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Editor's Word

Dear reader, we are pleased to present the final issue of 2024. I want to congratulate the authors whose articles are featured in this edition and extend my gratitude to all those who submitted their manuscripts, even if they were not approved for publication.

The entire process at REPeC is conducted with a strong commitment to maintaining high quality. The desk rejection rate for submitted articles is 90%, aligning with the standards of leading international journals. Consequently, the selection process inherently involves the rejection of many submissions. However, articles that advance to the final publication stage demonstrate their high quality by successfully undergoing a rigorous blind review. Below is a summary of the approved articles.

The first article is an invited contribution authored by professors Fábio Frezatti, Franciele Beck, Ana Paula Capuano da Cruz, Emanuel Junqueira, and Daniel Mucci. It aims to illuminate the quality attributes of scientific research—namely, gap, relevance, innovation, contribution, and impact—previously outlined by Frezatti (2020) in a REPeC editorial. These attributes are examined in detail through a study project developed by participants in a research group. The motivation for the article stems from the recurring issue of article and project rejections, as weaknesses often arise during the conception of a manuscript, compromising its execution and hindering the adjustments needed for successful publication.

The second article, authored by Ana Cláudia Deconto, Cristian Baú Dal Magro, Alini da Silva, and Mazzioni, analyzes the influence of Dark Triad personality traits among managers on the earnings management practices of credit unions. The findings from the multiple linear regression analysis revealed that narcissism and psychopathy traits in managers are associated with an increase in earnings management through specific accruals, while Machiavellianism showed no significant effect. Further regression analysis demonstrated that credit union managers are generally inclined toward earnings management, suggesting that cooperatives engage in such practices. Additionally, managers exhibiting dark personality traits are likely to engage in earnings management to a greater extent.

The third article, authored by Jéssica Natália da Silva Martins, Bruno Tavares, and Antônio Carlos Brunozi Junior, aims to explore the role of Inter-municipal Health Consortia (IHC) in fostering cooperation among public entities by addressing barriers. The findings indicate that IHC adopt instruments to achieve mutual adjustment, facilitate technical debate, and enable joint deliberation. Additionally, governance controls support an IHC structure capable of overcoming obstacles to cooperation, curbing opportunistic behavior, and promoting conflict resolution.

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The fourth article, authored by Mariângela Araújo Barros, Orleans Martins, and Luiz Felipe Girão, aimed to adapt Benjamin Graham's value investing criteria for constructing stock portfolios in the Brazilian market and to evaluate their efficiency. The portfolios based on these criteria achieved returns above the market average. Specifically, portfolios comprising 10, 20, and 30 assets outperformed the Ibovespa, IBrX 100, and LFTs. Notably, the portfolio with 10 assets demonstrated the highest Alpha generation.

The fifth article, authored by Victor Alves, Cleyton Levy Melo, and Hellen Dias, examines the relationship between audit quality and quarterly earnings management in publicly traded companies in Latin America. The findings reveal that discretionary accruals are significantly higher in the fourth quarter than in other quarters, while the first quarter differs significantly from the second and third quarters. Brazil, Colombia, and Mexico exhibit lower levels of earnings management and higher audit quality than Argentina. These results suggest that countries with better audit quality experience reduced levels of quarterly earnings management, particularly in the fourth quarter.

The sixth article, authored by Rodrigo Thirion dos Santos and Tatiana Albanez, investigates the impact of debt diversification on the market value of listed Brazilian companies from 2010 to 2021. The findings indicate that more significant heterogeneity in companies' debt is associated with higher market value. It highlights the role of debt diversification in reducing agency costs and enhancing corporate efficiency. Additionally, the results emphasize the importance of considering local market characteristics in determining the effectiveness of creditor monitoring.

The seventh article, authored by Sylvia Domingos, Vera Maria Ponte, Edilson Paulo, and Antonio Rafael da Silva, examines whether earnings management practices explain the achievement of guidance published by Brazilian companies. The regression analysis indicates that companies employ accrual-based management to meet the guidance when projections exceed actual results. Conversely, companies rely on operational activity management to achieve projections when these fall below actual results.

Finally, I would like to emphasize that REPeC is not limited to education but extends to various disciplines, including finance, management, public administration, auditing, and taxation.

I extend my heartfelt gratitude to the referees, whose contributions are invaluable, and to the researchers who submitted their manuscripts to REPeC. Congratulations to all whose articles were approved, as the demand is exceptionally high, and the journey to final publication is arduous.

Thank you very much. Merry Christmas! I wish peace, health, and joy to the editorial team, the journal's secretariat, and their families.

Academic greetings,

Gerlando Lima, Ph.D.
Editor in Chief.

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Quality Pentagon in Research: An Approach for Multiple Cycles of Knowledge Construction

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Abstract

Objective: This study aims to shed light on the quality attributes of scientific research—gap, relevance, innovation, contribution, and impact—proposed by Frezatti (2020) in a REPeC editorial and to explore them through a project developed by participants of a research group. This objective addresses the issue of article and project rejection, which often originates from weaknesses at the conception stage, compromising execution and hindering necessary adjustments for publication.

Method: A theoretical-methodological approach was adopted to discuss five essential elements for developing a research project, referred to as the quality pentagon. These interdependent elements are applied throughout the entire research cycle, from conception to execution and publication.

Results: The proposed approach is expected to enhance the design and execution of research with greater intrinsic quality, particularly in the business field, thereby facilitating evaluation and acceptance in academic journals.

Contributions: This study's innovation lies in examining the interaction between the elements of the quality pentagon, a topic rarely explored in the literature. By addressing this interrelationship, we provide a tool to improve the planning and development of research, strengthen authors' arguments, and offer benefits to referees, editors, and advisors.

Keywords: Gap; Relevance; Contribution; Innovation; Impact; Quality pentagon; Intrinsic quality.

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1 Introduction

An action movie depicted an agent relentlessly pursuing a terrorist, always arriving too late and growing increasingly frustrated. At a critical moment, the agent's mentor advised: "*You need to go back to where you started and where you lost your way*!" This advice resonates with the challenges faced by some researchers. The pursuit of sophistication and innovation is often integral to a researcher's development. However, in this pursuit, substantial material has been produced, and significant efforts have been invested in inadequately planned projects—projects that frequently have uncertain outcomes and, in many cases, yield no tangible results. Losing one's way in research can signify a failure to maintain a consistent focus, ultimately compromising the quality of the research and the articles produced in a specific field. Such experiences are familiar to all of us in the academic community at some point in our careers.

The constitutive aspects of scientific research quality discussed in this theoretical-methodological article (Corley & Gioia, 2011; Godoi *et al.*, 2006), referred to as the quality pentagon, include **gap, relevance, innovation, contribution,** and **impact** (Frezatti, 2020). These elements are contextually anchored in the research problem, research question, theoretical framework, and the selected methodological approach.

In some cases, a problem that initially presents an opportunity for innovation within a field of knowledge when the research is designed may lose its relevance over time, particularly with the publication of new articles. In other instances, identifying a **gap** in an overly simplified or trivial manner (Alvesson & Sandberg, 2011) may later reveal that the gap either does not exist or lacks sufficient justification, thereby undermining the research's potential **contributions** (Alvesson & Sandberg, 2011) and overall **impact**. Authors are often advised to adjust their problem's focus based on its perceived **relevance** (Nicolai & Seidl, 2010), especially when preparing a manuscript for publication. Increasingly, researchers are being questioned about the societal **impact** of their work, particularly in the business field, where this discussion requires thoughtful and comprehensive reflection (Wickert *et al.*, 2021; Costa *et al.*, 2022). While the scenarios described above highlight potential challenges, they also offer opportunities for positive outcomes. When the elements of the quality pentagon are viewed as scaffolding that supports the development and communication of research, they can effectively guide the process. In this context, it is essential to acknowledge that opportunities may emerge and fade throughout the research journey.

But what are the main obstacles to the proper use of these elements? First, the definition of each attribute that constitutes the quality of academic research—including its concepts, boundaries, and interrelations—is often unclear and scattered across various stakeholders, such as journals, funding agencies, and universities. Additionally, the application of these elements can be perceived as static, when in fact, they have the potential to be dynamic. Their effective use involves enhancing a research proposal through practical reflection, which is essential for their operationalization.

In this context, this theoretical-methodological study seeks to shed light on the quality attributes of scientific research and explore them through a research project developed by members of the research group responsible for this discussion. Scientific research should provide researchers with well-founded arguments to structure their projects and articles—arguments that are persuasive not only for themselves but also for third parties, such as referees and readers. By identifying and analyzing quality attributes based on editorials and scientific articles in the business field, we also examine their interrelations. Furthermore, we demonstrate that when at least one element of the pentagon is insufficiently developed, the potential of the other elements is inevitably compromised, thereby diminishing the overall quality of the research. Ultimately, the discussion surrounding the quality pentagon offers a comprehensive and integrated perspective on the attributes that should guide the design and execution of research in the business field.

2 Research Framework and Construct

The identification and validation of the concepts necessary to characterize each of the five elements were grounded in methodology books that outline the quality attributes of scientific research, the websites of Brazilian and international journals that specify quality criteria and editorial policies, articles discussing the quality of research projects, scientific research in the business field, guidelines from research funding agencies, and our experience as researchers.

The delimitation of a topic marks the starting point of a research project (Boaventura, 2004). Once the thematic orientation of the investigation is defined, it becomes essential to identify the problem that allows for the development of questions or hypotheses. The process of formulating questions related to the topic to be addressed in research is referred to as problematization (Gil, 2010), which involves presenting a dilemma associated with the thematic line under study. A problem represents a challenge that requires investigation (Lakatos & Marconi, 2010), a situation that prompts the formulation of one or more questions (Klein *et al*., 2015). From this foundation, the application of the five elements of the quality pentagon becomes crucial.

Furthermore, the field of applied social sciences is characterized by (i) its multidisciplinarity, (ii) its influence from other areas of knowledge, such as sociology, psychology, law, and economics, and (iii) its connection between academic and practical environments (Corley & Gioia, 2011). The authors highlight the complexity of addressing theoretical contributions in this field, a reflection that can also be extended to defining a research problem and understanding and applying the other elements of the quality pentagon. This is particularly relevant because the field of applied social sciences, specifically the business domain, encompasses diverse theoretical foundations and perspectives, as well as multiple voices and audiences. These factors increase the complexity and potential confusion surrounding the interrelationship among these research elements, underscoring the importance of integrating them to achieve intrinsic research quality.

2.1 Gap

Identifying a gap, or at least acknowledging the need for one, has been a common concern in accounting research. While many researchers explicitly state the gap they intend to address or develop, merely recognizing a gap does not necessarily imply that the concept underlying the term is well established among researchers in the field. On the contrary, much of what has been published resembles the notion of an unsuccessful agent chasing a terrorist: a gap is presented, but the critical question remains—does it truly constitute a gap?

Identifying one or more gaps is a fundamental step in developing research questions (Sandberg & Alvesson, 2011). Consequently, many researchers strive to identify seldom-studied or even unexplored areas in the literature, using this as an argument to claim the existence of a research gap. However, a misinterpretation appears to have taken root in accounting research—namely, that the mere absence of studies on a specific area, sector, topic, or related subject necessarily constitutes a gap worthy of investigation. Naturally, the identification of gaps can vary significantly, ranging from incremental extensions to the introduction of more substantial contributions (Sandberg & Alvesson, 2011). In essence, identifying a genuine gap requires conducting thorough and consistent research at both local and international levels.

Based on a literature review, Sandberg and Alvesson (2011) identified that research gaps are generally derived from three main sources: (i) confusion within the existing literature, where contradictory evidence on a subject creates a gap to be addressed; (ii) the identification of a topic that lacks quality research, encompassing areas that are underexplored, neglected, or lacking empirical support; and (iii) the discovery of a new application within the existing literature.

The three sources promoting research development, as identified by Sandberg and Alvesson (2011), suggest that a **research gap** can be defined as a lack of consensus from a theoretical or literary perspective. In other words, a gap represents an opportunity arising from the collection of elements whose debate is either ongoing or yet to begin. To effectively specify a gap, it is essential to clarify which phenomena and contexts the literature has already addressed and, from there, identify the existing blind spots. However, this process is often undermined by a superficial presentation of what has already been studied, which impairs understanding and hinders the assessment of the gap's potential and scope. Along these lines, Paré *et al.* (2023) emphasize that identifying a gap involves highlighting areas where understanding is incomplete, confusing, or contradictory while pointing toward possible research directions. Importantly, they also stress that beyond identifying a gap, it is crucial to explain why it merits exploration (Paré *et al.*, 2023).

In this context, the importance of addressing bold ideas and adopting less conventional approaches to tackle significant unresolved problems (Colquitt & George, 2011) may offer a promising pathway for exploring research gaps. This perspective broadens the discussion by incorporating an empirical dimension, recognizing that the field—like economic and business activities—holds potential relevance for advancing research in accounting. Consequently, a research gap encompasses not only a lack of consensus from theoretical or literary perspectives but also from empirical standpoints.

Another critical aspect of identifying research opportunities lies in the structure of researchers' relationships. Burt (2004) suggests that individuals situated near "structural holes" within a social structure are more likely to generate good ideas. This is because behaviors and opinions tend to be more homogeneous within groups than between them. Individuals who navigate across different groups are exposed to diverse ways of thinking and behaving, which broadens their ability to select and synthesize ideas. Structural gaps, therefore, facilitate the identification and synthesis of promising ideas. The designation of an idea as "good" depends on its empirical validation, but generally, an idea is considered good when it is valued and praised by others (Burt, 2004).

Some gaps explicitly presented in articles are often cited as reasons for rejection by journal editors (Falaster *et al.*, 2016), either because they are superficially characterized without sufficient depth or because they focus on an unjustified research gap that fails to advance the field under study. For instance, an empirical gap (e.g., studies involving Brazilian companies) must be grounded in the specificities of its context and, more importantly, demonstrate how it can contribute to the generation of new knowledge within the existing literature.

Thus, a gap emerges from the defined research problem and is established through a process that includes: (i) identifying key terms associated with the problem; (ii) conducting a literature review guided by these terms to gather relevant publications and identify inconsistencies or deficiencies in quality; (iii) exploring studies cited in the relevant publications identified in step (ii); and (iv) pinpointing issues related to the problem that remain unaddressed by the current literature. Consequently, identifying and, equally importantly, effectively communicating a research gap necessitates a critical and selective literature review to encompass the most pertinent works covering the topic under study. This search must remain ongoing, as research fields are dynamic and evolve over time. In this regard, not every type of literature review is sufficient to address the demands of identifying a gap.

> **Essence:** a gap represents something unknown or incompletely understood about a phenomenon that is absent from the available literature within a given field, both nationally and internationally.

2.2 Relevance

Relevance must be embedded in the definition of the research problem, but it can also be influenced by the research gap and shaped by the target audience that the study aims to serve by generating new knowledge. This may involve expanding the scope of problem treatment, such as the intensity of use of something already known but requiring investigation in a specific context. The following discussion outlines key pillars of relevance in business research: concepts, users, and scope.

Although relevance is a requirement for most journals in the business field, its definition is not straightforward, as it holds distinct and sometimes contradictory meanings across different contexts (Nicolai & Seidl, 2010). The Oxford Dictionary (n.d.) offers a generic definition of relevance, describing it as "the fact of being valuable and useful to people in their lives and work" and "a close connection with the subject or situation being discussed."

This generic definition can be applied to research relevance, but it is crucial to consider aspects such as: what is valuable and useful for different research users? Relevance needs to be contextualized: for whom and in what context or time? In line with this discussion, Nicolai and Seidl (2010, p. 1278) argue that "the more we realize that 'relevance' is a problem with many facets and, as such, closely related to the social dynamics of science, the more it becomes apparent that the solutions are not as obvious as many contributions to the relevance debate seem to imply."

Many studies on the relevance of scientific research in business are based on the understanding held by managers in organizations. In this sense, they reflect to what extent research allows for generating insights valuable to professionals (Vermeulen, 2007). McGahan (2007) proposes five ways of translating the relevance of research for professionals: (1) counterintuitive insights regarding prevailing paradigms, (2) transformation of business practices, (3) practices that violate management principles, (4) unique situations that benefit from a conceptual perspective, and (5) problems or phenomena that allow for new perspectives on research and practice.

Nicolai and Seidl (2010) propose a taxonomy of relevance forms: conceptual, instrumental, and legitimizing. Conceptual relevance reflects the extent to which scientific knowledge alters managers' understanding of decision-making situations. It encompasses new concepts and metaphors communicated to professionals (linguistic constructs), the discovery of decision alternatives, and relationships that merit exploration in the context of a problem. McGahan's (2007) relevance forms align with the perspective of conceptual relevance in Nicolai and Seidl's (2010) taxonomy. Instrumental relevance involves scientific knowledge influencing specific decisions, including frameworks for systematically visualizing situations (e.g., models, graphs), decision-support guidance, and future predictions. In essence, it reflects the applicability of scientific research in practical contexts. Legitimizing relevance highlights how knowledge can legitimize or enforce actions in practice, given its association with the prestige of researchers and their affiliated institutions (Nicolai & Seidl, 2010). Corley and Gioia (2011) stress that research should directly or indirectly address a practice-related problem. However, practical utility should not be conflated with pragmatic utility in the sense of instrumentalization (Corley & Gioia, 2011).

Although several authors argue that business studies should prioritize relevance to professionals, others adopt a broader perspective, focusing on the research user. In this context, Palmer *et al.* (2009) suggest that the meaning of relevance should consider the intended audience of the research. Daft and Lewin (2008) propose two types of relevance—academic and practical—serving distinct groups or sub communities. Research can thus be relevant for generating knowledge and fostering reflection among researchers and academics or for addressing problems and promoting practices within organizations. The authors conclude that, while the practical value of research for managers (as end users) is important, researchers should not focus exclusively on the immediate practical relevance of their work (Daft & Lewin, 2008). Wickert *et al*. (2021) broaden the perspective of research users by including academics, professionals, society, educators, regulators, and politicians. Researchers should recognize that their work might be relevant to one or several of these audiences.

In addition to discussing what can be perceived as relevant from a research perspective, it is important to consider dimensions such as scale, scope, or urgency to make the concept more tangible. The Oxford definition associates relevance with the extent to which a problem or finding is useful to a large number of people or organizations. This perspective aligns with Nicolai and Seidl's (2010) taxonomy of conceptual, instrumental, and legitimizing relevance. The magnitude of relevance varies depending on the context, user, and time.

In summary, this study considers relevance in its broadest sense, encompassing the perception that a problem or finding is valuable and useful to both people and organizations (managers and academics). It is conceptualized in terms of conceptual relevance (learning, reflection, critique, insights) and instrumental relevance (tools, applications, solutions).

> **Essence:** relevance can be defined as the degree of importance, encompassing the value and usefulness that research provides to a community.

2.3 Innovation

Innovation refers to the successful introduction of an idea, practice, or object perceived as new within a given social system. Even if it previously existed in a different form or setting, it can still be characterized as innovative as long as it is perceived as new by a group or within a location (Rogers, 2003).

Miles *et al.* (2011) identify three main justifications for innovation: theoretical, moral/ethical, and practical reasons. Moral or ethical reasons are tied to the desire to enhance understanding of the emotional dimensions of a topic to present a holistic perspective, address empowerment and fair participation, foster collaboration, or reduce the risk of harm. Practical reasons stem from incentives or pressures to solve problems that yield direct or indirect economic benefits or other advantages.

