the countries in which they operate. In the case of multinationals operating in sectors with greater potential for social and environmental impacts (Neu *et al.*, 1998; Sarmiento & Larrinaga, 2021; Crous *et al.*, 2021), this would reflect a lack of actual engagement of entities facing sustainability challenges, even for priority stakeholders interested in this specific and local information.

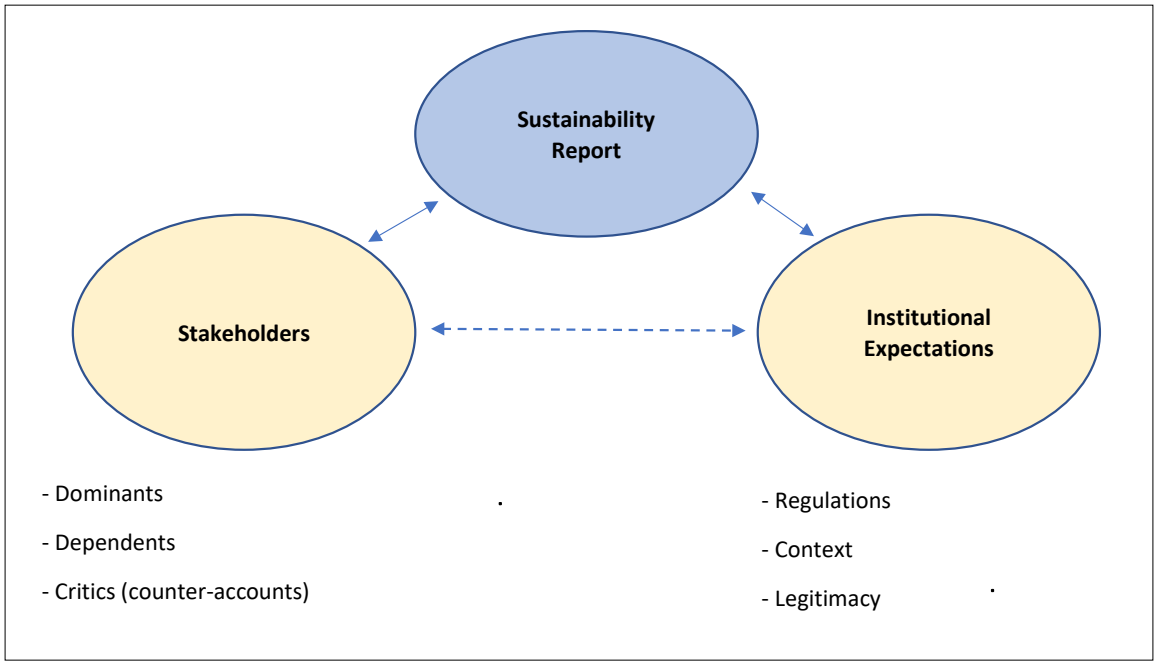
In weaker regulatory contexts, reporting entities could act differently than required in their country of origin, where there may be more rigorous regulations. The literature shows that these entities may also influence, modify, or edit RS disclosure standards according to their interests. Larrinaga and Bebbington (2021) emphasize that in multi-stakeholder scenarios, organizations also influence epistemic communities, standard setters, and governments, thus being active producers of reporting standards while also shaping their own reports. In these contexts, other monitoring instruments emerge that contribute to shaping sustainability reports, such as employees, unions, Non-Governmental Organizations (NGOs), the local community, the scientific community, and civil society (Larrinaga & Bebbington, 2021).

The various social actors also contribute in a more or less predominant manner (according to their attributes) and collaborate for disclosures to reach greater transparency in RS. Other examples of these stakeholder groups are NGOs, environmentalists, social activists, the media, and the academic community, who give voice to existing socio-environmental conflicts depending on the companies' potential socio-environmental impact (Sarmiento & Larrinaga, 2021). The literature defines these groups as counter-accounts or shadow accounts, as they are sources of information not controlled by the companies and enable the verification or comparison of corporate information with the actual context (Macellari et al., 2020). By denouncing the divergences between reports and the corporate's actual context, counter-accounts draw attention to the incongruity of organizational actions and the rights and values of other audiences (Sarmiento & Larrinaga, 2021). This pressure on organizations and society tends to favor higher levels of RS transparency (Macellari et al., 2020).

Thus, the intersection of fragmented social values, diverse stakeholder groups, and the need for companies to operate in a competitive global economy makes organizational legitimacy increasingly important but even more challenging to achieve homogeneously (Dillard & Brown, 2015). The existence of so many conflicting differences in behaviors and mentalities suggests that corporate legitimacy can vary from one context to another, which requires using accounting practices that democratically consider stakeholders' different values and interests (Brown, 2009; Dillard & Brown, 2015).

From this perspective, groups of critical stakeholders, named counter-accounts, favor the visualization of the level of transparency and reliability of the entities' RS, in addition to acting as regulators and inspectors (Macellari et al., 2020; Laine, Tregidga, & Unerman, 2021; Larrinaga & Senn, 2021). In some cases, the communication strategy of large multinational corporations in disclosing SR may be oriented towards ignoring or making invisible the demands of these critical groups, depending on the context (Neu et al., 1998). Therefore, these multinationals may restrict access to complete information, reduce public knowledge about their social and environmental practices, and impact the transparency of these reports and public trust.

The strategy of restricting access to information seeks not to legitimize by increasing disclosure in response to criticism and environmental and social claims, which organizations want to avoid (Neu *et al.*, 1998). Hence, reports would continue to meet the already established demands and expectations, not attempting to adhere to a cause or respond to more critical groups (Neu *et al.*, 1998), which would contribute to increasing the level of transparency of RS. Figure 2 presents the accounting constellation of sustainability reports considering transparency.



Note: The arrows represent the two-way influence relationships between all the groups.

Figure 2. Accounting constellation for sustainability disclosure

Figure 2 shows the pressures influencing the disclosure of sustainability information: the demands of stakeholder groups and institutional expectations. Stakeholder groups may be dominant, dependent, or critical according to their attributes. Counter-accounts belong to the group of critical stakeholders. Institutional expectations include laws, regulations, standards of conduct, and socially accepted standards in different contexts and business practices in a given sector or organizational field. Local, specific contextual and cultural aspects are also included in these expectations.

In a scenario where sustainability information is internationally standardized, sustainability reports from developing and developed countries would present the same topics and level of information despite different audiences and contextual aspects – such as regulatory rigidity, for instance (Sarmiento & Larrinaga, 2021; Gómez-Villegas & Larrinaga, 2022).

Despite the previously discussed limitations inherent to SR, the concept of transparency in sustainability disclosures presents itself in different ways in academic research. In this context, scientific publications from the last five years were collected to critically analyze whether academic research shares a common understanding of the concept of transparency and its implications for international sustainability reporting standards.

3. Methods

A narrative literature review was performed, considering studies published in the last five years, to analyze whether academic research shares a common understanding of the concept of transparency and the implications of using this construct for social and environmental accounting (SEA). The strategy proposed by Chung and Cho (2018) was used. Three criteria were established to define the scoping review. The first was to identify studies that analyzed publicly traded companies listed on the stock exchange. This criterion was established due to investors' increased demands for standardizing sustainability reports (IFRS, 2021). Additionally, these companies initiated this type of sustainability disclosure and contributed to social awareness of Corporate Social Responsibility activities and performance (Buhr, Gray, & Milne, 2014).

The second criterion was the keywords "Sustainability Report" and "Transparency" published in English in the Scopus database. The objective was to ensure the robustness of review and analysis procedures and deepen research with more significant potential to reach the global academic community, which represents a limitation in this study (Chung & Cho, 2018). The papers identified represent a small portion of the universe of existing research, as thousands of articles were found using more specific phrases such as "accounting and sustainability" and "corporate social responsibility."