Rothwell and Gardiner (1985) argue that innovation is not solely characterized by major breakthroughs, such as radical innovations, but can also occur on a smaller scale, as incremental innovations. In other words, innovation is not a binary concept of presence or absence; rather, it often involves efforts to demonstrate the innovative aspects of research. The potential for **innovation** arises from identifying and addressing a gap related to a specific problem

Innovation in research involves introducing new ideas, methods, approaches, or discoveries that contribute to the evolution of a field of study. Thomas Kuhn (1962) highlights the pivotal role of innovation in scientific revolutions, where it challenges established paradigms with novel theories and methods. Similarly, Popper (1959) supports Kuhn's perspective, emphasizing that innovation occurs when new theories are proposed, tested, and potentially refuted, thereby driving scientific progress.

The demand for innovation in social research methods is widespread (Wiles *et al.,* 2011), driven in part by research funding programs and evolving trends in research reporting (Taylor & Coffey, 2009). Ziman (2000) highlights the role of social interactions among scientists in fostering innovation and underscores the significance of consensus and communication in validating new ideas.

Wiles *et al.* (2011) caution that innovation should not merely serve as a gimmick to garner favorable opinions from referees or funding agencies, nor should it simply respond to fleeting trends. Instead, it must be grounded in genuine efforts to enhance the quality and contributions of research (Taylor & Coffey, 2009). Foster *et al.* (2015) highlight that the selection of a research problem often reflects an inherent tension between adhering to established traditions and embracing the risks of innovation. They note that while innovative research is more likely to achieve significant impact compared to conservative approaches, the potential reward may not always outweigh the risk of failing to publish. To address this tension, the authors advocate for policy interventions aimed at fostering innovation in research.

The risk of not publishing may help explain why much of the innovation in social science research involves adapting existing methods rather than inventing entirely new ones (Wiles *et al.*, 2011). In the same study, Wiles *et al.* (2011) propose a hierarchical categorization of innovation stages in research articles: inception, adaptation, and adoption. Among these, adoption represents the lowest level of innovation.

Scientific research can be considered innovative when it satisfies the following attributes: (a) Originality: The work introduces ideas, methods, or discoveries that are novel within the field (Kuhn, 1962); (b) Significance: The innovation has a substantial impact on the field, altering the understanding or approach to a problem (Popper, 1959); (c) Importance: The contributions address current challenges and possess the potential to pave the way for future research (Rogers, 2003); (d) Validation: New ideas are rigorously tested and validated through experiments or analyses that demonstrate their effectiveness and applicability (Ziman, 2000); (e) Clarity and Complexity: The innovation is communicated clearly and perceived as accessible and practical, facilitating its recognition and application by other researchers (Fagerberg, 2005; Rogers, 2003; Dosi, 1988); and (f) Compatibility: The innovation aligns with the existing values, past experiences, and needs of potential adopters. Innovations that are incompatible with the values and norms of a social system tend to face slower adoption (Rogers, 2003).

Essence: Innovation is the introduction of ideas, methodologies, or discoveries aimed to reduce or eliminate a gap.

2.4 Contribution

The contribution of research has become a central topic of interest and discussion in both academic and practical contexts in recent years. Notable works, such as those by Whetten (1989), Alvesson and Sandberg (2011), Corley and Gioia (2011), Albu and Toader (2012), Corley and Schinoff (2017), and Freitag *et al*. (2019), emphasize the need to reflect on the concept and scope of research contributions and their critical role in advancing knowledge within the applied social sciences.

Rynes (2002, p. 311) states that "The notion of contribution – like many other abstract concepts, such as quality or truth – is somewhat subjective and can only be assessed in the context of each manuscript," highlighting the need for a structured approach to understanding the elements inherent in theoretical contributions. In the business field, there is a notable interest in understanding and applying this concept. For instance, Whetten (1989), in his article for the Academy of Management Review (AMR), addresses this concern by clarifying the expectations of AMR regarding what constitutes a theoretical contribution. Similarly, Corley and Gioia (2011) assert that to be considered for publication in a high-impact journal, an article must present a theoretical contribution, underscoring its status as a fundamental requirement in the academic domain.

Corley and Gioia (2011, p. 12) define theory as "a statement of concepts and their interrelationships that shows how and/or why a phenomenon occurs," emphasizing that theory is grounded in the formal and systematic explanation of a phenomenon. As highlighted in the literature, a theoretical contribution involves a significant advancement in our understanding and explanation of a phenomenon, whether achieved through theoretical or empirical means (Corley & Schinoff, 2016; Corley & Gioia, 2011).

Therefore, this discussion is based on the understanding that research demonstrates a contribution either through an incremental perspective—building on existing theory, such as when the inclusion of a new variable in a model alters the understanding of the phenomenon under study—or through a revealing perspective, which involves proposing a new theory or significantly redefining how a phenomenon is explained. The latter may address issues such as redefining a problem, resolving a paradox, or challenging theoretical assumptions. According to Alvesson and Sandberg (2011), this approach enables the exploration of more "interesting" research, thereby increasing its potential to attract attention and citations in academic publications.

Additionally, the contribution of research necessarily involves its usefulness, meaning its capacity to advance the theoretical foundation and/or provide practical insights and reflections (Whetten, 1989). Usefulness, in this context, encompasses two key dimensions: (i) scientific usefulness, which facilitates the application or replication of theory to further scholarly discussions, and (ii) practical usefulness, which enables the application of research findings to address challenges faced by professionals and organizations (Corley & Gioia, 2011).

As Corley and Gioia (2011) discuss, the contribution of a research project is closely linked to relevance and innovation, as it often emerges as a result of these two attributes, with the research gap serving as its foundation. Relevance emphasizes the usefulness of research for specific users (to whom), while contribution focuses on the knowledge (what) that the research provides to these actors. Furthermore, innovation pertains to the project's design, such as its constructs or methodological approach, whereas contribution offers an *ex-post* perspective on the knowledge added to the existing scientific base.

Corley and Gioia (2011) propose that theoretical contributions should include an element of anticipation, addressing future problems that the theory might explain and/or future needs emerging from the practical field. They refer to this aspect as "prescient theorizing," emphasizing the growing expectation for researchers to consider the broader impacts of their work. This involves reflecting on the relationships between researchers themselves and between researchers and the practical field, thereby enhancing and complementing the originality and usefulness of the research.

It is important to emphasize that, although research with incremental contributions currently receives less attention, particularly in top journals, it remains fundamental within the framework of scientific logic. One of the core aspects of a theory is its ability to be replicated and applied in different contexts, as well as its capacity to address aspects not previously considered by the theoretical model (Corley & Gioia, 2011). Thus, understanding the potential contribution of research and how it is characterized in terms of originality and usefulness for both theoretical and practical applications is essential for addressing a research problem and effectively communicating the study.

Essence: Contribution is the generation of new knowledge that advances the understanding and fosters development within a field.

2.5 Impact

In Brazil, researchers have emphasized the importance of incorporating both rigor and practical relevance into scientific research (Costa *et al*., 2022). For example, Costa *et al.* (2022, p. 829) propose the *Modelo Orientado ao Impacto Societal* [Societal Impact-Oriented Model], which integrates "production based on the merit of the scientific method with the delivery of value and the promotion of positive impacts on society." Research should inspire audiences beyond academia to think and act differently, with the goal of enhancing organizational functioning and the broader organizational environment (Alvesson, 2012).

Apparently, research institutions can offer more effective support for researchers than the methodology literature alone. Some notable examples of this support include:

As proposed by the Australian Research Council (Stratford, 2020), "Research impact is the contribution that research makes to the economy, society, environment or culture, beyond the contribution to academic research." Academic institutions and research widely use the Australian approach.

- "The impact of some research is evident immediately, whereas in other cases, it can take years, or even decades before the true value becomes apparent. There are no simple predictors of potential benefits or outcomes and no single measure of impact." (Oxford University, 2024)

- "Research impact is real change in the real world. There are many different kinds of impact, including attitudinal, awareness, economic, social, political, cultural, and health. It takes hard work and persistence to create an impact from research. Impact is achieved through several steps that include helping relevant audiences to discover, connect with, understand, apply and advocate for research." (Rapple, 2019)
- "We have succeeded when the knowledge generated by our research contributes to, benefits, and influences society, culture, our environment, and the economy. We value the process as well as the outcome since working with partners who use the new knowledge we create informs our research directions and methods." (University of York, 2024).

The Australian Research Council approach was adopted here with specific adjustments to address the demand for operationalization. Within the editorial environment, the term "impact" is largely endogenous, oriented toward the acceptance of articles and journals (Reips & Matzat, 2013; Oliveira & De Andrade Martins, 2019; Corley & Gioia, 2011). In this context, researchers primarily write for other researchers, with the impact factor serving as a measure of this influence. However, the understanding of "impact" within the editorial sphere has gradually broadened, incorporating not only the academic logic of citation and adoption (Tushman & O'Reilly, 2007; Gulati, 2007; Alvesson & Sandberg, 2011) but also the notion of benefit to others, often referred to as practical relevance (Nicolai & Seidl, 2010). Additionally, regulatory agencies have begun to emphasize a broader definition of impact, focusing on societal benefits. This shift has been driven by competition for research funding, particularly in fields where externalization and perceived impact within organizational environments are critical (Daft & Lewin, 2008).

In line with this perspective, Wickert *et al.* (2021) build on and complement the Australian approach by categorizing the types of impact that social scientists are uniquely positioned and responsible for achieving. These impacts extend the scope of stakeholders to include a broader range of actors such as academics, professionals, society, regulators, and educators. **Academic impact** is achieved through innovative and engaging research that focuses on problem- or phenomenon-oriented studies, contributing to the advancement of theoretical knowledge. P**ractical impact** addresses the needs of professionals by developing scientifically validated tools, explaining the practical applications of findings, and aiding in the implementation of research insights to solve real-world problems. **Social impact** occurs when research provides solutions to societal challenges or stimulates debates on pressing social issues. **Political-regulatory impact** is realized when research influences the development of public policies or the standards set by regulatory organizations. Finally, **Educational impact** focuses on enhancing teaching and learning through the development of innovative curricula and teaching methods (Wickert *et al.*, 2021).

In any case, a clearer and more effective understanding of what constitutes impact is necessary. This need is evident within the academic community and is reflected in the association between research that is widely cited and research that drives meaningful changes in organizations and society (Alvesson & Sandberg, 2011; Gulati, 2007).

We specified elements that should be considered when evaluating impact: (a) the approach integrates theoretical impact and "provable" impact, addressing the field within its specific contexts; (b) impact should be assessed not only in the short term but also in the medium and long term, drawing inspiration from Oxford University; and (c) a focus on both products and processes, as emphasized by York University, is essential.

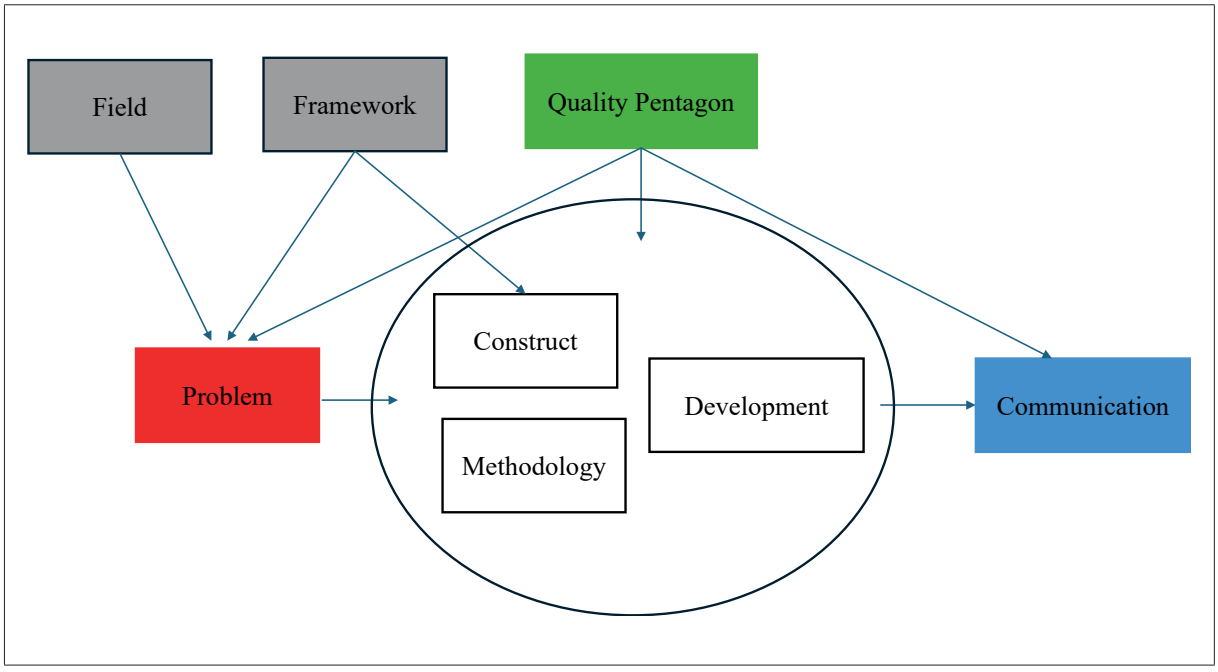
Essence: impact is the change that new knowledge brings to a community.

3 Methodological Development and Proposal Implementation

This study originated from an editorial by Frezatti (2020), which explored the quality elements of a research project and an article communicating its results. While it remains one of the most widely read pieces in the Journal of Education and Research in Accounting (REPEC, 2024), we identified a need for more uniformly accepted conceptual clarifications and practical guidance. This study is categorized as a theoretical-methodological investigation. The idea for this discussion emerged organically during meetings where we analyzed the elements of the pentagon and their application in the field. These discussions occurred at various stages, including the preparation of research projects and the drafting of articles, with a focus on conceptual exploration and their practical application in projects.

Research development in applied social sciences often begins with a deep understanding of the field and a heuristic perception aimed at generating new knowledge on a specific topic. It can also emerge from bibliographic research that explores the state of the art across various nuances, identifying gaps or areas that have yet to be addressed, evidenced, or proposed.

Once the problem is defined, the research question specifies the direction, focus, and scope of the study. From this point, the research is constructed from two perspectives: (i) the elements that ensure the **intrinsic quality** of the research, including the theoretical constructs necessary for the development of the field stage, and (ii) the operational elements that organize, test, and refine the research components, enabling effective communication of the findings upon completion (Figure 1).



Source: Developed by the authors based on the literature and the group's reflections

Figure 1. Stages of development of scientific research

Building on the preceding discussion, we provide a detailed description of the concept and properties of each attribute of the pentagon (Table 1). Additionally, we identify the key theoretical references that informed these attributes and served as inspiration for the pentagon framework.

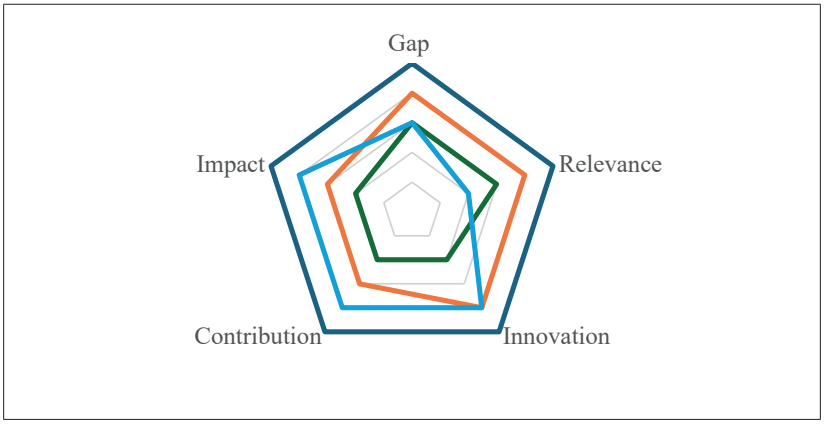
Table 1

Characterization of Pentagon Attributes

Element	Essence	Proprieties	Theoretical Framework
Gap	Something unknown or incompletely understood about a phenomenon, not addressed in the literature available in a given field, country, or abroad.	Interaction of logics; Integration of knowledge	Sandberg e Alvesson (2011)
Relevance	The degree of importance (value and usefulness) that research provides to a community.	How relevant a problem is; To whom is it relevant?	Corley and Gioia (2011), Daft and Lewin (2008), and Nicolai e Seidl (2010)
Innovation	The introduction of ideas, methodologies or discoveries that reduce or eliminate a gap.	Which part of a theoretical, empirical or methodological gap is mitigated?	Miles et al. (2011)
Contribution	New knowledge that advances the understanding and development of a field.	Theoretical and empirical	Corley and Gioia (2011)
Impact	What new knowledge changes in a community?	What changes or might change in which part of a community? What transforms the practice of various actors?	Alvesson e Sandberg (2011), Gulati, 2007) and Wickert et al. (2021)

Source: developed by the authors based on the literature and group's reflections.

The elements of the pentagon are interdependent, influencing one another; thus, any change in one element of the research invariably necessitates adjustments in the others. Additionally, the quality of research can be assessed through the vertices of the pentagon (Figure 2). The figure illustrates that research may exhibit varying strengths across the elements, and it is unlikely for all elements to reach their maximum potential simultaneously.



Source: adapted from Frezatti (2020).

Figure 2. Quality pentagon showing different configurations of the five quality attributes

We can evaluate the elements of the pentagon through a qualitative analysis presented in the following section. This analysis is guided by a rubric designed to assess the pentagon's elements in scientific research (Table 2), whether at the project stage, as a working paper, or as already published research. Similar to this study, the analysis at the research project or working paper stage aims to assess the quality of the research by considering aspects such as its theme, depth of exploration, relevance, and potential contribution. To this end, we propose three levels for evaluating each element of the pentagon. While this approach may seem straightforward, it is inherently complex due to the interconnections among these attributes within a research's argumentation and positioning.

Table 2

Analysis of the elements of the pentagon

Element	Inappropriate	Can be improved	Appropriate
Gap	Not evidenced or perceived	Existent, but is very abstract, difficult to understand or accept	Clearly understood
Relevance	Benefit or recipient of benefit is unclear	Importance is specific to a local group or context.	Relevance is clear and evident for whom it is economically and/or socially relevant
Innovation	Lack evidence of something not previously known	Innovation exists mas is minimal	Innovation and its extension are evident
Contribution	Lack of gap evidence indicates no contribution; if present, elements are misaligned.	Contribution mitigates the gap, but it persists	Contribution addresses or eliminates the gap
Impact	No evidence of impact on various segments of a community.	Potential impact exists but is generalized and unclear.	Impact is understood and perceived as broad

Source: Developed by the authors based on the literature and group's reflections.

4 Analysis of a project according to the Pentagon

Evidence of use is crucial for evaluating the usefulness of an approach and identifying its potential for action and opportunities for improvement. To this end, we developed an analysis process based on a **research project** currently under development, addressing similar research topics, and with the authors' authorization. The project excerpts are presented in tables, accompanied by reflections on each of the five elements of the pentagon.