The third criterion concerns the period of analysis. Studies published between 2018 and 2022 were searched for two reasons: i) initially, because the proposition of international standardization is something recent, and the literature review covering the last five years brings a more precise and more recent view of the academic perspective on the transparency of sustainability reports; and ii) Chung and Cho (2018) conducted a comprehensive literature review published between 2000 and 2017. That review encompassed relevant aspects of research on sustainability disclosures, and therefore, this review seeks to complement existing literature and contribute to the body of knowledge in the field (Massaro, Dumay, & Guthrie, 2016).

Seventy-six articles were found using the criteria of date of publication and keywords. Two reading filters were applied to select the papers composing the final sample. The first consisted of reading the papers' titles, abstracts, and keywords. Twenty-three papers were excluded in this first phase for not meeting the research objectives.

The second filter consisted of reading the papers' introductions, methodology sections, discussions, and conclusions. After this, 26 papers were excluded for not directly exploring the issue of transparency in sustainability reports. Hence, the final sample comprised 27 papers whose full texts were read for conceptual and theoretical analysis. The results were then critically discussed, following the methodological classification proposed by Oliveira et al. (2017) concerning the transparency concept.

4. Presentation and discussion of results

This literature review considered studies published in the last five years addressing the transparency concept to identify the extent to which researchers investigating the transparency of sustainability reports share a common view of the definition, function, and implications of this construct within the scope of the international standardization of sustainability reports in the dissemination of sustainability reports. The search was conducted using the Scopus database, and we reviewed the main conceptual characteristics addressed in the studies. As expected, different understandings of the concept of RS transparency were identified.

4.1 Conceptual analysis of transparency in RS

The typology proposed by Wehmeier and Raaz (2012) and adapted by Melquiades Soares (2022) was used to review the papers selected for analysis and discussion. Figure 3 presents the concepts of transparency identified in the literature. The model has five conceptual focuses: Ethics, Efficiency and Effectiveness, Communication, Legal, and Financial Performance.

Results	Concept assigned to Transparency	Characteristics	Arguments
Ethics, Relationship with stakeholders (accountability)	Ethics	Ethical arguments include the creation of policies and programs that incorporate social responsibility.	Differences between countries and contexts need to be respected. Transparency is a matter of integrity and trust.
	Communication and Relationship	A concern with establishing a dialogue and relationships between individuals and organizations. The focus is on engaging with stakeholders to understand their demands.	Information is a public good; therefore, democratic participation must be ensured, enabling periodical access.
Information comparability and control (standardization)	Efficiency and efficacy	A relationship between transparency and market performance is established, focusing on information relevant to investors.	The performance of all countries can be monitored and compared through a single and accessible methodology.
	Financial performance	Transparency is believed to contribute to increasing financial results.	An alignment between different objectives is possible, seeking to improve financial performance and sustainability.
	Laws and Regulation	The institutionalization of transparency through organizational or government policies is demanded.	The regulation of a reporting methodology is defended to ensure control, clarity, and compliance.

Source: adapted from Wehmeier and Raaz (2012) and Melquiades Soares (2022).

Figure 3. Results

Most papers used the concepts interchangeably. The studies were classified according to their discussions and conclusions though. Of the five categories used, two main categorizations of the transparency construct were found: i) Ethics of disclosures, communication and relationships with stakeholders; and ii) Comparability of information and control (see Figure 3, column 1).

Some studies (Cunha & Moneva, 2018; Calabrese *et al*., 2019; Adel *et al*., 2019; Crous *et al*., 2020; Macellari *et al*., 2020; Ionaşcu *et al*., 2020; Perello-Marin, 2022; Tang & Higgins, 2022) investigated how organizations seek to improve their reports to interact, dialogue, and be accountable to stakeholders. For instance, Tang and Higgins (2022) performed a content analysis of sustainability reports from the ten most transparent fashion companies, according to the Fashion Transparency Index 2020. This ranking includes companies from around the world. The authors use the concept of transparency as an intentional decision to expose organizational activities (various) to build stakeholder trust and improve the decision-making process. Furthermore, the authors state that the relationship between transparency in communicating sustainability information and stakeholder trust is bidirectional; in other words, the greater the trust promoted, the greater transparency tends to be.

In other studies (Zsóka, & Vajkai, 2018; García-Sánchez et al., 2020; Machado *et al*., 2021; Murillo-Avalos *et al*., 2021; Macellari *et al*., 2021; Prisandani, 2022; Correa-Mejía, 2022; Hamilton & Waters, 2022; Perello-Marin, 2022), the concept of transparency depended on how sustainability information was disclosed, or companies failed to comply with the standard of disclosure. This approach suggests that the standardization and systematization of RS disclosures are necessary to achieve transparency and promote comparability between companies. This idea reinforces a tendency towards uniform and institutionalized disclosure despite being limited. Although there are relevant differences regarding organizational impacts in the social and environmental sphere in different contexts and sectors, some papers (Zsóka, & Vajkai, 2018; Adel *et al*., 2019; Murillo-Avalos *et al*., 2021; Machado *et al*., 2021; Hamilton & Waters, 2022; Soares, 2022) indicate the existence of a demand for standardization concerning what is, or is not relevant, legitimate or material, and what should be disclosed. However, this behavior may indicate that the demands of more powerful stakeholders continue to be met while others remain invisible. In this sense, transparency is a way of seeing some things but ignoring others (Sarmiento & Larrinaga, 2021; Quattrone, 2022).

On the other hand, the non-standard way of disclosing non-financial information was addressed by Hamilton and Waters (2022), also considering companies that did not disclose sustainability information through a framework such as the GRI. Likewise, the concept of transparency is linked to comparability to achieve efficiency and effectiveness and assertive communication with the stakeholders that are most relevant for an organization (Dilling & Harris, 2018; Adel *et al*., 2019) through the provision of a minimum of comparable information. These concepts are used interchangeably though. They emphasize that it is impractical to expect organizations to provide meaningful and complete metrics about their sustainability efforts without prior guidance. In these cases, the standard structure guides organizations through pre-established guidelines, helping them to report indicators that meet the most urgent and general expectations and present their efforts toward sustainability through a concise and comparable structure (Dilling & Harris, 2018).

Thus, a convergence of two central perspectives was identified: "Ethics and Relationship with stakeholders" and "Comparability of information and Control". This result may be related both to the researchers' epistemic position and to the possibility that local and contextual aspects may not be relevant for some stakeholders specific to the business model of the entities analyzed.

A portion of the studies (Ngu & Amran, 2018; Calabrese *et al.*, 2019; Crous *et al*., 2020; Macellari *et al*., 2021; Perello-Marin, 2022; Higgins, Tang, & Stubbs, 2020; Murillo-Avalos *et al.*, 2021; Tang & Higgins, 2022) show that researchers consider the relationship and communication with stakeholders to be a fundamental aspect for the transparency and communication of sustainability actions. Through stakeholders' feedback, entities seek to identify the materiality of the information to be disclosed to meet the demands of the most important parties for the company. In this sense, research showed corporate engagement to obtain feedback through opening channels via the Internet (in addition to the report), ombudsperson offices, and regular meetings, among others.

In addition to attempting to meet stakeholder demands, companies must also meet institutional demands. In this sense, the papers discussed the contextual differences between countries with mandatory and non-mandatory disclosures. Institutional factors such as laws, regulations, policies, and supervision or the countries' economic development stage may determine whether disclosures are more transparent in RS. There is evidence in the case of developed countries that mandatory RS contributes to increased business leaders' social responsibility, prioritizing employee training, increased implementation of ethical practices, decreased bribery and corruption, and improved social credibility (Ioannou, & Serafeim, 2017). These effects are observed in countries with effective inspection mechanisms though, where ensuring sustainability data is more frequent, a context different from that commonly experienced in Latin American countries, such as Brazil (Prates *et al*., 2022).