Before presenting excerpts from the project, it is important to provide a brief contextualization of the research problem proposed in this investigation. The project discussion is based on the premise that variations in the volatility of business environments may necessitate the use of artifacts with differing complexities and applications in the planning and control process. This is particularly relevant when comparing organizations in the Anglo-Saxon environment with those in emerging countries, given the differences in their macroeconomic environments. Additionally, different phases of organizational evolution may demand different configurations of management control artifacts. Strategic planning, budgeting, forecasting, the Balanced Scorecard (BSC), and budgetary control may be used in various configurations, and the relevance of each in the management model may change depending on the stability or turbulence of the environment. The configuration refers to a set of elements that work cohesively together, and once altered, they form a new set of elements. A configuration is useful in a specific organizational context and at a particular point in time, aiming to optimize accuracy in the planning and control process, which, in turn, influences internal decision-making and management effectiveness. Changes in the external environment and the stage of organizational development can create demands for adjustments in the configuration of management control systems. The **central problem addressed in the research project concerns the accuracy of the planning and control process related to artifacts in medium and large family-owned businesses.** The following **reflective steps** will guide the analysis of each of the pentagon's elements in the context of this research project:

4.1 Gap

The first gap concerns the lack of attention to structuring diagnostic and interactive use control systems in research environments where Simons' (1995) model predominates. The model assumes the existence of artifacts that will automatically serve both diagnostic and interactive purposes, without addressing how these systems should be effectively structured. The second gap is linked to the development of management control systems (Anthony, 1965) primarily in developed countries with an Anglo-Saxon cultural context. This creates a need for adaptation when applying these models in organizations operating in emerging economies (Howorth, Rose, Hamilton, & Westhead, 2010). The expectation is that research conducted outside of this dominant axis will contribute innovative knowledge (Xu & Meyer, 2013). A key gap this study addresses is the critique of the monolithic view that what works in one environment can be simply transplanted into another. The third gap involves the lack of recognition of dynamism in organizational configurations, often viewed as stable over time and across different organizations. The assumption of equilibrium is rare, with organizations shifting between states of balance and imbalance. These periods of discontinuity disrupt stable phases, and changes typically occur episodically, driven by organizational rigidity. This raises questions about the premise of equifinality, which suggests that different forms can equally address the same situation (Meyer *et al.,* 1993), even though dynamic tensions continuously affect a company's routine activities. The fourth gap addresses the failure to identify what level of accuracy is acceptable to organizations, an issue often overlooked in research. From this perspective, the study proposes a discussion of how the configuration should be adjusted to meet these needs. Lastly, the fifth gap relates to the focus on medium and large family businesses, a sector that has been underexplored, particularly those that are not publicly listed. This represents a significant area for further research and contribution.

1. A framework that relates to the theme and supports the structuring of the project as part of the construct.
2. Identification of aspects the framework does not address in relation to the problem, considering: environment, scope, and relationship with other elements, emphasis, and customization for the target audience. The logic behind identifying the gap involves highlighting what is not yet known, but is significant and relevant to the target audience.
3. In the example, the combination of gaps includes a lack of detailed structuring of the model: (a) this gap stems from a different environment than the one we currently operate in, considering the homogeneity and development stage. It invites a discussion on whether a conceptual framework should be transplanted or adapted to new environments; (2) A lack of dynamism: the absence of dynamism in models implies that they should be periodically reviewed to remain relevant, thus contributing to their sustainability in specific contexts; (3) Equifinality: this concept acknowledges that there may be multiple valid approaches for the same situation, focusing the research on the accuracy of outcomes; (4) A robust framework of argumentation: this gap emphasizes the importance of a strong theoretical framework to facilitate understanding, especially in the context of family businesses; and (5) An emerging segment: this refers to the growing strength of research within a specific area of analysis.

4.2 Relevance

Accuracy in a stable environment may require follow-up actions to ensure that "things happen." A volatile environment, however, will also require instruments and actions to "maintain the strategic planning matters and make them a reality." In such a context, accuracy is more than "getting what will happen right," but rather "ensuring that what was decided will happen." This is the role of the mechanism (Merchant & van Stede, 2007, p. 8). Research is relevant because: i) it deals with a fundamental topic for the management and sustainability of companies, that is, the effectiveness of planning and control artifacts; and ii) it focuses on the segment of organizations that correspond to approximately 70-80% of Brazil's GDP and about which little is known about the topic.

1. Clearly identified gaps are relevant antecedents, as they can have different degrees of relevance.

2. The combination of gaps should provide an opportunity to expand relevance. Therefore, when relevance appears to be limited, returning to the gap may be an appropriate path for improvement. In the exercise presented here, the focus on family businesses opens up a range of benefits for a highly relevant portion of organizations, indicated by their participation in GDP and employment. Relevance depends on the breadth of the benefit, and something universal carries more weight than something that concerns only a specific environment. Although this may seem obvious, communication may lead to different understandings. Additionally, the theme of sustainability is to be valued, and mechanisms are required for it to be achieved.
3. In addition to determining "to whom" the research is addressed, it is necessary to determine "what purpose" it serves. In this regard, the project emphasizes that the accuracy of planning mechanisms has value and utility for companies operating in stable environments (monitoring actions) and those in more volatile environments, considering the challenge of "ensuring that what was decided will happen."
4. Thus, the relevance analysis may change when considering the following perspectives of the problem's scope: environment, scope, and relationship with other elements, emphasis, and customization for the target audience.

4.3 Innovation

An approach is innovative because, as it develops, it provides individual rewards as companies join and are accepted into the stratified sample. This approach was chosen to (i) improve the credibility of the data, (ii) enhance the image of the "research" theme among companies, and (iii) establish long-term relationships with organizations. No other published articles using this approach were found.

1. **Originality**: Assessing whether the research presents ideas, methods, or findings that are new to the field (Kuhn, 1962). The proposal for individual retribution to companies is an original innovation not found in other published studies.
2. **Significance**: Verifying the significant impact of the innovation on the field, including how it changes the understanding or approach to a problem (Popper, 1959). The proposed innovation enhances the quality and credibility of data, significantly impacting the robustness and validity of the results.
3. **Importance**: Identifying the relevance of new contributions to current challenges and their potential to open new avenues for future research (Rogers, 2003). Retribution to companies improves the research image, promotes long-term relationships, and benefits future collaborations and studies.
4. **Validation**: Ensuring that new ideas are validated through rigorous experiments or analyses, demonstrating their effectiveness and applicability (Ziman, 2000). The original methodological approach should be validated by improving the credibility and quality of data.
5. **Clarity and Complexity**: Presenting the innovation clearly and understandably, perceived as easy to use and allowing identification and application by other researchers (Fagerberg, 2005; Rogers, 2003; Dosi, 1988). The compensation methodology must be clear so that other researchers can replicate and adapt the approach.
6. **Compatibility**: Assessing the degree to which the innovation aligns with existing values, past experiences, and the needs of potential adopters. An idea incompatible with the values and norms of a social system will not be readily adopted (Rogers, 2003). Compensation must be compatible with the practices and expectations of participating companies, facilitating its acceptance and implementation.

4.4 Contribution

The study examined here contributes to the understanding of various planning and control configurations and, potentially, to improving the management model by providing insights into configurations that are more suited to organizations' needs at their respective stages. This information can be proactively integrated into the management model, enhancing assertiveness and reducing risks by anticipating and adjusting to crises, which, in turn, can lead to transformations (Greiner, 1972, 1997, 1998).

1. With clarity about innovation, the contribution can be theoretical, substantially affecting what is known and creating new opportunities, or it may be limited to empirical contributions that are more difficult to theorize but useful for a specific niche.
2. The separation and argumentation claiming the contributions should refer to what was described in the gap, relevance, and innovation. Depending on the communication vehicle, the detailing or synthesis of the contributions is emphasized. In the example presented here, the choice was to focus on synthesis.
3. The **theoretical contributions** of this example, addressed by the gaps, concern knowledge about the set of mechanisms of the control system. This indicates that the set is not uniform and can coexist with different compositions and levels of importance to meet the needs of an organization and contribute to the concept of equifinality. Additionally, the perception that the set has a dynamic rather than a permanent static perspective at a given moment offers an opportunity to understand the system's evolution. In this sense, recognizing that accuracy is important and that companies may interpret it differently is an innovation that contributes to the literature on management control systems.
4. Additionally, **practical, empirical contributions** include the specific approach to family businesses, mainly those not listed on stock exchanges but highly relevant for wealth generation in the country and which exhibit unique characteristics over time. Finally, a specific empirical contribution is that this example study focused on an environment that is rarely studied: that of emerging countries.

4.5 Impact

The knowledge provided by research in a volatile environment, such as the Brazilian one, can significantly impact organizations. Managers can be more assertive in their tasks by understanding what constitutes "normality" based on the organization's stage and identifying areas for improvement. It is known as academic or theoretical impact, which influences organizations and people indirectly. By understanding and managing organizational changes, organizations can create better operating conditions and foster growth, thereby increasing employment.
Other impacts include the practical impact on organizational managers. These professionals enhance their models and, with greater precision, achieve greater efficiency for their organizations. Additionally, there is a social impact derived from the practical impact: improved efficiency promotes economic sustainability and positively influences employment levels. Finally, an educational impact benefits students, better preparing them to face the challenges of entering the job market.

1. Typically, this is the item on the pentagon that causes the most difficulties for authors in various areas of human development, especially in the business field, as it synthesizes several highly abstract elements and possibilities.
2. Since we are in an applied social area, the indirect impact is often the most honest for the "end audience." The closer we can get to this point, the stronger the research communication becomes. For example, if we can demonstrate that the use of the diagnostic control system saves lives, the impact is stronger. However, this is unlikely; thus, we move towards an approach that shows how we affect people, who in turn save others.

3. The framework (Wickert *et al*., 2021) indicates that the various possibilities of impact should be considered, such as: i) indirect academic or theoretical impact, considering the final benefit recipient, measured mainly by the number of citations; ii) practical impact, in the professional environment; iii) social impact, which is broader and can be direct or indirect; iv) regulatory political impact, when it enhances public policies; and v) educational impact, when it improves teaching and learning.
4. The impact indicated in the example refers to promoting greater assertiveness, which, in turn, improves management. Hence, the impact is on management (organizations as targets of research sustainability) and employment (which benefits people through economic development).

As discussed in this study, the quality pentagon is a helpful and robust tool for planning and conducting research in applied social sciences, particularly in the accounting field, which is the focus of the research project that served as the basis for this discussion. It is important to emphasize that the quality pentagon is a subjective approach, and the evaluation of its five elements – gap, relevance, innovation, contribution, and impact – explored here was shaped by our worldview and biases as researchers. Therefore, the subjectivity of the pentagon analysis is inherent to the method. Each researcher and, consequently, each referee will have their own mental model for constructing the pentagon, which may differ from one author or referee to another.

Identifying research gaps allows us to focus on areas where knowledge is limited or lacking, encouraging research that meaningfully addresses these gaps. Relevance ensures that our research targets questions that truly matter to both the academic and practitioner communities, thereby enhancing the usefulness and applicability of the findings. Innovation is crucial to scientific advancement, introducing new ideas and methodologies that can transform a field of study. This study emphasized the importance of not only pursuing innovation but also rigorously validating it to ensure its effectiveness and applicability.

The contribution of a research project should be clear, substantial, and either add new knowledge or significantly expand existing theories. It is important to emphasize that both theoretical and empirical contributions are vital to the advancement of a field and should be thoughtfully discussed and defended. The impact of a research project should be evaluated not only in academic terms but also in practical, social, political, and educational dimensions. Accordingly, we propose adopting a broad perspective on impact, suggesting that research should aim to positively influence society across multiple dimensions.

The key is to analyze the elements of the pentagon in an integrated manner, taking into account the context and specific needs of the field of study in question. This approach enhances the quality of the research and simplifies the work of authors, referees, editors, and advisors alike.

5 Final (Initial) Considerations

If, by reading this discussion, you expected a straightforward script to identify the "terrorist," imprison him/her, and ensure peace of mind with years of imprisonment, we regret to inform you that this was not our intention. Even if you compile an extensive dossier with evidence of all the elements we have highlighted as crucial for promoting the intrinsic quality of research, the arguments are unlikely to be equally accepted by all judges assigned to evaluate your case. As emphasized in the third gap of the project explored here, the inherent dynamism of a research field is almost a close relative of the "terrorist." This means that the elements of the pentagon can be interpreted differently depending on the audience (different individuals), and even the same audience may conclude that an element once deemed important has lost its relevance, given the ever-changing nature of science.

The reflection we aim to encourage with this theoretical-methodological article parallels the lesson of the agent in the movie who was always late and was advised by his mentor to return to where he started. Thus, at the conclusion of this discussion—commonly referred to as final considerations in many studies—we invite all readers to revisit their initial considerations. The objective is not to provide a checklist for evaluating the quality pentagon of one or more research projects but to foster awareness of the robustness that attention to these five elements can bring to an investigation. As outlined in this study's objective, research should offer arguments to help researchers structure their projects and articles—arguments for themselves, for third parties, and for evaluators and readers to inform their analyses and reflections.

We recognize that gap, relevance, innovation, contribution, and impact may carry different weights and measures. Our aim is not to quantify them objectively but to raise awareness among accounting researchers of their existence and, more importantly, their interrelation. As emphasized in the initial considerations, when one element of the pentagon is not well developed, the potential of the others is compromised.

Note that this "movie" (discussion) will have served its purpose if, based on the reflections and provocations we presented, you were able to structure a roadmap to guide your journey. Maturing is a process that takes time, varying in pace and effectiveness for each researcher, but its ultimate goal is to simplify life—not only yours but also that of editors, authors, students, and managers, benefiting both the scientific and practical communities as a whole. Even if you have not formalized a roadmap, but instead find yourself mentally reviewing your projects and dedicating more time when structuring new ones to ensure the five elements of the pentagon are at least minimally addressed, we consider it a meaningful achievement.

Finally, the pentagon proposed here is subjective—it is not intended to feed a system capable of assigning a grade for approval or failure, but rather to serve as a framework that helps the academic community coexist with and respond to a field in constant evolution. Depending on your perspective, your intention might be to pursue and eliminate the "terrorist." We respect that, but the team behind this manuscript recommends embracing the idea that the pentagon of intrinsic research quality can take on different configurations.

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Managers' Dark Triad personality traits and earnings management practices in credit unions

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Abstract

Objective: This study aims to analyze the relationship between managers' Dark Triad personality traits and earnings management practices in credit unions.

Method: This descriptive and documentary study employs a survey and quantitative approach. It presents a theoretical discussion on the Dark Triad personality traits—Machiavellianism, narcissism, and psychopathy—and their influence on earnings management practices. The sample comprises 103 credit cooperative managers (restricted to one response per cooperative). Data were collected in two stages: (a) a questionnaire was administered to managers to capture their personality traits and propensity for earnings management, and (b) accounting information was gathered from entities' reports and financial statements covering the period from the first half of 2015 to the second half of 2021. Earnings management practices were assessed using specific accruals. Descriptive statistics, multiple linear regression, and logistic regression analyses were conducted using Stata.

Results and Contributions: The findings reveal that credit unions engage in earnings management practices and that managers with Dark Triad personality traits exhibit a higher propensity to manage earnings. This underscores the importance of considering personality traits when recruiting and selecting professionals for management positions, as these traits can influence attitudes and behaviors that may not align with organizational objectives. These insights are particularly relevant for members, credit cooperatives, regulatory bodies, analysts, auditors, statutory boards, and society at large, as they demonstrate the impact of individual personality traits on accounting decisions and organizational outcomes.

Keywords: Credit Cooperatives, Earnings Management, Personality Traits.

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1 Introduction

Cooperative societies operate within a socioeconomic model that promotes sustainable regional development. In 2020, these entities ranked first in loans granted to micro and small businesses, with assets exceeding R$310 billion, according to the Organization of Brazilian Cooperatives (OCB, 2020).

The strength of credit unions influences the distribution of earnings to members and facilitates access to credit for individuals underserved by the conventional banking model (OCB, 2020; Soares & Sobrinho, 2008), thereby fulfilling an important social role (Porto, Ribeiro, Anjos & Sampaio, 2020).

As credit unions expand, concerns emerge about signaling positive performance to members, as negative outcomes may cause insecurity among members and attract scrutiny from regulatory bodies, potentially indicating inefficient management (Bressan, Bressan & Silva, 2016).

In this context, managers may adopt earnings management strategies to adjust the level of provisions for doubtful debts, seeking private advantages that could result in losses and dissatisfaction among members (Macedo & Kelly, 2016). Numerous studies have explored earnings management in credit unions, with notable contributions from Brown and Davis (2009) and Hillier, Hodgson, Stevenson-Clarke, and Lhaopadchan (2008). In Brazil, Maia, Bressan, Lamounier, and Braga (2013) were among the first to address this topic, paving the way for subsequent studies, including Bressan, Bressan, and Silva Júnior (2015); Bressan, Santos, and Bressan (2015); Bressan et al. (2016); Bressan, Souza, and Bressan (2017); Dantas, Borges, and Fernandes (2018); Santos, Bressan, Braga, and Guerra (2018); Porto *et al.* (2020); and Santos and Santos (2020).

These studies emphasized that cooperatives aim for less variable results, underscoring the importance of analyzing the quality of the reported information. Indicators such as solidity, credibility, and efficiency provided by credit cooperatives serve to validate their performance and attest to the effectiveness of their managers (Bressan et al., 2016; Maia et al., 2013).

The pressure to present surpluses may lead cooperative managers to make opportunistic decisions aimed at demonstrating their management skills to members and maintaining the cooperative's credibility (Santos & Santos, 2020). In this context, the propensity for earnings management emerges as a predisposition among managers to make decisions driven by opportunism.

Chowdhury, Mollah, and Al Farooque (2018) note that earnings management practices can be influenced by managers' attitudinal factors. The discussion of Dark Triad personality traits—narcissism, Machiavellianism, and psychopathy—offers a social perspective within personality psychology. Originally proposed by Paulhus and Williams (2002) and later revisited by Jones and Paulhus (2014), it provides a valuable framework for analysis. The study instrument, a self-report questionnaire, captures the predisposition of these traits within a population, without the intention of establishing clinical diagnoses (D'Souza, Lima, Jones & Carré, 2019).

Managers' Dark Triad personality traits significantly influence their judgment and decision-making (Ham, Lang, Seybert, & Wang, 2017). For instance, narcissists seek attention and are self-promoters; Machiavellians are highly manipulative; and individuals with psychopathic traits exhibit impulsiveness and a lack of empathy (Crysel, Crosier, & Webster, 2013; Góis, 2017).

Dark Triad traits have been associated with organizational decisions, profit maximization, and work behavior, highlighting the studies by Campbell, Hoffman, Campbell and Marchisio (2011), Chatterjee and Hambrick (2007), Capalbo, Frino, Lim, Mollica and Palumbo (2017), Carré, Jones and Mueller (2020), D'Souza *et al.* (2019), D'Souza (2016), D'Souza and Lima (2015), Góis (2017), Grover and Furnham (2021), Ham *et al.* (2017), Jones (2013), Murphy (2012), and Silva (2019).

Managers influenced by the personality traits of psychopathy, Machiavellianism, or narcissism, and driven to report strong performance to satisfy and attract new associates, may exhibit a greater propensity for engaging in earnings management practices (D'Souza & Lima, 2015; Góis, 2017). However, it is important to note that some studies have identified instances where individuals with dark personality traits make less aggressive decisions, ultimately benefiting their organizations (Spain et al., 2014; Papageorgiou, Wong & Clough, 2017; Templer, 2018; Hajhosseini, Fathi & Shafiei, 2019).

Building on the previous discussion, this study seeks to contribute to the ongoing and often contradictory discourse surrounding the influence of individuals' dark personality traits on decision-making, particularly in the context of credit unions. Accordingly, the following research problem is proposed: **What is the relationship between managers' Dark Triad personality traits and earnings management practices in credit unions?** The primary objective is to analyze the relationship between managers' Dark Triad personality traits and the earnings management practices observed in credit unions.

This study addresses a gap in the accounting field by analyzing credit unions and examining the propensity for earnings management in relation to Dark Triad personality traits. The analysis combines primary data, collected through a questionnaire on dark personality traits and earnings management propensity, with secondary data on earnings management practices derived from specific accruals. These accruals are considered an appropriate model for financial entities such as credit unions.

Given the significance of credit unions in the national landscape, their role in regional development, and the emphasis on reporting strong performance to members, identifying the presence of earnings management in credit unions and its relationship with managers' Dark Triad traits is crucial. This understanding provides insights into how personality traits and experiences influence managers' business decisions (Bouvatier, Lepetit and Strobel (2014); D'Souza & Lima, 2015; D'Souza *et al.*, 2019; Porto *et al.*, 2020).

Furthermore, accounting information can serve as the basis for calculating awards and bonuses tied to performance, making it susceptible to manipulation aimed at satisfying private interests and achieving personal or professional recognition (D'Souza *et al.*, 2019). In this context, personality emerges as a critical predictive factor that organizations often overlook. Dark Triad personality traits, in particular, may be associated with a predisposition toward unethical behavior (Carré *et al.*, 2020).

The results of this study revealed a general trend where credit union managers with Dark Triad personality traits were more likely to engage in earnings management practices. In their pursuit of satisfactory solutions to achieve business and personal goals, these managers often face the dilemma of using accounting information opportunistically, demonstrating a propensity for managing earnings.

This study offers information users a unique perspective on the individual characteristics of managers in credit unions and their potential motivations for engaging in earnings management practices—an aspect previously unexplored in the literature. Additionally, it underscores the importance of careful consideration when hiring professionals for management roles and highlights the necessity for credit unions to implement robust corporate governance mechanisms.

2 Theoretical discussion and hypothesis development

The manipulation of information and earnings management by managers significantly undermines the quality of accounting information, as it involves the discretionary use of accounting practices to alter results (Lee & Masulis, 2009).

Earnings management is not classified as fraud; however, entities that employ alternative representations of accounting events (management through accruals) or manipulate the timing of revenues and expenses (management through operational decisions) tend to exacerbate information asymmetry between insiders and outsiders. This practice often favors individual motivations and fails to reflect the true financial context of organizations (Noronha, Zeng, & Vinten, 2008).

Organizations can adopt various strategies to manage earnings, which can be analyzed from two perspectives. The first is accrual-based management, which involves altering accounting methods or estimates without violating accounting standards. The second is real activities management, which entails modifying management strategies to meet or exceed short-term goals. While the latter directly impacts cash flow, it may also lead to significant economic consequences in the long term (Gunny, 2010).

The methodological approach of analyzing specific accruals to detect earnings management is well established in the accounting literature (Martinez, 2001; Goulart, 2007; Dani, Filho, Santos, & Klann, 2017). Specific accruals are linked to unique characteristics and accounting standards relevant to particular industries, such as the financial sector (Martinez, 2013). This metric focuses on identifying and analyzing the behavior of specific accounting accounts or business segments, directing attention to accounts where managers are most likely to exercise discretion (Trapp, 2009).

McNichols and Wilson (1988) were among the first to discuss provisions for loan losses in banks, introducing the concept of specific accruals. Alali and Jaggi (2011) documented concerns raised by regulatory bodies regarding the use of provisions to manipulate earnings. Cheng (2012) further examined the practice of earnings management through specific accruals within the banking sector.

Banking institutions offer numerous research opportunities to isolate specific accruals from structuring transactions. Additionally, focusing on a single regulated sector enables more precise measurement of earnings management activities (Cheng, 2012). In Brazil, provisions for credit operations in financial institutions are governed by Resolution No. 2,682 of 1999 from the Central Bank of Brazil, which incorporates a degree of subjectivity in credit risk classification (Bischoff & Lustosa, 2014; Maia *et al*., 2013).

In this context, Brown and Davis (2009) emphasize that credit unions are particularly susceptible to agency problems, where the distribution of surpluses and concealment of losses serve as incentives for managers to adopt opportunistic practices, including a propensity for earnings management.

These arguments underscore the importance of monitoring mechanisms in organizations, as the characteristics of executives can provide insight into organizational outcomes (Chatterjee & Hambrick, 2007) and earnings management practices. In this context, the Upper Echelon Theory, proposed by Hambrick and Mason (1984), highlights the influence of executives and managers on company performance. This theory posits that the characteristics of the upper echelon—individuals in senior positions within organizations—can shape organizational results, as executives act based on their interpretations, experiences, values, and personality traits (Hambrick, 2007).

In this context, the study of Dark Triad personality traits emerges as a framework for understanding and influencing individuals' attitudes and behaviors (D'Souza *et al*., 2019; Smith, Wallace, & Jordan, 2016). First introduced by Paulhus and Williams (2002), the Dark Triad encompasses three interrelated personality traits: Machiavellianism, narcissism, and psychopathy. According to Crysel et al. (2013), individuals with high levels of these traits may exhibit features such as inflated self-importance (narcissism), manipulative tendencies to achieve their goals (Machiavellianism), or a lack of empathy (psychopathy).

Machiavellian individuals are manipulative and socially skilled, and may exhibit behaviors that appear to benefit those around them, but motivated by personal gains, they promote the use of deception, manipulation, and are domineering, distant, and practical (Smith *et al.*, 2016), in which such behaviors are potentially relevant to decisions about earnings management.

Grover and Furnham (2021) argue that Machiavellian individuals are long-term planners and strategists who take calculated risks when they stand to benefit. Additionally, those with high Machiavellian traits feel less guilt than others when providing inaccurate information to stakeholders (Murphy, 2012). D'Souza *et al.* (2019), D'Souza and Lima (2015), and Góis (2017) assert that managers with Machiavellian tendencies are inclined to make decisions that prioritize their own interests.

Narcissists are characterized as selfish, and those with pronounced traits are often described as impulsive, extroverted, arrogant, and prone to making riskier decisions in pursuit of rewards, attention, and grandiosity (Góis, 2017; Grover & Furnham, 2021; Jones, 2013; Paulhus & Jones, 2015). Narcissistic individuals crave applause and strive to maintain a public image that conveys grandeur (Capalbo *et al.*, 2017).

Narcissists are often characterized by egocentrism and a tendency to prioritize their own interests, even at the expense of others. They frequently believe that rules do not apply to them and are inclined to dominate decision-making processes, including those associated with earnings management practices (Ham *et al.*, 2017).

Johnson, Kuhn, Apostolou, and Hassell (2013) suggest that moderate levels of narcissism in leaders can benefit organizations by fostering creativity and exceptional performance. However, when excessive, these traits increase the risk of errors and fraud.

Narcissistic individuals often pursue leadership positions as a means to gain recognition and power (Góis, 2017). Chatterjee and Hambrick (2007) note that these individuals are drawn to innovation, present exhibitionist tendencies, and frequently engage in bold and attention-grabbing behavior. This includes making significant acquisitions, imposing strategies, or performing highly visible actions. Furthermore, highly narcissistic professionals tend to view themselves as more valuable than others.

Non-pathological psychopathy is characterized by traits such as insensitivity, impulsiveness, recklessness, low empathy, and anxiety (Paulhus & Williams, 2002; Paulhus & Jones, 2015), along with reduced levels of kindness and responsibility (Moraga, 2015). These individuals are also identified as skilled manipulators (Pethman & Erlandsson, 1997). They possess a predisposition to unethical behavior and may be inclined to engage in earnings management (D'Souza & Lima, 2015; Smith & Lilienfeld, 2013).

In contrast, Harrison, Summers, and Mennecke (2016) argue that these professionals can benefit organizations due to their appetite for risk, determination, and willingness to engage in ventures with greater exposure to uncertainty. Moreover, they tend to excel in chaotic and high-stress environments.

In this context, psychopathy presents ambiguous implications for leadership. Traits such as charisma and dominance may predispose individuals to achieve adaptive outcomes, making those with psychopathic tendencies appear to be effective leaders. However, impulsivity and egocentrism are often associated with ineffective outcomes and unethical behavior (Smith & Lilienfeld, 2013).

Jones (2013) investigated the impact of Dark Triad traits on the financial environment. The findings highlighted selfishness, stemming from psychopathy and narcissism, as a key factor, characterized by a willingness to benefit oneself at the expense of others. Additionally, Machiavellians were identified as strategists and long-term planners, often willing to risk others' resources to achieve personal gains.

D'Souza (2016) analyzed the relationship between Dark Triad personality traits and earnings management aimed at maximizing personal and corporate gains, finding a positive association between the interaction of the three traits and the propensity to manipulate earnings opportunistically. Furthermore, D'Souza *et al.* (2019) observed that individuals with Machiavellian traits were more likely to engage in opportunistic behavior to achieve personal goals. Psychopathic traits showed a moderate positive association with managers' tendencies to maximize their gains through earnings management practices. No significant associations were found for narcissistic traits.

Carré et al. (2020) explored the relationship between narcissism, psychopathy, Machiavellianism, and traits such as callousness and manipulation. Their findings revealed that individuals with high levels of Machiavellianism perceived profit opportunities—whether legal or illegal—differently, influencing their strategic actions. This perception was also correlated with an increased likelihood of engaging in fraud.

While managers may make decisions driven by personal interests, there is recognition that individual performance is ultimately tied to the organization's performance and survival (Haga, Huhtamäki, & Sundvik, 2022). Furthermore, professionals who perceive themselves as having superior skills and judgment often overestimate their abilities, making them more likely to modify accounting events to present favorable results and produce optimistic forecasts (Li & Hung, 2013).

Naaman (2018) and Zainuldin and Lui (2020) observe that earnings management involves managers disclosing results that align with their private interests. Even though earnings management is not illegal but rather a relaxation of rules, its practice can escalate into fraud and unethical behavior (D'Souza & Jones, 2017).

Additionally, Cheng (2012) examined earnings management practices in financial institutions, emphasizing that these entities manipulate earnings through provisions for doubtful debts and securitization to prevent declines in earnings and/or meet analysts' forecasts.

Thus, building on the conceptual framework and prior studies discussed, the first research hypothesis is proposed:

> **H_1:** Credit union managers exhibiting narcissistic, Machiavellian, or psychopathic personality traits influence earnings management practices through specific accruals in credit unions.

Managers are primarily responsible for monitoring market conditions and formulating strategies to achieve their organizations' objectives. In cooperatives, where management is concentrated among a small group of individuals, there may be a greater propensity to take actions aimed at maximizing profits (McKee, Kagan, & Ghosh, 2019).

Graham, Harvey, and Rajgopal (2005) observe that financial executives aim to meet short-term earnings benchmarks to establish market credibility, enhance their reputation, and foster expectations of long-term growth.

Noronha *et al.* (2008) identified four key incentives that drive managers to engage in earnings management: external contracts, performance-based compensation, regulatory requirements, and capital market motivations. However, managers may prioritize specific incentives based on their preferences, leading to opportunistic behavior where accounting information is deliberately altered to serve their personal interests.

Grover and Furnham (2021) explored the relationship between the Dark Triad and risk-taking propensity, finding correlations across all measures of the triad and risk-taking. Similarly, Spain, Harms, and Lebreton (2014) examined the dark side of personalities, highlighting their significance in shaping organizational outcomes. Furthermore, professionals who perceive themselves as having superior skills and judgment often overestimate their abilities, making them more likely to modify accounting events to present favorable results and produce optimistic forecasts (Li & Hung, 2013).

Thus, when presented with opportunity and motivation, managers are likely to engage in earnings management, leading to the formulation of the second research hypothesis:

H_2: Credit union managers exhibiting Machiavellian, narcissistic, or psychopathic personality traits are prone to engaging in earnings management practices in credit unions.

3 Methodological procedures

A descriptive study was conducted adopting a survey and documentary procedures, with a quantitative approach.

3.1 Study Sample

The study universe consisted of 817 individual credit unions in Brazil. Corporate email addresses were obtained from the database of cooperative financial institutions available on the Central Bank's website. In some cases, LinkedIn profiles or the cooperatives' websites were also utilized. The search focused on identifying the cooperative's name and the positions of individuals associated with the webpage.

The questionnaire was directed to presidents, directors, and managers who possess privileged information and have the authority and influence to manage results in cooperatives. Consequently, the sample included questionnaires voluntarily completed and returned by managers from various cooperatives. The non-probabilistic sample comprised 103 managers from distinct individual credit cooperatives, with responses restricted to one per cooperative.

3.2 Study Constructs and Instruments to Collect Data

Data were collected in two stages. The first stage involved administering a questionnaire organized into the following sections: i) study introduction and presentation; ii) characterization of the respondent and the cooperative; iii) a form with 27 questions to measure personality predisposition using the Short Dark Triad (SD3) rated on a 5-point Likert scale where items 1–9 measure Machiavellianism, 10–18 measure narcissism, and 19–27 measure psychopathy; iv) a form with 10 questions addressing the decision-making process related to earnings management; v) an informed consent form; and vi) acknowledgments. The instrument can be accessed via the following link: https://forms.gle/J34yLkre2jQeVo4k9.

Written authorization was obtained from scientist Daniel Nelson Jones to use the SD3. The translated questions from D'Souza (2016) were then utilized to assess the Dark Triad personality traits.

The score for personality traits was obtained by averaging each participant's responses to the SD3 trait, following the same technique used by Jones and Paulhus (2014), D'Souza (2016), and Silva (2019).

The variable propensity to manage earnings was based on D'Souza (2016), where the decision to manipulate earnings and Dark Triad personality traits were investigated. Therefore, a dummy variable of 1 was assigned for credit unions with a propensity to manage earnings (PM) and 0 otherwise. Hence, the answers were classified according to a) respondent's average score according to answers provided to the 10 statements (see Table 10); b) the median of the sample responses was calculated based on this average propensity; c) respondents whose scores for earnings management practices were above the sample median was assigned 1, and 0 otherwise.

Table 1 presents the questions that captured the managers' propensity for earnings management practices:

Table 1
Earnings Management Propensity Construct

Variable	Statements	Metric	Author
Earnings Management Propensity (PM)	In the month leading up to the closing of the results release, I try to: 1. Stay calm, knowing everything within reach was done to achieve the results. 2. Call the team to present the results achieved so far and ask for dedication and commitment in the remaining days. 3. Check whether adjustments to accounts receivable or the provision for doubtful accounts (increase or decrease in provision expense) are needed. 4. Check whether administrative, advertising, publicity and/or maintenance expenses can be adjusted. 5. Examine the possibility of postponing probable losses, indicated by the legal department in the positions of the legal proceedings, in order to be recorded in the next period. 6. Check whether financial charges can be recorded in the future period. 7. Examine the possibility of reversing amounts provisioned in credit operations to maximize results. 8. Check whether it is necessary to change the depreciation method of assets recorded in fixed assets. 9. Analyze the possibility of recognizing "prepaid expenses" as an expense for the period. 10. Analyze the possibility of adjusting accounting entries related to ongoing works/renovations (e.g., postponing or advancing the completion of the work).	5-point Likert Scale: (1) Never; (2) Rarely; (3) I rather not to answer; (4) Almost Always; (5) Always	Adapted from Baralexis (2004); Noronha *et al.* (2008); D'Souza (2016); Góis (2017); Lunardi, Haussmann and Klann (2020).

Source: developed by the authors (2022).

Secondary data were collected from the six-month reports provided in IF. Data and the analytical files of balance sheets and financial statements (Codes 4010 and 4016) were published on the Central Bank of Brazil website. According to Law No. 4,595 of December 31, 1964, financial institutions must close their accounts and determine their results in June and December of each year when the balance sheets are determined by the accounting rules established by the National Monetary Council.

Thus, the analysis period covered the first half of 2015 to the second half of 2021, as this was the latest information available in the study period. There were 994 observations totaling an unbalanced sample across the periods.

The questionnaire asked the respondents to provide the first eight digits of the cooperative's CNPJ number, which enabled the entities to be associated with their financial statements. Additionally, similar to Silva (2019), the executives' responses were multiplied by the number of years they remained in the same position within the respective cooperatives. Thus, secondary data were excluded from the years when the respondents did not hold a position at the credit union.

Secondary data revealed the practice of earnings management through specific accruals in credit unions. The procedures described by Santos and Santos (2020) were adopted to identify such practices, i.e., the values corresponding to earnings management were determined through the discretionary portion of expenses with PCLD. In which:

i) The value recorded under Provisions for Credit Operations (Cosif 1.6.9.00.00-8) was identified. It represents the amounts provisioned at different risk levels, reflecting the total accruals of cooperative i in period t ().

ii) Next, the PCLD portion was measured based on the weighting of the amount recorded in each risk level by the minimum percentage of provision regulated in Bacen Resolution No. 2,682, sensitizing the non-discretionary portion of the PCLD. The risk levels, accounting items, and respective percentages are highlighted in Table 2.

Table 2
Risk levels and minimum provision of PCLD

Risk Levels	Delay in days	% Minimum Regulatory Provision	Accounting Item (Cosif account)
AA	–	0,0%	3.1.1.00.00-3
A	–	0,5%	3.1.2.00.00-6
B	15 a 30	1,0%	3.1.3.00.00-9
C	31 a 60	3,0%	3.1.4.00.00-2
D	61 a 90	10,0%	3.1.5.00.00-5
E	91 a 120	30,0%	3.1.6.00.00-8
F	121 a 150	50,0%	3.1.7.00.00-1
G	151 a 180	70,0%	3.1.8.00.00-4
H	acima de 180	100,0%	3.1.9.00.00-7

Source: Resolution No. 2.682, from 1999; Santos and Santos (2020).

Once the non-discretionary portion is recognized, the difference between the two balances ($PCLD_{tit}$ *and* $PCLDnd_{it}$) is determined to identify the discretionary portion of PCLD, called $PCLD_{d'}$ which may or may not correspond to the surplus, in recognition of losses according to criteria other than those provided for in the regulation, thus indicating that cooperative i in period t incurred in earnings management. This balance was identified using Equation 1.

$$PCLDd_{it} = PCLDt_{it} - PCLDnd_{it}$$

Where: $PCLDd_{it}$: discretionary portion of PCLD; $PCLDt_{it}$: amount provisioned for credit operations; $PCLDnd_{it}$: non-discretionary portion of PCLD.

Additionally, a series of control variables were analyzed at the cooperative and manager levels, as the entities' features and the managers' characteristics, such as gender, marital status, and personality, explain variations in earnings results (Shafer & Wang, 2011; Capalbo *et al.*, 2017; Hilary, Huang & Xu, 2017; Ham *et al.,* 2017; Silva, 2019). These variables are presented in Table 3.

Table 3
Control variables at the manager and cooperative levels

Variable	Data source	Metric	Database	Theoretical Foundation
Control variables of cooperatives' characteristics				
Size (SIZE)	Secondary	Log of Total Assets of Cooperative i in year t.	Central Bank of Brazil	Brow and Davis (2009); Góis (2017); Kim; Liu and Rhee (2003); Lee and Masulis (2011).
Basel Index (BI)		Relationship between Reference Equity and Risk-Weighted Assets		Maia *et al.* (2013).
VOC		Variation in the volume of credit operations		Maia *et al.* (2013).
RNDoc		Profit before net provisions expenses, divided by total credit operations for this assessment, in period t-1;		Bressan *et al.* (2016); Maia *et al.* (2013).
Immobilization (IMMOB)		Permanent/Equity		Bressan, Braga, Bressan and Resende Filho (2011); Carvalho, Diaz, Bialoskorski Neto, and Kalatzis (2015).
Return on Equity (ROE)		Net Profit/Equity		Bittencourt, Bressan, Goulart, Bressan, Costa, and Lamounier (2017).
Return on Assets (ROA)		Net Income/Total Assets		Kim, Kim and Yi (2021)
Protection (PROT)		Provision for doubtful debts on credit transactions/Total classified portfolio		Bressan *et al.* (2011).
Auditing firms (AUDIT)		Dummy variable that assumes 1 when the cooperative is audited by the big four, and 0 otherwise.	Cooperatives' websites	Jin, Kanagaretnam and Liu (2018); Kanagaretnam, Krishnan and Lobo (2010).