The key argument to justify mandatory and non-mandatory disclosure in both contexts is transparency. Entities seek to achieve better transparency than they currently have, following a simplified, uniform, and systematic disclosure model, regardless of local specificities, to meet the most critical demands. Despite the heterogeneity and complexity of sustainability information, the literature shows arguments that a higher level of transparency and greater public trust in sustainability disclosures would be possible through the verifiability of information. The first argument is that transparency is feasible if a framework is provided since the calculations and indicators used would also be disclosed (Murillo-Avalos *et al*., 2021; Hamilton & Waters, 2022).

Another argument is based on the use of auditing services or external information assurance; more and more entities have sought some assurance service or external auditing (Larrinaga *et al.*, 2018; García-Sánchez *et al*., 2020; Boiral & Heras-Saizarbitoria, 2020). The results of Larrinaga *et al*. (2018) indicate that such a practice does not improve the quality and transparency of information though, as it is subject to a materiality analysis that is still controversial about what should or should not be disclosed (Unerman & Zappettini, 2014; Zsóka, & Vajkai, 2018; Calabrese *et al*., 2019; Hess, 2019; Puroila, & Mäkelä, 2019; Machado *et al*., 2021; Soares, 2022), in addition to the fact that much of information cannot be verified, compared or assured, given the complexity and breadth of corporate sustainability issues (Larrinaga et al., 2018; Boiral & Heras-Saizarbitoria, 2020). Consequently, corporate efforts to audit or assure sustainability issues may be limited, partially complemented by institutions specialized in issues specific to the entities' business model, such as product labeling and health inspection, among other aspects. As it is limited to each company and specific activity, this type of assurance may contribute to validating efforts, revealing corporate strategies on sustainability issues, and promoting the quantification of individual metrics over time.

As an initial step, the institutionalization of the practice of SR disclosure reinforced the importance of corporate social responsibility in critical sustainability issues, encouraging society and institutions in general to reflect upon the matter. The climate emergency has revealed that socio-environmental performance, previously considered in the literature to be a long-term matter, now requires urgency (Gray et al., 1992; Österblom et al., 2022). Even though corporate management must consider the short term in sustainability issues, we should emphasize, however, that adopting a homogeneous international report may ensure a minimum of comparable information but still not meet the concept of transparency or reflect corporate actions and strategies that go beyond the already established indicators, which may even contribute to covering up irresponsible corporate actions (Hess, 2019).

In practice, SR offer entities the opportunity to put up a good image and, often, to compensate for adverse consequences of their activities or manage this image (Agle *et al*., 2008; Neu *et al*., 1998). Larrinaga and Bebbington (2021) emphasize that SR are often dissociated from corporate activities in such a way that they are not fulfilling any of the objectives for which they are intended, neither in terms of generating benefits for companies and shareholders, nor giving power to stakeholders and make corporations responsible for their social and environmental impacts. When social responsibility mechanisms are well applied though, they promote corporate self-control and cost reduction. In contexts where institutional control fails, incorporating self-control measures focusing on social and environmental responsibility presents important advances (Wood, 2008; Prates *et al*., 2022).

Some authors note the need for legal tools to prevent the distorted use of RS and enable the transparency of information disclosed in RS (Machado, 2021; Prisandani, 2022; Correa-Mejía, 2022; Hamilton & Waters, 2022; Perello-Marin, 2022) while mitigating the greenwashing effect (Hess, 2019; Hamilton & Waters, 2022). From this perspective, disclosure would need to be mandatory through the imposition and enforcement of legal measures to ensure compliance, clarity, and control of corporate actions and disclosures at a sectoral level.

According to Wood (Agle *et al*., 2008), the government is the most effective vehicle for implementing social controls to support environmental protection, human rights, and justice. In the absence of adequate government controls – where governments are weak, authoritarian, or corrupt, corporate social responsibility is the second-best substitute to meet the broad interests of stakeholders and society (Hess, 2019). In this sense, the Stakeholder Theory and corporate social responsibility point to the need for social controls to encourage the beneficial effects of institutional behaviors and to regulate or avoid harmful effects (Agle *et al*., 2008).

Given the heterogeneity that sustainability reports naturally contain, transparency tends to be heterogeneous. The informative role of accounting can be directly affected by the limitations that standardizations produce since RS may not specifically reveal corporate impacts within their field of activity, business model, community, or sector. Furthermore, due to different contexts, stakeholders, and their attributes, SR transparency tends to be partial, meeting specific expectations and emphasizing the successes and challenges raised by the most relevant groups. Given the complexity and heterogeneity that permeates sustainability information, RS needs to maintain some flexibility.

5. Conclusions

This study aimed to critically analyze whether researchers share a common understanding of the concept of transparency and its implications. The growing demand for standardization of sustainability reports to increase transparency and promote comparability of information between different companies and countries motivated this investigation.

The transparency of sustainability reports is not something trivial, and from a critical perspective, the heterogeneity and complexity of these reports naturally limit their transparency, understanding, and use. Different understandings of the concept of transparency were found according to each study's focus and practical contribution. The consequence of this multiple understanding generates confusion. It negatively affects the transparency of RS, both regarding the information to be disclosed and the results of scientific production in the accounting field.

This study provides an alternative view on the application of the concept of transparency in research addressing social and environmental accounting (SEA accounting). This reflection is important because the scientific community reproduces practices, influencing the demand for RS standardization, which generates important implications for accounting. Most studies analyzed here sought to verify whether companies meet the capital markets' demands directly or indirectly. At this point, contemporary research did not prioritize greater information transparency in sustainability reports but rather some stakeholder groups. Regardless of the practical relevance for these stakeholder groups benefiting from the proceeds of investigations, this tendency limits these reports' scope and transparency. Therefore, RS transparency is limited by the complexity of information relative to the context and specificities and is partial because it is aimed at serving specific groups.

The limitation of RS transparency is characteristic of its essence, given the complexity of measuring the aspects and impacts of biodiversity and human rights (Hess, 2019). Thus, achieving a lesser or greater degree of transparency is possible depending on the incorporation of most organizational interactions (regardless of good or bad news). However, transparency is relative and particular to each organization, sector, country, and context; therefore, using another concept for sustainability disclosures could be more appropriate.

Regarding standardization at a global level, it is argued that SR can provide a minimum level of transparency. The fact that groups, their requirements, contexts, and understandings are so heterogeneous, however, implies the need for SR to be flexible and adaptable. Moreover, standardized disclosure practices influence accounting research not to consider other non-measurable sustainability aspects, driven by stronger demands from some groups or greater data availability. An example is that academia remains distant from the practical reality of companies and their social and environmental impacts and responsibilities. Such distance is revealed to the extent that researchers consider transparent only what is already established as relevant in the reports (e.g., due to the availability of measurable data), and interactions that promote relevant social and environmental impacts are considered superfluous or excessive; these remain hidden because they are not measurable or there is no regulation requiring the disclosure of this information in specific contexts.

Another implication is that academia contributes to the institutionalization of partial transparency that meets specific demands to the detriment of accountability for the impacts and accountability of organizations. In this sense, it is essential to reflect on the role of academia: will we reproduce or build practices within the scope of sustainability? The critical impacts of specific sectors often escape collective disclosure standards and can be omitted, as in the case of mining (socio-environmental conflicts). Thus, more specific typologies can contribute more effectively to adequate disclosure, which should integrate sustainability reports and improve transparency.