Control variables of managers' characteristics				
Age group	Primary	Respondent's age characterized as follows: 1= 20 to 30 years; 2= 31 to 40 years; 3= 41 to 50 years; and 4 = 51 year-old or older.	Questionnaire and SD3.	D'Souza (2016); Grover and Furnham (2021); Ham *et al.* (2017).
Sex		Dummy variable where 1 corresponds to male and 0 to female.		D'Souza (2016); Grover and Furnham (2021).
Years in the position within the same cooperative		Number of years in the position within the same cooperative		Silva (2019).
Position		Respondent's position characterized as follow: 1= supervisor/coordinator; 2 = manager; 3 = director; 4 = vice president; and 5 = president.		Silva (2019).
Experience		Number of years working in cooperatives		D'Souza (2016); Grover and Furnham (2021).
Educational background		Respondent's education level: 1 is assigned for secondary education; 2 for higher education; and 3 for specialization		Grover and Furnham (2021).
Marital Status		Dummy variable for marital status, where 1 corresponds to married/stable union, and 0 otherwise		Ham *et al.* (2017); Silva (2019).

Source: developed by the authors (2022).

3.3 Data Analysis Procedures

Descriptive statistics, multiple linear regression, and logistic regression were performed using Stata® to answer the proposed problem. The variables were Winsorized so as not to bias the results due to the effect of outliers.

Multiple linear regressions were applied, testing the absence of serial autocorrelation of the residuals using the Durbin-Watson (DW) test and multicollinearity between the independent variables using the Variance Inflation Factor (VIF) test. Additionally, the Shapiro-Francia normality and Breusch-Pagan heteroscedasticity tests were performed. Equation 2 demonstrates the model.

$$EM_{it} = \alpha_0 + \beta_1 DARK_{it} + \theta_2 \Sigma VCCOOP_{it} + \theta_3 \Sigma VCGEST_{it} + \varepsilon_{it} \quad (2)$$

Where: EM_{it}: earnings management analyzed by specific accruals and propensity; $DARK_{it}$: variable representing the managers' Machiavellianism, narcissism, and psychopathy traits; $\Sigma VCGEST_{it}$: control variables of characteristics of cooperatives; ; control variables of the managers' characteristics; ε: Regression Error.

According to D'Souza, 2016, the model with the dependent variable EM (categorical variable) was operationalized by logistic regression. Logistic regression was also performed separately for each independent variable of DARK representing Machiavellianism, narcissism, and psychopathy. Six regressions were performed in total.

4 Analyses and interpretation of results

4.1 Descriptive Statistics of the Managers' Characterization Variables

Of the 103 managers from different credit unions who answered the questionnaire, 82% were male, and 18% were female. These results corroborate the study by Hryniewicz and Vianna (2018), in which the higher the position, the lower the female representation.

Regarding the respondents' marital status, 83% are married. Regarding age, 33% were between 31 and 40, 30% were between 41 and 50, and 34% were over 51. Regarding the respondents' positions within the cooperatives, 17% were managers, 55% were directors, 2% were vice presidents, and 21% were chairpersons in the cooperative's board of directors. Regarding educational level, 91% had a bachelor's degree, 1% had a specialization, and 8% had completed high school.

Additionally, the respondents had an average of 16 years of experience in credit unions and held their positions within the same cooperative for 7 years. The results show that credit union managers build their careers in cooperatives, which contrasts with the findings of D'Souza *et al.* (2019), who found younger profiles with less than 3 years of experience in a survey conducted with 263 management professionals.

The analysis of personality traits revealed that the respondents presented different levels of Machiavellianism, narcissism, and psychopathy, with mean scores ranging from 1 to 5—the closer one's score to 5, the higher one's predisposition to that personality trait. The minimum score for Machiavellianism (MACH) and psychopathy (PSYCHO) traits was 1.22, while 2.11 was found for narcissism (NARC). Narcissism also obtained the highest mean score (3.07), while the means for Machiavellianism (MACH) and psychopathy (PSYCHO) were 2.45 and 1.93, respectively.

Thus, the results indicate that most cooperative managers had a greater predisposition to narcissistic traits, followed by Machiavellianism and psychopathy. Buchholz, Lopatta, and Maas (2020) found that narcissistic behavior is associated with greater engagement in earnings management.

Furthermore, corroborating the previously described context, Chatterjee and Hambrick (2007) argue that narcissistic managers tend to make grand and bold strategic decisions that affect the organization's performance. They are recognized for their leadership skills, confidence, vision, and innovative thinking. On the other hand, they are impulsive, manipulative, and take risks in decision-making (Rosenthal & Pittinsky, 2006; D'Souza *et al.*, 2019).

An analysis of the distribution of the managers' responses about whether they agree with the opportunity to incur in earnings management showed that 48% had a predisposition to adopt this strategy, while 52% did not.

On average, credit union managers almost always examine the need to adjust accounts receivable or the provision for doubtful accounts, which increases or decreases provision expenses. They also verify whether administrative, advertising, publicity, and/or maintenance expenses can be adjusted. These indicators suggest that the managers of these cooperatives are prone to becoming involved in earnings management.

D'Souza (2016) contributes by documenting that managers are motivated to increase their personal satisfaction and meet expectations about performance.

4.2 Descriptive Statistics of Variables at the Cooperative Level

In addition to the previous characterization of cooperative managers, Table 4 presents a descriptive analysis of control variables at the cooperative level.

Table 4
Descriptive Statistics of the control variables at the cooperative level

Variables	Mean	Minimum	Maximum	Median	Standard Deviation
TAM	18,85584	12,93923	22,89823	19,0672	1,778217
IB	0,396875	0,1102	1,8167	0,22985	0,382155
IMOB	0,1038827	0,00	0,5226	0,086	0,086633
ROA	0,0152216	-0,0675396	0,1655603	0,0120297	0,0172797
ROE	0,0629837	-0,5386611	0,3003422	0,0612841	0,0561992
PROT	0,045328	0,005	0,1823975	0,0397017	0,0272394
VOC	0,1256725	-0,2902344	0,9274725	0,104355	0,1595957
RNDoc	0,0000228	-0,000202	0,000258	0,000023	0,0000378

Legend: 994 observations; TAM: Size; IB: Basen Index; IMOB: Immobilization; ROE: Return on Equity; ROA: Return on assets; PROT: Protection; VOC: Variation in the volume of credit operations; RNDoc: Non-discretionary result on credit operations divided by the volume of credit operations. .

Source: Study data (2022).

Table 4 shows that the size of the cooperatives (SIZE) measured by the natural logarithm of the total assets was 18.85584, on average. Regarding the Basel Index (BI), the cooperatives presented a mean index of 0.396875, above regulatory limits, showing their continuity in the financial system.

Regarding the degree of immobilization (IMMOB), some cooperatives do not present immobilization; others show high values, such as 0.5226; the degree of immobilization was 0.1038827, on average.

Regarding the Return on Assets (ROA) and Return on Equity (ROE) indicators, an average of 0.0152216 for ROA and 0.0629837 for ROE were found, showing that cooperatives obtain low returns from members' investments and those associated with their assets.

The protection indicator (PROT) obtained an average of 0.045328, and the maximum value was 0.1823975; the lower this indicator, the better a cooperative's situation, as its default rate will be lower. Regarding the variation in the volume of credit operations, the value of the cooperative's credit operations portfolio varied by 0.1256725, on average, in relation to the previous semester.

Regarding the variable "results before net provisions expenses (RNDoc)," the average RNDoc is similar to the findings of Dantas et al. (2018). However, it is worth noting that non-discretionary results on credit operations vary among cooperatives (Bressan *et al.*, 2016).

Regarding the audit companies hired by the cooperatives, the Big Four performed 25% of the audits, and other firms audited 75% between the first half of 2015 and the second half of 2021. It is worth noting that credit unions have a cooperative auditing entity, the *Confederação Nacional de Auditoria Cooperativa* (CNAC) [National Confederation of Cooperative Auditing], which provides this service to individual cooperatives.

4.3 Relationship between the Managers' Dark Triad traits and the adoption of Earnings Management Practices

The results obtained by the regressions, intended to verify the relationship between the managers' Dark Triad personality traits and earnings management by specific accruals, are presented below according to the number of years the manager remained in the same position during the first half of 2015 to the second half of 2021.

Table 5
Managers' Dark Triad and earnings management by specific accrualss

Variables	EM		
	Model 1	Model 2	Model 3
MACH	89417,51 (1,57)	–	–
NARC	–	154303,2* (1,79)	–
PSYCHO	–	–	191490** (2,14)
SIZE	492023,7*** (13,58)	482724,6*** (13,41)	491837,3*** (13,63)
IB	1084134*** (5,09)	1085165*** (5,10)	1128185*** (5,32)
IMMOB	227665,3 (0,46)	304223,5 (0,61)	313159,8 (0,63)
ROA	1,56e+07*** (3,16)	1,58e+07*** (3,19)	1,49e+07*** (3,00)
ROE	-2871349** (-2,19)	-2953386** (-2,26)	-2686885** (-2,05)
PROT	6344167*** (3,86)	6213029*** (3,77)	5874042*** (3,54)
AUDIT	199656,5** (2,29)	193183,8** (2,23)	172961,8** (2,01)
VOC	533206,7** (1,91)	563226,9** (2,01)	525910,4* (1,88)
RNDoc	-4,17e+09*** (-2,94)	-4,28e+09 *** (-3,01)	-4,41e+09*** (-3,09)
SEX	258533,5*** (2,38)	293129,8*** (2,75)	301595*** (2,83)
AGE RANGE	-247352,2*** (-4,55)	-235811,3*** (-4,36)	-243115,9*** (-4,49)
MARITALSTATUS	-474904,3*** (-4,63)	-467277,2*** (-4,56)	-454435*** (-4,44)
EDUCATIONAL BACKGROUND	-158921,2 (-1,13)	-108511,9 (-0,77)	-90606,07 (-0,64)
POSITION	-26038,12 (-0,64)	-31718,82 (-0,77)	-32561,14 (-0,79)
EXPERIENCE	5523,588 (1,01)	5298,949 (0,97)	4140,84 (0,75)
TENURE IN OFFICE	-3829,743 (-0,55)	-4573,387 (-0,65)	-3939,461 (-0,56)
Constant	-8520816*** (-10,32)	-8747848*** (-10,26)	-8805173*** (-10,39)

Variables	EM		
	Model 1	Model 2	Model 3
Year	Yes	Yes	Yes
Adjusted R^2	0,3953	0,3958	0,3966
F-value	20,99	21,03	21,10
VIF	1,16 a 5,74	1,15 a 5,72	1,16 a 5,70
DW	2,26	2,26	2,25
N	994	994	994

Legend: Levels of significance: * p<0.1, ** p<0.05, *** p<0.01. MACH: Machiavellianism; NARC: Narcissism; PSYCHO: Psychopathy; SIZE: Size; BI: Basel Index; VOC: Variation in volume of credit operations; RNDoc: Non-discretionary result on credit operations, divided by the volume of credit operations; IMMOB: Fixed assets; ROE: Return on equity; ROA: Return on assets; PROT: Protection; AUDIT: Audit firm. T-test value within parentheses. VIF: Variance Inflation Factor. DW: Durbin Watson. N: Number of observations.

Source: Study data (2022).

Table 5 shows the three models used to test hypothesis H_1, which presented an explanatory power of 39%. Positive and significant relationships were found between narcissism and earnings management by specific accruals (p<0.1) in Model 2 and between psychopathy and earnings management by specific accruals (p<0.05) in Model 3. Model 1, on the other hand, did not show significant relationships between Machiavellianism and earnings management by specific accruals.

The results of models 2 and 3 reveal that the personality traits of narcissism and psychopathy positively influence earnings management through specific accruals, impacting cooperative strategies. In this sense, Grover and Furnham (2021) found that narcissism and psychopathy positively predict decision-making focused on taking risks. This factor might trigger the practice of earnings management in the corporate environment.

Chatterjee and Hambrick (2007) found that narcissistic executives are motivated to make bold and highly visible decisions, often leading to extreme management actions. Ham *et al.* (2017) report that narcissistic directors are more likely to use provisions and earnings management to manipulate results. Another trait of this personality profile is the tendency to avoid recognizing losses in the current period, often concealing past mistakes. As a result, organizations may experience ineffective internal controls and an increased likelihood of inaccurate reporting.

Campbell *et al.* (2011) contribute by highlighting that narcissism significantly affects the decision-making process, with managers exhibiting this trait prioritizing their selfish needs. As a result, they are more likely to engage in earnings management practices.

Regarding psychopathy, the results corroborate Góis (2017), as they show that individuals with psychopathic traits tend to take unnecessary risks to obtain gains. However, they diverge from D'Souza *et al.* (2019), who indicated that managers with psychopathic traits showed a lower tendency to maximize gains by manipulating results.

Babiak, Neumann, and Hare (2010) found that some organizations see executives with psychopathic traits as having leadership potential. These individuals can manipulate decision-makers, which facilitates advancing their careers. In this context, D'Souza *et al.* (2019) show that, when holding high-level positions, individuals with high psychopathy levels look for loopholes in legislation, manipulate prices for personal gain without worrying about long-term implications, and may become involved with earnings management practices.

Regarding the control variables, this study suggests that the size of credit unions (SIZE) positively influences earnings management. This result corroborates the research by Alali and Jaggi (2011), which points out that the size of the financial institution plays an important role in managerial motivation for earnings management.

The BI variable was significant and positive, showing that compliance with minimum capital requirements influences earnings management practices. Hillier *et al.* (2008) found that credit unions employed accounting strategies to reduce the risk of being under regulatory supervision for not meeting minimum capital requirements over 12 months. On the other hand, Maia *et al.* (2013) found no significant evidence that credit unions were adopting earnings management practices to improve capital requirements.

Return on assets (ROA) presented a positive coefficient. It was significant in all models, indicating that more profitable credit unions are more likely to practice earnings management, consistent with Cheng (2012) and Jin *et al.* (2018). Regarding return on equity (ROE), it negatively influenced earnings management, corroborating the findings by Bittencourt *et al.* (2017).

The protection indicator (PROT) is related to the cooperatives' default. Similar to the results presented by Bressan *et al.* (2011), it had a positive and significant effect, suggesting that the higher the default level, the greater the probability of earnings management, which could lead to a credit cooperative's insolvency.

The audit firm (AUDIT) variable presented a positive and significant coefficient. This finding differs from that of Jin et al. (2018), in which entities audited by one of the Big Four manage their results to a lesser extent, increasing the quality of disclosed information.

Regarding the variable "Variation in the Volume of Credit Operations (VOC)," a positive and significant association was found with earnings management by accruals. This finding contrasts with that of Bressan *et al.* (2016), though it is consistent with the results of Maia et al. (2013) and Dantas *et al.* (2018).

Regarding the variable "non-discretionary result on credit operations (RNDoc)," the results were significant with a negative coefficient, contradicting the positive coefficient reported by Maia *et al.* (2013), Bressan *et al.* (2016), Bressan *et al.* (2017).

In turn, Goulart (2007) reveals that when profit in credit operations increases (excluding the effect of PCLD expenses); PCLD is directed to reduce it. There is a tendency to postpone provision records when profits decrease.

Regarding the characteristics of credit union managers, gender was significant and positive in the three models, indicating that men holding management positions increase earnings management, which is aligned with the findings by Cumming, Leung, and Rui (2015).

Age and marital status were significant, but there was a negative coefficient in all three models, showing that older or married managers are less likely to adopt earnings management practices. Hilary *et al.* (2017) reported that married individuals have more significant economic and social commitments and are less willing to take actions that could negatively affect their families. Finally, the control variables involving immobilization (IMMOB), education, position, experience, and time in the position were not significant in any of the models.

Table 6 presents the results of the logistic regression that was performed due to the dichotomous nature of the dependent variable (propensity for earnings management) compared to the independent variable (Dark Triad personality traits) and the control variables, which were included because they are considered potential influencers in decision-making (D'Souza, 2016).

Table 6

Managers' Dark Triad earnings management propensity

Variables	PM		
	Model 1	Model 2	Model 3
MACH	2,259045***	-	-
NARC	-	0,4458165***	-
PSYCHO	-	-	1,343776***
SEX	0,0328373	0,2986973*	0,3436608*
AGE RANGE	-0,501685***	-0,0652398	-0,1046862
MARITAL STATUS	1,350928***	0,8149845***	1,012838***
POSITION	-0,4617665***	-0,3965364***	-0,4152213***
EDUCATIONAL BACKGROUND	-1,41654***	-0,459627*	-0,2389813
EXPERIENCE	0,0323071***	-0,0033052	-0,0083848
TENURE IN OFFICE	-0,0325572**	0,0125576	0,0072083
Constant	-1,358811	-0,0821513	-1,616465
Correctly classified	75,45%	55,73%	62,98%
Pseudo R2	0,2592	0,0411	0,08
LR chi2	356,36	56,52	109,97
Log likelihood	-509,11557	-659,03446	-632,31022

Legend: Significant levels: * p<0.1, ** p<0.05, *** p<0.01. MACH: Machiavellianism; NARC: Narcissism; PSYCHO: Psychopathy; Number of observations.

Source: Study data (2022).

Overall, the models predict that the coefficients are significant in explaining the decision to manage earnings, revealing a propensity for adopting such a practice.

Thus, hypothesis H_2 was confirmed. It predicts that credit union managers with Machiavellian, narcissistic, or psychopathic personality traits are more likely to adopt earnings management practices in credit unions. It is important to note that decision-making results from judgments influenced by opinions and preferences (D'Souza & Lima, 2015), and managers with Machiavellian, narcissistic, or psychopathic traits tend to engage in earnings management more frequently.

The Dark Triad has been associated with the practice of illicit financial acts, with narcissism being perceived as a risk factor for fraud among auditors. Machiavellianism is associated with the reporting of inaccurate reports, while psychopathy is associated with financial infractions. Furthermore, individuals with a high level of narcissistic traits are impulsive and do not act strategically. Those with high psychopathy levels are reckless and antisocial. In turn, Machiavellianism is opportunistic and strategic, leading to actions based on possible financial gains (Carré *et al.*, 2020).

Regarding Machiavellianism, Murphy (2012) identified that people with a higher degree of Machiavellianism are more susceptible to reporting inaccurate information. Moreover, they show no guilt in the face of unethical behavior, and thus, they might engage in earnings management practices. Shafer and Wang (2011) found that individuals with high Machiavellian traits did not consider earnings management through accounting choices to be a problematic matter, though operational management was considered more severe.

Also, Machiavellians might selfishly use their power and influence to promote their interests. They are emotionally balanced in situations of customer resistance, efficient in an initial contact and cold calling, and manipulative (Bagozzi, Verbeke, Dietvorst, Belschak, Van Den Berg & Rietdijk, 2013). Such behaviors are potentially relevant to earnings management decisions.

Regarding narcissism, Capalbo *et al*. (2017) found a positive relationship between CEO narcissism and earnings management. Ham *et al.* (2017) found that CFO narcissism traits are associated with earnings management, lower timely loss recognition, vulnerable internal control, and republication of information.

Chatterjee and Hambrick (2007) argue that this trait in executives is positively related to the strategic dynamism of grandiosity, generating remarkable and fluctuating organizational performance. D'Souza and Lima (2015) indicated that when highly narcissistic executives occupy powerful positions and lack control, they might act unethically and harm the organization. Additionally, D'Souza *et al.* (2019) point out that such individuals can boost their performance reporting when there are positive implications of social status associated with earnings management.

The results regarding psychopathy are supported by Góis (2017), who identified that such a trait significantly influences the management of results through provisions and actual operational activities, reflecting insensitive behavior, erratic lifestyle, and short-term manipulations.

When analyzing managers' decisions from the perspective of psychopathy, these individuals are capable of lying, persuading, and manipulating to obtain power, wealth, and status. They are responsible for part of the negative behavior in the corporate environment, such as inventory manipulation and involvement in fraud, for instance (Boddy, 2011; D'Souza & Lima, 2015).

Babiak *et al.* (2010) examined psychopathy and its correlates. They indicated that this trait is positively associated with strategic thinking and communication skills but negatively associated with responsibility and performance ratings and may be involved in earnings management practices.

Sex was positively and significantly associated with narcissism and psychopathy in models 2 and 3. Therefore, male managers with narcissistic or psychopathic traits are more likely to make decisions focused on earnings management. These results are consistent with those Peni and Vähämaa (2010) reported.

Arun, Almahrog, and Ali Aribi (2015) argue that female executives are more risk-averse and display ethical behavior; hence, they are less frequently associated with earnings management than their male counterparts.

Age appears significant only in Model 1 (Machiavellianism) and showed a negative coefficient. Roussanov and Savor (2014) note that older CEOs may be more conservative in business, and their results indicate that age is negatively associated with entrepreneurial risk-taking.

Marital status was positive and significant in the three models, a finding that diverge from the results by Hilary *et al.* (2017), who found that single CEOs are more likely to manage results.

The "position" variable was also significant in the three models, though it had a negative coefficient; hence, it was not a predictive factor for earnings management.

The participants' educational level was significant, with a negative sign in models 1 and 2 (Machiavellianism and narcissism). Regarding this aspect, Hirschi and Spurk (2021) analyzed ambition and the search for recognition and achievement in the organizational environment and found that the professionals' educational level exerted a strong and positive influence.

The participants' experience showed a significant and positive influence only in Model 1 (Machiavellianism); though it is worth noting that managers' choices are influenced by their experiences throughout their careers, which can affect corporate results (Bamber, Jiang & Wang, 2010).

Similarly, the variable "tenure in office" was significant only in Model 1 (Machiavellianism) but presented a negative coefficient. This finding is consistent with that described by Driesch, Costa, Flatten, and Brettel (2015), in which CEOs with more tenure in office consider decision-making focused on changes less radically and less frequently, not using their entities' resource base nor engaging in earnings management, despite knowing the specificities of their organizations.

Overall, the results show that managers motivated to report good performance and satisfy and attract new associates to achieve personal and business goals face the dilemma of using accounting information opportunistically for decision-making. Moreover, dark personality traits encourage such practices intended to benefit managers to the detriment of the business (D'Souza & Lima, 2015; Naaman, 2018).

Notably, many narcissistic qualities, such as self-confidence and empowerment, are positive in disputes over leadership decisions. Individuals with high levels of psychopathic traits are associated with the use of tactics and influence, and Machiavellians are considered charming and deceitful (O'Boyle, Forsyth, Banks & Story, 2013).

For example, narcissists in the business world are recognized for being visionary and charismatic, seeking leadership positions, and influencing people (D'Souza & Lima, 2015). Machiavellians can identify risk factors in opportunities and behaviors before fraud occurs (Carré et al., 2020). Those with psychopathy traits crave excitement and demonstrate order, effort, and self-discipline (D'Souza *et al.*, 2019).

5 Conclusions

This study analyzed the relationship between managers' Dark Triad personality traits and earnings management among credit unions. Data were collected in two stages, using primary and secondary sources. The final sample comprised the managers of 103 credit unions.

The results show that the presence of narcissism and psychopathy traits among managers increases earnings management through specific accruals. Machiavellianism, in turn, did not exert a significant influence. However, when analyzing the final decision to verify the opportunistic attitude of managers towards such practice, the three traits showed that credit union managers are prone to earnings management.

Thus, managers might be encouraged to improve their reputation and image by seeking immediate benefits for all stakeholders if credit union members and supervisory bodies demand satisfactory results (Maia et al., 2013; Santos & Santos, 2020).

Hence, we reinforce the importance of analyzing personality traits in the credit union environment, considering that these traits lead managers to adopt attitudes and behaviors not aligned with the organizations' interests. As suggested by the Upper Echelon Theory, an individual's decisions and interpretations are influenced by their experiences, values, and personality, and managers with personality traits are prone to earnings management.

In this context, earnings management is considered a strategy to report positive results, which can potentially result in private advantages to managers and losses for cooperatives in the long term, such as the arbitration of the constitution of provisions for credit operations, fines, and, in more extreme cases, the determination of the manager's ineligibility (Bressan *et al.*, 2016).

This study's contributions include filling a gap in Brazilian studies, as previous studies seldom adopt behavioral variables to analyze earnings management and decision-making (D'Souza *et al.*, 2019; Silva, 2019). Additionally, no studies were found on personality traits in the context of credit unions. Another contribution concerns the adoption of the Upper Echelon Theory, which indicates that a manager's characteristics interfere with decision-making in the accounting sphere in a corporate environment with a cooperative bias.

This study's findings are relevant to members, credit unions, regulatory entities, analysts, auditors, statutory bodies, and society in general, as they show that an individual's personality influences accounting choices and decision-making. The results may also help highlight the need to pay attention when hiring professionals with these traits to hold management positions (D'Souza, 2016), considering their implications in the corporate environment.

Finally, a vulnerable control environment might encourage individuals with Dark Triad traits to get involved in situations that are at odds with their organization's strategies. Hence, internal control mechanisms, good corporate governance practices, and compensation of control levels are necessary to minimize consequences in the presence of individuals with these traits (D'Souza & Lima, 2015; Góis, 2017).

Regarding this study's limitations, the first concerns the application of the personality and decision-making questionnaire. It was self-administered and does not constitute a clinical diagnosis. Furthermore, given the subject's sensitivity, the results cannot be generalized. The questions aimed to capture the participants' characteristics, but their responses may not accurately represent their real behavior (D'Souza, 2016). Even though the analysis of the managers' personality traits was assumed to be constant over the period, one cannot state that these remained unchanged during the analysis.

Furthermore, other professionals in the credit union environment responsible for decision-making may influence earnings management but did not participate in the study. Future studies are suggested to discuss behavioral accounting, qualitatively exploring the managers' environment, investigate the pressure they suffer to present a good performance to the members and society, and include variables such as corporate governance, organizational culture, profit sharing programs, regulatory changes with an impact on accounting recognition; classify personality traits according to high and low levels; address larger samples; and investigate other fields, such as education and administration. Investigating the positive effects of these traits in the corporate environment is also recommended, as well as including other personality traits and methodological choices.

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Inter-municipal Health Consortia and the Challenges of Cooperation: An Analysis of the Experience in the Zona da Mata Region of Minas Gerais, Brazil

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Abstract

Objective: To examine the role of Inter-municipal Health Consortia (IHC) in the Zona da Mata region of Minas Gerais, Brazil, in fostering joint action among public entities.

Method: A thematic categorical content analysis was conducted on 33 documents, including protocols of intent, statutes, program and apportionment contracts, from the nine IHC members in the Zona da Mata region. Additionally, 10 interviews were carried out with executive secretaries, administrative managers, and mayors.

Results: This study highlights the presence of instruments for mutual adjustment, arenas for technical debate, and joint deliberation, along with controls that position IHC as a governance structure capable of overcoming obstacles to cooperation, limiting opportunistic actions, and facilitating conflict resolution.

Contributions: The findings shed light on how cooperation functions within IHC. The analysis reveals characteristics and models of the federalist system and public administration, alongside the risks of opportunistic behavior. While actors display utilitarian tendencies, their objectives also converge in the management of IHC.

Keywords: Federalism; Cooperation; Municipal associations; Governance.

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1 Introduction

Inter-municipal Health Consortia (IHC) are public structures designed to promote cooperation among state entities to implement medium- and high-complexity health policies (Diniz Filho, 2014). This study examines the conditions within consortia that facilitate joint action among municipalities, even under adverse circumstances such as pronounced socioeconomic disparities, the complexity of state apparatus, and differences across federative levels (Union, states, and municipalities) (Affonso, 2000; Filippim & Abrucio, 2016).

IHC break away from the traditionally isolated structure of Brazilian public administration by incorporating the need for action at the regional level (between state and municipal levels) and driving a transformation in public management. In this context, IHC are established as cooperative institutional arrangements within a framework of competitive federalism and self-governing municipalism (Abrucio & Sano, 2013).

Establishing a consortium alone does not ensure consensus on municipalities' actions, which could render consortium little more than a good concept. For instance, Teixeira *et al.* (2003) note that while mayors may initially be incentivized to participate in consortia to improve and expand health services in secondary and tertiary care, they may not sustain their commitment to the partnership over time.

Therefore, it is essential to establish a process for constructing common objectives—through contracts, agreements, and the formalization of a structure—and to develop instruments that facilitate the implementation of actions in pursuit of IHC's public purpose (Galvão, 2020). Generally, the structure of IHC can be understood as arrangements designed to foster cooperation, coordinate activities, and establish agreements to resolve conflicts.

In addition to their bureaucratic and organizational structure, consortia are established and operate based on four main agreements: the protocol of intentions (the initial agreement among public authorities to establish the consortium), the statute (which defines general rules for operation, structure, and relationships among participants), the program contract, and the apportionment contract (agreements specifying financial contributions and the provision of medium- and high-complexity health services between the consortium and each municipality). Therefore, Inter-municipal Health Consortia (IHC) embody agreements formalized through governance instruments. Reis and Diehl (2015) identified these elements as key components of good governance in the IHC of Rio Grande do Sul.

However, IHC continue to face challenges inherent to the structure of Brazilian public administration, where the personal and political interests of individual actors often take precedence. Analyzing this public institutional arrangement underscores the fundamental conditions required to promote cooperation among these actors. Such cooperation necessitates the creation of rules and agreements that depart significantly from the isolated bureaucratic practices of municipal authorities and the conventional federative dynamics between state and municipal levels (Diniz Filho, 2013).

Based on the above, this study aims to understand the role of the IHC in the Zona da Mata region of Minas Gerais, Brazil, in facilitating joint actions among public entities. To this end, the governance instruments formalized by the IHC in this region were analyzed. The Zona da Mata mesoregion was chosen due to the highly heterogeneous nature of its municipalities, which presents significant challenges to the implementation of collective public policy strategies (Sachs, 2008).

Some elements justify this study and its objective: (i) previous studies (Morais & Chaves, 2016; Lui *et al.,* 2020; Lui *et al.,* 2022) have predominantly focused on describing the content or strategies of agreements signed between entities of the Federation. This study, however, emphasizes relationships, particularly the sharing of attributions and responsibilities for the provision of public health, with a focus on the perspective of stakeholders—highlighting how public consortia interact across various management instances; (ii) in addition to documentary analysis, the study captured the perceptions of individuals involved in the governance of IHC, recognizing that relationships and management involve people who must be heard; and (iii) as discussed by Lui *et al*. (2022), research in this field lacks critical reflections on how public consortia communicate (relationships) and whether managers find cooperation adequate. This context in Minas Gerais served as the foundation for this investigation.

This study provides significant contributions, particularly regarding establishing cooperation relationships in IHC. The findings reveal a perception of autonomous municipalism, competitive federalism, bureaucratic public administration models, heterogeneity among municipalities, and the risk of opportunistic behavior. These factors suggest that actors in the management of IHC exhibit both utilitarian behaviors and a degree of convergence toward shared objectives.

After the introduction, this study comprises four sections structured as follows: First, it presents the theoretical foundations that form the basis of the research. Next, it outlines the methodological approach used and the analysis results. The discussion follows, offering insights into the findings. Finally, the study concludes by emphasizing its contributions and providing recommendations for future research.

2 Theoretical Framework

2.1 Public consortia: collective action and governance in health

Public consortia are structures that allow participating municipalities to address the demand for the provision of public goods. In this way, the shared needs of consortium municipalities are recognized and addressed through collective actions (Gerigk & Pessali, 2014; Amaral & Blatt, 2011; Nascimento *et a*l., 2021).

In general, collective actions are understood as social and economic interactions among individuals within the same group who share common interests (Wolfart *et al*., 2014). Despite the shared understanding of collective actions, various approaches and authors explore this topic from different perspectives. Olson (2015), for instance, argues that collective action can be beneficial depending on certain variables, such as the size and behavior of groups of actors. Conversely, Hardin (1982) and Ostrom (2005) focus on collective action in the context of managing shared resources often referred to as "commons." In this view, groups tend to unite when they recognize that resources—whether natural, such as water or air, or otherwise—are scarce and require coordinated management.

In the public sector, Feiock and Scholz (2009) emphasize that collective action among local governments is essential for addressing issues that transcend municipal boundaries, such as natural resource management and economic development. They highlight that the effectiveness of these collaborative networks largely depends on local contexts, including the history of interjurisdictional cooperation and the unique incentives present in each region.

Therefore, there are no consistent patterns of collective action; in other words, the actors (network members) do not behave uniformly in every situation, nor is it possible to identify homogeneous groups within society. As Carlos (2015, p. 84) affirms, corroborating Dagnino *et al*. (2006), "there is no homogeneous pattern or unitary model of action that represents societal actors and that serves as a paradigm for the action of social movements, given the complexity and heterogeneity of civil society." (Free Translation)

Similarly, Bimber et al. (2005, p. 366) argue that it is crucial to examine whether contemporary examples of collective action align with theoretical frameworks and whether the theory itself aligns "with the rich set of collective actions now present in public life." Therefore, the analysis of IHC understood as a form of collective action, must effectively address its intended focus—specifically, the characteristics of behaviors and agreements in the interrelationships among municipal authorities.

Collective action in HCI, in this context, serves as a significant strategy for understanding cooperation among municipalities. In a Brazilian context characterized by pronounced regional inequality and challenges in managing public resources, HCI enable municipalities of varying sizes and administrative capacities to collaborate in delivering health services more efficiently and equitably, thereby overcoming individual limitations. This form of collective organization facilitates, for instance, the expansion of access to medium- and high-complexity healthcare services, cost reduction through economies of scope, and enhanced negotiating power with suppliers of inputs and services through economies of scale (Arretche, 2010; Flexa & Barbastefano, 2020).

However, collective action in HCI encounters significant challenges and relies on various institutional and contextual factors. Among the primary challenges are the coordination among participating entities and the sustained commitment of municipalities. The diversity of interests and disparities in the financial and administrative capacities of municipalities can undermine the cohesion, cooperation, and efficiency of the consortium. Regarding institutional and contextual factors, the governance of HCI must be adaptive, enabling flexible management that addresses local needs and responds swiftly to changes in the political, economic, and social landscape. Moreover, building trust among municipalities is crucial for the success of collective action, as it facilitates cooperation and minimizes the risks of conflicts and inefficiencies (Domingos *et al*., 2019; Martins *et al*., 2020).

In this context, the literature (Ostrom, 1990; Feiock, 2007) on collective action emphasizes the importance of governance mechanisms that promote cooperation and reduce the risk of opportunistic behavior, such as "free-riding." In the HCI environment, this occurs when some municipalities benefit from the consortium's advantages without adequately contributing to the agreed-upon distribution (Teixeira *et al*., 2003). The institutional design of consortia, including clear rules for membership, cost sharing, monitoring, and enforcement mechanisms, is crucial for the success of these initiatives.

Studies (Grin *et al*., 2018; Ventura & Suquisaqui, 2020) indicate that consortia often invest in developing technical and administrative capacities while fostering organizational learning among participants. These efforts are vital for ensuring the long-term sustainability of HCI and creating an environment that encourages innovation and the continuous improvement of services. Consequently, collective action not only enhances the efficiency of service delivery but also strengthens local and regional governance, amplifying the positive impacts of public policies.

In this study, we aim to explore the role of HCI, as a form of collective action, in enabling public health services. Governance is a central aspect of this analysis, as it forms the foundation for understanding the agreements and standards that facilitate collaborative efforts to deliver medium- and high-complexity healthcare. However, the focus is not on the elements or motivations behind the formation of inter-municipal public consortia but rather on analyzing the relational dynamics that define responsibilities and guide the planning of service provision. Specifically, this study examines how collective action in HCI takes place and how it overcomes contextual barriers within Brazilian public administration. Additionally, we identify factors hindering more efficient collective action and analyze how these obstacles manifest, as discussed in the following sections.

3 Theoretical elements that influence the performance of IHC: federalism and public management models

Public organizations embody characteristics from various models, paradigms, and systems (Klumb & Hoffmann, 2016). Specifically, HCI are shaped by the dynamics of the Brazilian federal system (Diniz Filho, 2013) and by influences from patrimonialism, bureaucratic, and managerial models (Denhardt & Catlaw, 2017; Fabriz, 2017; Lui & Schabbach, 2020; Mathias & Oliveira, 2019).

Regarding the Brazilian federal system, it is important to highlight the coexistence of two models: competitive and cooperative (Elazar, 1987). The competitive model originates from the Applied Economic Theory of Decentralization, first presented in a seminal work by Tiebout (1956). This model emphasizes that governments should focus on enhancing public sector efficiency. In contrast, the cooperative model proves more viable in contexts marked by regional inequality (Ismael, 2018).

HCI emerged in Brazil in a specific context: a) on the one hand, municipalities are encouraged to become autonomous in managing their health policies; b) on the other hand, they face difficulties mainly regarding limited capacity and resources and see cooperation as a way to implement health actions (Abrucio et al., 2013). Thus, when structured, HCI enable joint coordination between municipalities to offer these services and carry out collective purchases, optimizing resources and expanding healthcare coverage. These consortia have proven to be fundamental in overcoming the limitations imposed by regional inequalities and managing difficulties and scarcity of resources (Domingos *et al*., 2019; Martins *et al*., 2020).

Nascimento et al. (2021) emphasize that HCI enable the sharing of resources, infrastructure, and technical knowledge, helping mitigate regional healthcare delivery inequalities. These arrangements allow smaller or resource-limited municipalities to access services they would otherwise be unable to provide independently. However, the authors also highlight challenges related to the coordination and governance of consortia, including the need to align the interests of different municipalities and the complexities of collective decision-making. Additionally, they stress that the political, economic, and social characteristics of each region significantly influence the success and functionality of these cooperative arrangements.

Fernandes *et al.* (2020) demonstrate that the formation of inter-municipal consortia can enhance municipalities' operational efficiency by enabling the sharing of costs and resources. Additionally, according to the State Department of Health of Minas Gerais (2021), such consortia offer several advantages, including cost reduction, improved dialogue among municipalities within the same region, resolution of regional issues, and joint planning for implementing health policies.

However, they emphasize that local factors—such as geographical proximity, a history of cooperation among municipalities, and local socioeconomic characteristics—are crucial for the formation and effectiveness of consortia (Nascimento *et al*., 2021; Fernandes *et al*., 2023).

In this context, the management and governance of HCI encounter several challenges, particularly in coordinating the diverse federated entities and ensuring long-term financial sustainability. Integrating health policies within consortia demands effective governance that can align the interests of various municipalities while ensuring transparency and accountability in the use of public resources (Martins *et al*., 2020; Souza, 2023).

Regarding elements of public administration, Julião and Oliveri (2020), in their study of public consortia in Ceará, Brazil, emphasize the roles of politicians and bureaucrats. According to the authors, bureaucracy was particularly evident through the state government's initiatives and the actions of managers involved in public administration, who played a key role in the strategy to establish consortia in that state. Similarly, Nuske *et al.* (2018) highlight bureaucratic elements—such as organizational structures, rules, and deadlines—already present in municipal public administration and now integrate these new forms of action.

According to Flexa and Barbastefano (2020), several challenges inherent to municipal management persist even after the establishment of HCI. Examples include low qualifications among public servants, scheduling conflicts, planning deficiencies, bureaucratic hurdles, and limited or inefficiently allocated resources. Consequently, forming consortia becomes essential to address the difficulties many municipalities face in providing public services (Marroni *et al*., 2021; Lui & Schabbach, 2020; Silva *et al.,* 2017). Once these new entities are consolidated, many municipalities can overcome the primary challenges of delivering medium- and high-complexity health services, enhancing effectiveness through managerial practices.