Future research can contribute to a greater understanding of the levels of transparency of sustainability disclosures in different countries. Comparative studies in specific sectors can reveal how transparency is built or established in practice, considering different contexts, stakeholders, and local institutional aspects. A comparative study between the SR structure of multinational companies and their subsidiaries in different countries whose individuals, in addition to different perceptions, also have different values and conceptions of the context of the country of origin could reveal aspects and differences reinforced by the actions of other groups of critical stakeholders and offer greater understanding and a better perception of the level of reports' transparency.

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Objective: this study was aimed at investigating the relevance of accounting education and research for the growth of the Brazilian economy during the first decade of the 21st century.

Method: to collect the data, a structured questionnaire was used, elaborated based on the relevant literature. The questionnaire was tested and applied to a sample of Brazilian accountants and businessmen during 2017. In the analysis of these data, content analysis was applied and statistical tests were used to establish relations between the answers obtained.

Results: the main findings of this study indicate that the expansion of accounting education and research in Brazil was essential for the growth of the economy, according to the respondents' perception, despite the impression that accountants and businessmen need to make better use of the accounting information.

Contributions: from the academic viewpoint, the evidences from this research contribute to fill of an important existing gap in the Brazilian literature. What the market is concerned, they contribute by providing evidence that, despite its perceived relevance, its users need to make better use of the accounting information.

Key words: Education: Research; Accounting.

- The article itself, written in Portuguese or English, with at least 5,000 and at most 9,000 words, including tables, figures, notes and references.
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The table should usually show numeric or textual information organized in an orderly exposition of columns and rows. Any other statement should be characterized as textual figure.

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Font	Times New Roman, size 10
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Spacing before and after paragraphs	3 pt
Table colors	Use only black and white (grayscale)
Title	The table title must be brief, clear and explanatory. It should be placed above the table, in the top left corner, and on the next line, just below the word Table (with a capital initial), followed by the number that designates it. The tables are presented with Arabic numerals in sequence and within the text as a whole. Eg: Table 1, Table 2, Table 3, and so on
Citation of tables	When citing tables in the text, type only the number referring to the table, for example Table 1, Table 2, Table 3 and so on. (the word 'Table' should be presented with the first letter capitalized). Never write 'table below', 'table above' or 'table on page XX' because the page numbers of the article may change while formatting
Table notes	The font used in the notes of the table should be Times New Roman, size 10, single spaced. The notes should be described in the footnote of the table, and they serve to indicate the Source of the information of the table, and other information important to understanding the table

3.2 Figures

The figure should show a flow chart, a chart, a photograph, a drawing or any other illustration or textual representation.

The figure should be displayed with its information visible and adequate for its understanding, and should be formatted as follows:

Font	Times New Roman, size 10
Figure colors	Use only black and white (grayscale)
Format	Figures should be submitted in an editable format
Title	It explains the figure concisely, but discursively. The title should be placed under the figure and numbered with Arabic numerals in sequence, preceded by the word Figure (with initial capital). Eg: Figure 1, Figure 2, Figure 3, etc. After the title, any other information necessary for clarification of the figure or source must be added as a note
Captions	The caption is the explanation of the symbols used in the figure and must be placed within the limits of the figure
Size and proportion	Figures must fit the dimensions of the journal. Therefore, a figure should be drawn or inserted into the article so that it can be reproduced in the width of a column or page of the journal to which it will be submitted
Citations in the main text	When citing a figure in the text type only the number referring to the figure, e.g. Figure 1, Figure 2, Figure 3 and so on. (the word 'Figure' should be presented with the first letter capitalized). Never write 'figure below' figure above ', or even 'figure on page XX' because the page numbers of the article can be changed during formatting

4. Citations and References

For the full version of the standards of citations and references according to APA (American Psychological Association), access http://www.repec.org.br/index.php/repec/article/view/1607/1237.