Studies on the performance of HCI have also highlighted the importance of evaluating and analyzing the users of the health services provided by these entities, as well as the role of social control (Fabriz, 2017; Mathias & Oliveira, 2019). HCI are not solely focused on service delivery but also on addressing the broader needs of society.

It is important to emphasize that, in addition to being public structures aimed at achieving social outcomes, HCI are also understood as new entities formed through municipal cooperation. Their organizational structure includes actors—such as the assembly, president, executive secretary, and fiscal council—who interact in situations that may not always be cooperative and can sometimes involve conflict (Gerigk & Pessali, 2014).

4 Methodological Procedures

According to the Minas Gerais State Health Department (SES-MG), in 2021, there were 74 active HCI, of which 64 were generalist and 10 thematic (linked to the Mobile Emergency Care Service - SAMU), encompassing more than 90% of the state's municipalities and serving a population exceeding 20 million inhabitants. In April of the same year, according to SES, nine inter-municipal health consortia were operating in the Zona da Mata mesoregion, eight generalists and one thematic.

This study analyzed 134 municipalities associated with HCI in Minas Gerais' Zona da Mata mesoregion. This mesoregion was selected because it reflects a key characteristic of the state of Minas Gerais: the heterogeneity among its municipalities.

Thirty-three contracts (including memorandums of understanding, bylaws, apportionment agreements, and program contracts) were analyzed to comprehend the governance structure of the aforementioned HCI. These documents were obtained from consortia websites or via telephone or email requests between January and March 2021.

Ten interviews were held with managers from eight of the nine HCI in the Zona da Mata region of Minas Gerais to understand these agreements and the contextual factors shaping Brazilian public administration that may influence municipal cooperation. Among the respondents, six were executive secretaries, two were administrative managers, and two were mayors. The interviews, conducted in July 2021, followed a semi-structured script. A literature review on consortia was also performed to support the data analysis.

This study was authorized and registered with the hosting Institutional Review Board through the Certificate of Presentation of Ethical Appreciation (CAAE) under No. 39277220.9.0000.5153.

Data analysis and interpretation were conducted using categorical content analysis with a mixed grid (Bardin, 2011). Predefined categories were established based on the theoretical framework, while additional categories emerged from the empirical analysis (Table 1).

table 1
Categories of Analysis

Contextual Factors	Incentives for cooperation	Potential benefits of joint action, characteristics of the federative pact, incentives from government levels (state and federal) and models of personalistic or bureaucratic public administration	Kissler and Heidemann (2006), Abrucio et al. (2013), Diniz Filho, (2013), Filippim and Abrucio (2016), Bevir (2017), Silva et al. (2017), Ismael (2018), Flexa and Barbastefano (2020), Lui and Schabbach (2020), Marroni et al. (2021), Nascimento et al. (2021), Fernandes et al. (2020), Fernandes et al. (2023), Domingos et al. (2019)
	Obstacles to consortium	Self-governing municipalism, risk of opportunistic behavior, managerial public administration model, heterogeneity among participants.	
Consortium structure and instruments	Structure	Set of bodies and positions r elated to the consortium's governance	Kissler and Heidemann (2006), Denhardt (2012), Capano et al. (2015), Martins et al. (2020)
	Instruments and rules	Contracts, standards and rules for accountability	
	Deliberation	Forms of deliberation and participation of those involved	
	Relationships	Forms and means of communication of the IHC and between the consortium municipalities	
Actors	Functions and responsibilities	Identification of the responsible actors and what roles they perform	Kissler and Heidemann (2006), Denhardt (2012), Capano et al. (2015), Martins et al. (2020)
	Involvement	Mode of participation and level of engagement	

Source: developed by the authors.

The categories were selected because they align with the study's objective: to understand the role of IHC in Minas Gerais's Zona da Mata region in facilitating joint action between municipalities. In this context, analyzing the factors that drive the formation of IHC and those that influence the dynamics of their relationships is crucial, as these factors may highlight the dichotomy between cooperation and competition within the public sphere (Abrucio *et al.*, 2013). Additionally, the analysis may reveal the system of checks and balances that limits opportunistic actions through participation and control mechanisms. Structural and compositional elements of IHC are also essential for understanding management and governance, as they shed light on the presence of various actors, each with distinct roles and responsibilities (Denhardt, 2012).

4.1 Results and Discussion

4.1.1 Incentives and obstacles to public consortium

The responsibility municipalities assume for healthcare delivery originates from the Federal Constitution of 1988, which pressured municipal management to secure resources and establish structures despite the centralization of revenue collection by the states and the Union. IHC emerged as a strategy to mitigate these challenges (Report 1).

> Consortia are actually the primary means for solving municipal problems today. Currently, we have a federal pact that exonerates the municipality in terms of responsibility and relieves it in terms of taxes [...]. So, consortia appear to be an instrument for strengthening negotiations as a whole (Report 1).

If the federative pact pushes municipalities to form consortia out of necessity, it also does so through political incentives. Incentives for forming consortia include those from federal and state governments (Teixeira & Dowell, 2002; Leal et al., 2019), gains in efficiency and scale (Amaral & Blatt, 2011), and the feasibility of providing services in contexts where a municipality alone would be unable to fulfill its constitutional obligations (Flexa & Barbastefano, 2020).

Leal *et al*. (2019) analyzed the factors driving the increase in the number of IHC in the State of Pernambuco, Brazil. Similar to Minas Gerais, the focus of this study, the authors highlight that the expansion of consortia in Pernambuco is primarily attributed to the need to enhance efficiency in health service delivery, address resource constraints in smaller municipalities, and promote equitable access to health services across different regions of the state.

Since 1995, consortia have been encouraged in Minas Gerais. In 2003, the relationships among stakeholders were regulated (SES/MG Resolution No. 0353/2003), and in 2009, the State Program for Strengthening Inter-municipal Health Consortia in Minas Gerais (Procis) was consolidated (Diniz Filho, 2013).

These factors encourage cooperative municipalism and promote regionalized action by local authorities. As noted in Report 2, consortia achieve results that would be unattainable through the isolated efforts of individual municipalities, particularly smaller ones.

> The consortium is crucial, particularly for small municipalities, you know […] providing adequate healthcare in a small municipality is challenging without being a consortium member. We consider a consortium to be a highly important tool due to its inherent logic you know. See, bringing together multiple municipalities allows for purchasing in larger volumes at reduced costs. It is different when a single municipality makes individual purchases instead of several municipalities buying together. So, we can access procedures at significantly lower prices (Report 2).

Although larger municipalities with large populations and high revenues could provide such services independently, the additional benefits of collective action, such as reducing idle capacity (scale gains) and offering specialized services (scope gains), encourage the formation of consortia. These benefits serve as incentives for establishing and maintaining cooperation, aligning with the suggestions of Flexa & Barbastefano (2020) and as outlined in Report 3.

> I think that the consortium represented progress on several fronts. First, it increased the number of exams, consultations, and procedures performed. Second, it reduced costs by enabling regular product acquisition through the consortium. Additionally, investments led to a greater and improved number of devices, resulting in more accurate diagnoses (Report 3).

Supply management is also undertaken by the IHC, alleviating the burden on municipal governments while generating benefits in specialization and management. These advantages align with the managerial discourse promoted by the *Nova Administração* Pública [New Public Administration]. The adoption of this school of thought, particularly by mayors, can facilitate the establishment of consortia and influence their operational dynamics. The influence of New Public Management principles—economy, efficiency, and flexibility—is evident in documents such as statutes and protocols of intent, where business-oriented terms like "efficiency," "economy," and "establishment of partnerships" are explicitly emphasized.

Similarly, Galindo *et al*. (2014) observed that the organizational policy of the Inter-municipal Health Consortium of Sertão do Araripe, Pernambuco (Cisape) was in transition, reflecting management-focused characteristics in its structure. These included a reduction in the sphere of control through empowerment and a concentration of authority within a hierarchy of competencies.

Thus, the characteristics of the Brazilian federative pact—decentralization of responsibilities combined with the centralization of revenue collection—and the initiatives of the state of Minas Gerais, along with the potential benefits of consortia, promote the establishment of these structures. Nevertheless, there remain challenges to their creation and sustainability.

Although IHC operate cooperatively, they may also involve competition, as each municipality seeks independence and autonomy—characteristics typical of autonomous municipalism. As a result, contextual incentives for the creation of IHC may be insufficient to sustain cooperation or may limit it to a merely formal level.

Pereira *et al.* (2020) highlighted elements that align with the discussion presented here. In their analysis of health regionalization in Minas Gerais, the authors emphasized that, while regionalization is considered a vital strategy for improving the organization and delivery of health services, numerous challenges undermine its effectiveness. Chief among these obstacles are the difficulties in coordination between different levels of government and among the municipalities themselves.

Ribeiro and Costa (2000) also identified obstacles arising from "typical problems of governability," such as the appropriation of political benefits, which increases the risk of opportunism (e.g., by mayors). These challenges include conflicts among members, lack of commitment to the consortium, and other difficulties associated with "autonomous municipalism." Reports 4 and 5 highlight similar situations observed in IHCs in the Zona da Mata region of Minas Gerais:

> Clearly, municipalities have very different interests regarding the consortium. In 2021, several mayors were not reelected, bringing a political framework different from that before 2020. As people start to actively participate in the consortium and fully understand its purpose and role, their perspectives begin to shift. However, there is still a noticeable difference in how many of them approach it (Report 04).

> During elections, municipalities often want to [...]; one might aim to become the president, leading to disagreements [...]. Following the elections, the newly elected president may attempt to interfere in the consortium's actions—often in ways that shouldn't involve political influence, such as appointing allies to positions or favoring certain individuals. This is a common issue in municipalities, and sometimes this mindset carries over to the consortium. They may view the consortium as a tool for their own benefit, rather than focusing on the broader perspective. We, however, maintain a more comprehensive outlook, considering the whole rather than just the needs of a single municipality. Municipalities often prioritize actions that serve their own interests, seeking visible results or media attention, and this political approach can sometimes clash with the consortium's broader objectives (Report 5).

Thus, certain factors may work against the essence of IHC formation—uniting efforts and fostering partnerships for the joint provision of health services—and instead promote isolation or non-cooperation. Differences in political influence, municipality size, contribution amounts, and inter-federative relationships can lead to individual municipalities' particular interests and needs taking precedence over shared goals (Nascimento *et al.*, 2021) (Reports 6 and 7):

> **Have you ever witnessed divergent interests in a consortium?**
> Yes, when a new member joined the consortium and political influence prevailed (Report 6).

> To be quite honest, when (NAME OF MUNICIPALITY HIDDEN) manages the consortium [...], even because (NAME OF MUNICIPALITY HIDDEN) represents 58% of the resources here and the population is much larger. But when he manages the consortium, he takes a stand like he deserves more, you know? (Report 7).

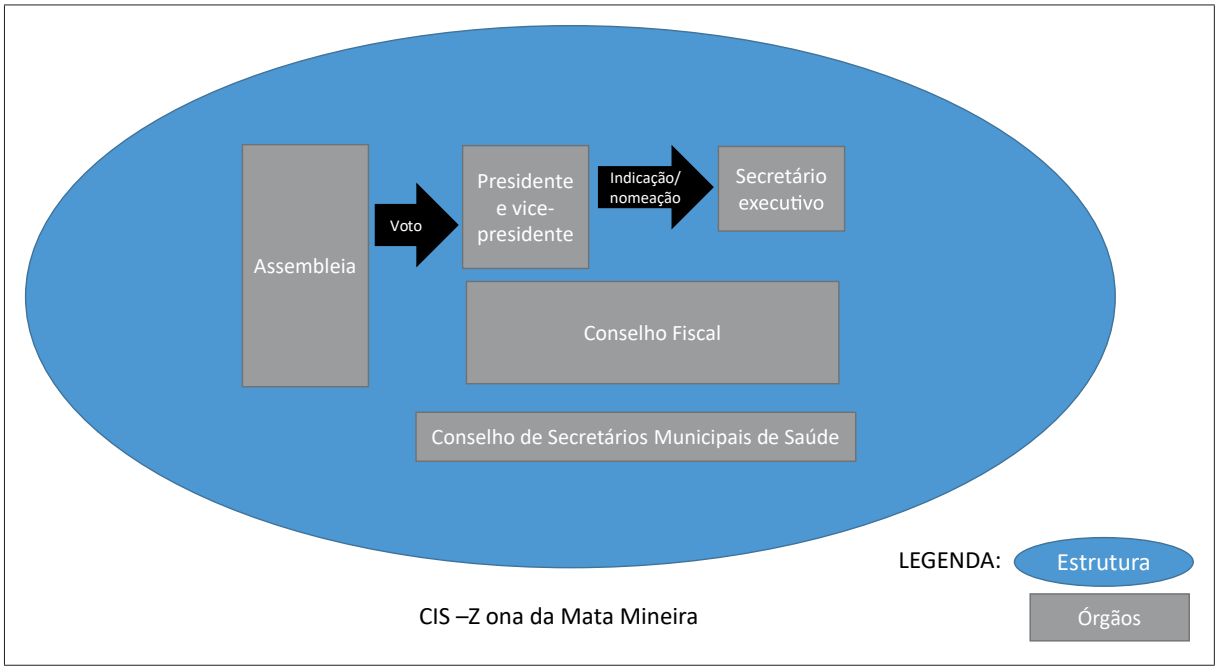
As political actors, mayors may be incentivized toward opportunistic behavior, such as using the consortium to increase regional influence or strengthen their position within their municipality by directing the consortium's actions to serve their interests (Report 7). However, for cooperation to succeed, it is essential to address these challenges by establishing structures and mechanisms that ensure participation and control. Such safeguards are necessary to prevent mutual trust from deteriorating otherwise the cost of maintaining cooperation may become unsustainably high.

Effective governance is essential to address these differences and ensure the continuity and viability of the consortium (Nascimento et al., 2021). This governance must respect heterogeneity and promote robust internal management. Accordingly, the agreements must account for each municipality's specific characteristics, ensuring equitable treatment and accommodating their demands while acknowledging their limitations.

4.1.2 Ensuring cooperation: consortium structure and instruments to resolve conflicts and strengthen the common objective

The governance elements reflect the identification of the entities and agents within the IHC that must collaborate to enable collective action. Understanding their roles and responsibilities reveals an initial "layer" of structure aimed at safeguarding cooperation from opportunistic behavior and aligning activities with the intended purpose—promoting medium- and high-complexity healthcare services in municipalities.

Documentary analysis revealed a common structure within the IHC in the Zona da Mata region of Minas Gerais, which includes an assembly, a president, an executive secretary, a fiscal council, and a council of municipal health secretaries (comprising the health secretaries from the consortium's municipalities) (Figure 1).



Translate: Assembly; Vote; President and Vice-President; Nomination; Executive Secretary; Fiscal Council; Council of Municipal Health Secretaries

Source: developed by the authors

Figure 1. Actors/bodies that form the basic structure of the IHC in Zona da Mata – MG

The assembly (formed by the heads of the Executive Branch of each of the consortium members) is responsible for the main decisions of the IHC, including electing, by vote, the president and representatives of the fiscal council, approving the appointment of the executive secretary, deliberating on changes to regulations (bylaws, contracts) and the accounts of the IHC. The president (a member of the assembly elected by peers) is responsible for representing and responding to the consortium in various instances, in addition to seeking partnerships and appointing the executive secretary, who (appointed by the president and approved by the assembly) acts as the manager of the IHC, based on the demands of the assembly, the president and the councils. The fiscal council (composed of members of the assembly elected by peers) monitors and supervises the IHC, obtaining information on the accounts and the decisions of the president and secretary.

Report 8 describes the structure from the perspective of an interviewee.

> The CONSORTIUM has its own councils; we follow a rule, a general line for consortia, through a council of municipal health secretaries and a fiscal council. As I already mentioned, the Council of Municipal Health Secretaries dictates the policies to be followed by the consortium—the fiscal council, which exercises control *per se*. Moreover, the Council of Mayors (assembly) is a legal body that gives legality to our acts. It creates resolutions similar to a city council that creates laws, you know, and votes on laws. So, to be more precise, our council [assembly] approves the bylaws and statutory changes to the protocol of the public consortium contract. In short, it issues the resolutions. This is the consortium's line, and, as far as we know, it is very similar to most of them (Report 8).

The existence of the secretaries' councils is noteworthy, as it provides a platform for technical discussions aimed at both guiding the assembly and overseeing the consortium's management.

Communication methods also serve to reduce information asymmetry and facilitate decision-making. Document analysis revealed that traditional channels, such as bulletin boards and e-mail/fax, were initially used. However, reports indicated the existence of synchronous and informal communication channels. In most of the IHC (seven of the eight analyzed), communication now incorporates web systems and platforms: "There, through the WhatsApp group, and published in the official gazette, the website... (Report 9)."

As reported by one of the representatives in an IHC (Report 10), more significant informal interaction can help strengthen ties and, through mutual knowledge, increase social capital, avoid communication problems, and promote learning. It is worth noting that the managers are the organizers of the meeting, which reveals the convergence with the consortium's collective nature, which can contribute to favoring regional integration beyond its purpose in health.

> We have a monthly and itinerant assembly with mayors, which is always held on the last Friday of each month. So, each month, we go to a different municipality, and then we start with breakfast, hold a meeting, and end it with lunch. It is a get-together, a time to exchange ideas, a connection between them, which significantly strengthens joint actions, the exchange of help, you know? So we have this practice here; it has been our peculiarity since the beginning of the consortium's foundation (Report 10).

Participation, deliberation, and accountability must also be considered structure elements.

Participation in the consortium entities primarily occurs through voting, with each member entitled to a vote. All protocols and statutes reference the rights and duties of consortium members, as established in Art. 4 of Law No. 11,107, dated April 6, 2005 (*Lei de Consórcios Públicos*). The accountability system, requiring the executive secretary and the president to report to the assembly, with oversight by the fiscal council, serves as a mechanism to mitigate political influence and opportunistic behavior.

However, voting does not necessarily guarantee effective equity (Shleifer & Vishny, 1997), particularly given disparities in resource capacity and health service demands. While voting is a fundamental mechanism in democratic processes, it may fail to achieve genuine equity and balance in complex contexts such as public consortia (Gerick & Pessali, 2014).

Even though IHC differ from private structures—where shareholders invest with the expectation of returns proportional to their shares—there may be instances where those contributing more may demand even greater access to services, potentially affecting the relationships within the consortium. This heterogeneity among municipalities, particularly the dominance of larger municipalities or those with more decisive political leadership over smaller ones or those lacking political capital, poses a risk of imbalance and a source of opportunism.

Instruments are required to balance participants' demands and capacities. Two key tools stand out: apportionment agreements and program contracts, which help resolve conflicts over which services will be offered. These agreements are established between the IHC and each participating entity to determine each municipality's financial contribution to the consortium and the specific actions contracted with the IHC. As such, these contracts serve as mechanisms to equalize differences, enabling the adjustment of varying demands through tailored approaches.

Interviews revealed that in six consortium members, apportionment contracts are determined based on the number of inhabitants (municipal population) or the Municipal Participation Fund coefficient. This approach aligns contribution capacity with receiving resources from the federative pact rather than the municipality's revenue. On the other hand, program contracts are tailored individually for all eight members, considering the medium- and high-complexity health services each municipality deems necessary for its population. Each municipality contracts only for the services it will utilize.

The protocols of intent and statutes of the consortia are also noteworthy for emphasizing partnerships, which can be understood as municipal governments' collective objectives to achieve contracting flexibility beyond the constraints of direct public administration. Reports confirmed that IHC can establish outsourced partnerships (Report 11).

> There is a requirement for the professionals hired, the specialists, to have a degree. High-quality outsourced services are hired to offer countless procedures, whether in gastroenterology, ophthalmology, imaging, resonance, tomography, and many other imaging exams, which are countless. So, we seek these partners to perform outside the walls, which is what we do not have to offer here (Report 11).

4.1.3 Actors' actions: mayors, executive secretaries, and health secretaries

For cooperation to endure, consortia must effectively capitalize on potential benefits and continuously adapt their dynamics. This section delves into accounts of the everyday functioning of IHC, extending beyond their structure and instruments.

The documents (statute, apportionment agreement, and program agreement) emphasize control as a means of safeguarding the interests of the IHC and its stakeholders while limiting opportunistic behavior. Interviews revealed that this control is underpinned by trust among peers and is primarily grounded in a technical perspective from municipal health secretaries' councils. Notably, differences in how consortia activities are monitored can be observed across the following structures: the assembly (comprising all mayors), the fiscal council (composed of a subset of mayors), and the council of health secretaries.

Mayors, including those serving on the fiscal council, often lack a deeper understanding of the IHC's decisions, suggesting room for improvement in the oversight process. However, this also indicates a degree of trust in the relationships within the consortium. In some cases, the fiscal council was described as underdeveloped, with meetings functioning more as a statutory formality than as a meaningful oversight mechanism, as noted in Report 12.

> The fiscal council rarely meets. Getting the mayor to review the accounts is very difficult, even though it is mandatory to present an accounting report every six months. We call it an accounting report, where we show the council what is happening. We present the balance, the expenditures, the commitment notes, and all the procedures that need attention (Report 12).

It is important to emphasize that delegation—decentralizing decision-making to municipal health secretaries—does not imply negligence or invite moral judgment. One of the key benefits of the consortium is its ability to absorb part of the responsibilities of the municipal executive structure, effectively "freeing" mayors to focus on their roles as heads of the municipal executive.

Mayors, primarily through the assembly or, in some cases, the fiscal council, tend to play a more peripheral role, generally endorsing regulations, opinions, and decisions made by the council of secretaries. This indicates a "delegating behavior" that is less participatory, with mayors focusing more on political actions within the IHC.

Delegating behavior also highlights a focus on isolated political actions, underscoring that while consortia represent an effort to break away from the individualistic paradigm, they remain insufficient to extend into other dimensions and overcome the challenges posed by heterogeneity, competitive federalism, and autonomous municipalism.

The Council of Municipal Health Secretaries is regarded as a technical body focused on health-related decisions, such as hiring physicians, purchasing equipment, and assessing the feasibility of offering new specialties. The interviews revealed that these councils are active and must be consulted before any deliberation in the assembly, which typically unanimously approves the recommendations made by the municipal health secretaries (Report 13).

> We have a council of municipal health secretaries that also meets monthly, and, actually, all the health guidelines we have are included in the council of secretaries. [...] So, the council (of health) is the one that deliberates on health actions and gives us the direction of what we need to develop, hire, undo hiring, or modify. So, the guidelines are really theirs. (Report 13).

Regarding the objective of this study, the closer involvement of the council of secretaries compared to that of the mayors highlights key elements of the dynamics within the IHC.

The greater involvement of health secretaries, coupled with the relative distance of mayors and their limited engagement in key technical decisions, reflects the managerial character of IHC. This "delegating behavior," even if unintentional, reinforces the health sector's technical specificity while diminishing the consortium's political nature. The fiscal council's focus on technical decisions and oversight highlights the mayors' more specific and limited participation, primarily during assemblies.

The nature of delivering health services through collective action was most prominently reflected in the protocols of intent and statutes. As foundational agreements of the consortium, these documents outline the objectives, functions, and representational intentions of the IHC (Abrucio *et al.*, 2013; Gerigk & Pessali, 2014). Interviewees corroborated these elements, emphasizing responsibility, the pursuit of collective objectives, and the importance of partnerships.

The unique characteristics of each municipality, as previously noted, are accommodated through apportionment and program contracts. Additionally, representatives emphasize that this heterogeneity is acknowledged, and disregarding it could jeopardize the feasibility of cooperation.

We asked whether any municipality held greater influence over others within the IHC. While some cases in the reports suggested such instances, the predominant finding was that no municipality had a greater influence within the consortium. Managers (executive secretaries) expressed a clear commitment to maintaining the consortium as a collective entity, ensuring that all municipalities contribute equally to the IHC while preserving its collaborative nature (Report 14).

> Interviewee: No, we have never allowed this [difference between municipalities] to happen. In the assembly, votes have the same weight, and the location of the headquarters is chosen for strategic reasons. It is not the largest municipality; it is one of the largest; it is a hub, but it is not the largest. And it is always like this when there is an election... one of the largest municipalities or the headquarters municipality, the new manager [president] usually thinks he is the master of the situation, but later, he realizes he is not. So, we always take this political issue very seriously, ensuring everyone has the same weight within the consortium. We have experience much interference or problems with this (Report 14).

Mayors, health secretaries, and executive secretaries play distinct roles within the consortia's structure, each contributing to its legitimacy in specific ways. Mayors provide institutional legitimacy, health secretaries bring technical expertise, and executive secretaries ensure collective interests are respected.

4.1.4 Summary Report

The structure and instruments designed to ensure cooperation are not self-operating. On the contrary, their effectiveness depends on adherence to functions and rules to ensure that "institutions function." One report encapsulates these concerns (Report 15).

> So, in the previous administration, when the mayor of (NAME OF MUNICIPALITY HIDDEN) took office, he joined the consortium thinking that it was part of (NAME OF MUNICIPALITY HIDDEN). He thought the consortium belonged to (NAME OF MUNICIPALITY HIDDEN). He had no idea that it was only headquartered here and that it belonged to all municipalities. He thought it was just his. So, he wanted to be president at any cost, but the mayors did not accept it. And then he wanted to leave the consortium; he did not contribute for a while, he got angry [...], until he found out about it, came back, contributed, you know, participated in the consortium, and continued to be a member of the consortium for the first year. In the second year, he wanted to be president, and then, in a meeting, they accepted that he would be president, but he practically broke the consortium within almost six months. For the first time, the consortium could not meet all its commitments at the end of the year because, in less than six months, it practically went bankrupt precisely because he brought the political dimension into the consortium. We held a meeting [...] in the middle of the year. Look how important meetings are! We held a meeting, and I, as executive secretary, showed the consortium's financial situation. I said we were going bankrupt and would go bankrupt by the end of the year. The mayors decided and fired many people, people who had joined but were useless, for political positions, and so on. The consortium barely made it to the end of the year. So, what happened? He wanted to be reelected. But, the members did not accept his reelection. As the president, he did not even accept that meeting to finish, the meeting was closed right there and then. We were left without a president. As the executive secretary, I held a meeting. I called a meeting because the statute allowed me to. In that meeting, we unanimously elected a new president – without the current president's consent, he was still president— for the next term. So a new president was chosen because the assembly is sovereign, the president has power, but his power lasts until the end of the year, and the assembly is even more powerful than the president because the members are all the owners of the consortium, you know, all the municipalities. So that was done; a new president was appointed, and he simply cooled off and removed the municipality from the consortium. (Report 15).

The case describes an instance of opportunistic behavior by a mayor who repeatedly attempted to take over the presidency without fulfilling the municipality's financial obligations to the consortium. After eventually being elected president, the mayor distorted the consortium's purpose, leading to serious financial issues for the IHC. The response came from the executive secretary (as an agent) and the assembly, which dismissed individuals hired for political reasons. Subsequently, due to the president's resistance to a new election, the executive secretary, acting by the statute, convened a new assembly where a new president was elected and sworn in.

In summary, the institutions (statute, assembly, and executive secretariat) operated as checks and balances to deter opportunistic behavior and provide mechanisms for conflict resolution, thereby ensuring cooperation. Opportunistic actions were curtailed by the response of a structure designed to uphold collective action. From this perspective, the role of the manager was also highlighted. With extensive experience at the IHC and a clear understanding of his responsibilities as executive secretary, the manager took the initiative and implemented measures to prioritize the collective interest, effectively acting as a guarantor of the IHC's objectives.

Still considering the characteristics and contextual elements in which IHC are formed, these structures represent public arrangements that potentially reflect patrimonialist, bureaucratic, and managerial models (Fabriz, 2017; Lui & Schabbach, 2020; Mathias & Oliveira, 2019). The patrimonialist model is evident in the inherent duality of interests (public and private) embedded within the arrangement. The bureaucratic model is reflected in the presence of formal structures and regulations. Meanwhile, the managerial model is characterized by efforts to develop a flexible structure to achieve results, particularly in delivering medium- and high-complexity public health services (Denhardt & Catlaw, 2017).

Thus, consortia can be understood as:

- a forum and agent to promote integration between consortium members and other actors with a view to institutional development and regional development in the health sector; and
- guided by efficiency and economy of resources (human, financial, and material), in addition to acting to obtain resources via partnerships with public and private entities for investments of regional interest in the health sector.

5 Final Considerations

This study aimed to understand the role of IHC in the Zona da Mata region of Minas Gerais, Brazil in facilitating joint action among public entities. To establish a foundation, elements of the federative pact, autonomous municipalism, and public management models were examined. An analysis of empirical data from documents and interviews revealed factors that both promote and constrain cooperation, the institutions that shape IHC (structures and standards), and accounts of situations where these mechanisms curbed opportunistic behavior and enabled the potential benefits of consortia.

Although designed as instruments to facilitate the provision of medium- to high-complexity public health services and to overcome local barriers, IHC in the Zona da Mata region of Minas Gerais still face challenges that hinder cooperation. These challenges include autonomous municipalism, competitive federalism, bureaucratic public administration models, heterogeneity among municipalities, and the risk of opportunistic behavior. While the IHC members in this mesoregion strive to mitigate these risks and phenomena, they have not yet fully overcome them. To reduce the risk of opportunistic behavior and conflicts that could weaken cooperation, IHC have implemented mechanisms such as instruments for mutual adjustment (apportionment and program contracts), arenas for technical debate (council of health secretaries), and joint deliberation platforms (assembly), along with oversight controls like the fiscal council. The actions of executive secretaries (managers) demonstrated significant dedication to preserving the collectivist nature of the entity.

In summary, inter-municipal health consortia are governance structures aimed at integrating participants whose dynamics and managerial logic prevail. They are institutionally legitimized by the participation of local executives. Although no spillovers to other areas of joint action at the regional level have been observed, the health consortia of Zona da Mata in Minas Gerais illustrate an institutional form of cooperation between public entities of direct administration.

Limiting factors include the reliance on documents that have already been formalized and entities that are already established. Studies focusing on the creation process could uncover challenges specific to the formative stages and the initial phases of operation.

As a means of improvement and future studies, we suggest a debate on greater participation by civil society (democratic public governance) and the importance of considering the dynamics of IHC in terms of management and relationships at the regional level. Comparative studies between health consortia and other sectors and between different states can reveal relevant aspects for a broader understanding of cooperation in the public sphere.

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Value Investing in Brazil: A Novel Application of Benjamin Graham's Criteria to Generating Abnormal Returns

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Abstract

Objective: This study aimed to adapt Benjamin Graham's criteria to the Brazilian stock market, using a ranking strategy to build winning portfolios that offer abnormal returns.

Method: We have collected data from all companies traded on the stock exchange in Brazil between the 4th quarter of 1998 and the 2nd quarter of 2020. Graham's criteria were adapted using each indicator's quarterly median and sector-wise. We employed the Greenblatt (2006) ranking strategy in the portfolio construction.

Results: We employed the five-factor asset pricing model to analyze the abnormal returns of the portfolios. Our findings indicate that portfolios formed with the adapted criteria consistently outperformed the market average. Notably, the portfolios with 10, 20, and 30 assets demonstrated superior returns compared to the Ibovespa, IBrX 100, and LFTs, with the 10-asset portfolio generating the highest Alpha.

Contributions: This research advances the literature on value investing in emerging markets by adapting Benjamin Graham's criteria to the Brazilian context using quarterly sector medians and a ranking strategy. The study demonstrates the potential for generating abnormal returns, outperforming benchmarks such as the Ibovespa and IBrX 100. It underscores the importance of periodic adjustments and sector-specific adaptations, providing valuable insights for investors applying fundamental analysis in emerging markets. These contributions bridge traditional value investing principles with the unique dynamics of emerging markets, aiding in more informed portfolio management decisions.

Keywords: Fundamental analysis. Benjamin Graham. Stock portfolios. Value investing. Adapted criteria.

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Introduction

The formation of stock portfolios has long been a central topic in accounting, finance, and investments. The financial literature of the 1950s and 1960s, primarily developed in influential markets such as the United States and the United Kingdom, introduced various theories on stock price predictability and capital market behavior (Fama, 1965; 1970).

The research presented here aims to innovatively adapt Benjamin Graham's fundamentalist assumptions to the Brazilian stock market and use a ranking strategy to build winning portfolios that offer abnormal returns. Our main innovation is the attempt to apply a new adaptation of the so-called "Graham criteria", a strategy based on fundamental analysis, to an emerging market, which may provide a diverse set of challenges and opportunities. In addition to adapting the criteria, we also adapt how stocks are selected for a portfolio by using a ranking derived from the classification of firms according to these criteria.

The financial literature presents various approaches to optimal portfolio formation and asset selection. Beyond Graham (1965), influential studies by Fama and French (1992, 1993, 2012) introduced additional factors to the Capital Asset Pricing Model (CAPM), originally developed by Treynor (1962) and Sharpe (1963). More recently, Frazzini, Kabiller, and Pedersen (2019) have attempted to explain Warren Buffett's exceptional returns, a prominent investor adhering to Graham's value investing principles. However, the literature on applying "Graham criteria" in the Brazilian context is still scarce and limited by methodological choices that distance the results from the reality of potential research users.

For example, Testa and Lima (2012) made adjustments to the values used by Graham's original proposal to make them closer to the situation in Brazil. However, we believe that this still does not solve the problem because in investments we need to relativize things to find the best options available among all those that are available, which is why we always compare the company's criteria with its comparables within the same sector.

Passos and Pinheiro (2009) considered a 5-year buy-and-hold portfolio. We believe that this is not the most appropriate methodology, especially in a country like Brazil, because businesses are more sensitive and less mature. Our differential in this case is the application of quarterly rebalancing of portfolios.

Finally, on performance evaluation of the strategy, Domingues et al. (2022) and Palazzo, Savoia, and Securato (2018), evaluated the performance of the strategy using standard Jensen's Alpha, with only one risk factor controlled (market beta). Based on modern asset pricing literature, the alpha presented by them may be affected by other risk factors that have not yet been incorporated, whereas our research applies the classic 5 risk factors (Taib & Benfeddoul, 2023).To achieve the study's objective, we applied Graham's fundamentalist methodology to stock selection in the Brazilian market and the formation of stock portfolios, proposing adjustments and rankings that make sense for applying research results in real life. Through empirical analysis, we evaluated the performance of portfolios constructed according to these criteria and examined whether these portfolios can generate risk-adjusted returns above the market. Our analysis strategy allows more stocks to be available for selection and portfolio construction, solving a common problem with applying Graham's original criteria in Brazil (they generally restrict the majority of stocks from Brazil, a market significantly smaller than the United States).

The original Graham criteria were adapted for the Brazilian market, considering differences between the US and Brazilian markets. We have ranked the firms by quarter and used the average score of the rankings to select the best companies. This approach considered sensitivity to outliers, allowing companies with unsatisfactory performance in some criteria to be part of the sample. After building the portfolios, we used a five-factor asset pricing model to evaluate whether the strategy could generate abnormal returns.

Our main results demonstrate that the stock selection strategy, based on Graham's adjusted criteria, can be effective in the Brazilian market. Portfolios formed by this strategy outperform the overall market, suggesting that a value investing approach may be applicable even in emerging markets like Brazil. These results contrast with previous studies conducted in developed markets, which found mixed evidence regarding the effectiveness of value investing (Fama & French, 1992, 2012).

This research contributes to the financial literature by introducing a novel methodology for stock selection based on value investing in an emerging context. Furthermore, the research sought to comprehensively analyze the returns of portfolios formed based on the adapted Graham criteria in the Brazilian context. Portfolios created based on the strategy presented in the research with adapted Graham criteria and ten assets exhibited significant abnormal returns. In comparison, portfolios with 20 and 30 assets did not exhibit significant abnormal returns. These findings are significant for Brazil, an emerging market with less than 10% of total shares traded in the United States, where the original model was developed.

Finally, the methodology employed in this research provides valuable insights into the efficiency and applicability of these criteria in the Brazilian market. The results contribute to the academic literature and may be helpful for investors interested in value investing strategies and stock portfolio construction in Brazil. Graham's criteria are primarily known to small investors through the best-selling book "The Intelligent Investor". With this study, we can add information to these investors in the Brazilian market. Furthermore, it is essential to emphasize that the analysis of risk factors and ongoing strategy monitoring are recommended to understand better the returns and risks involved.

2 Literature Review

In the Brazilian market, research has emerged aiming to find performance differences between the Sharpe (1964) and Markowitz (1952) models. Some of these studies aimed to compare the two models and also motivated to analyze specific markets. In this regard, Brochmann et al. (2000) conducted a comparative analysis between the models, whose evidence demonstrates that the Markowitz model outperformed the Sharpe model. In this regard, Bruni and Famá (1998) and Hieda and Oda (1998) conducted similar analyses, evaluating portfolio performance in the Brazilian market scenario, using Markowitz's portfolio optimization theory as a basis.

From this perspective, Graham (1965) presents strategies for selecting companies based on fundamental assumptions (value investing). Then, he evaluates these to identify prices traded below the intrinsic value of the pre-selected companies. Graham (1965) suggests that his strategy is valid for long-term investment, believing that the value will prevail and that it would not be safe to adequately infer the possibility of obtaining abnormal returns in the short term.

Value investing consists of an investment strategy disseminated especially by Graham and Dodd (1934), establishing specific criteria that need to be identified in companies, such as, for example, presenting good corporate governance, a good profit history, and low risk. Such criteria would become crucial for the shares of these companies to outperform the market average. Subsequently, to guide investors when carrying out their investment analyses with a long-term focus, Graham and Dodd (1951) presented their asset selection strategies based on the perspectives of value investing. In its latest version, Graham (2007) listed seven criteria with a quantitative scope for selecting stocks:

1. Adequate Size: Minimum revenue of US$ 100 million for industrial companies and minimum total assets of US$ 50 million for utility companies.
2. Sufficiently financial solid condition:
   a. For industrial companies, current assets must be at least twice the current liabilities (typical liquidity ratio). Long-term debt should not exceed the working capital of the company (current assets - current liabilities); and,
   b. For utility companies, the debt should be at most two times the shareholders' equity (book value).
3. Uninterrupted dividends for at least the past twenty years.
4. No losses in the past ten years, only profits.
5. Minimum growth of one-third in earnings per share in the past ten years.
6. Price should not exceed 15 times the average earnings of the past three years.
7. The stock price should be at most 1.5 times the equity book value.

When analyzing portfolios based on value investing, Oppenheimer (1984) found results that outperformed the market average for the period studied between 1974 and 1981. Using equivalent parameters based on the value investment assumptions to select assets, Klerck and Maritz (1997) also observed positive results during the analysis period from 1977 to 1994. In Brazil, Vasconcelos and Martins (2019) analyzed the creation of shareholder value and its relationship with value and growth investing strategies. The authors found different results from the US market, observing that in Brazil, the formation of portfolios with growth stocks have higher returns than value stocks and that growth companies have higher dividend growth than value companies.

The application of Graham's criteria in their original version to construct a portfolio in the Brazilian context can be overly restrictive, considering not only the maturity of the capital market in Brazil but also the characteristics of companies with traded stocks in the country. Thus, although these criteria are widely studied in the investment literature, this study assumes that adopting Graham's criteria in their original format is unsuitable for the Brazilian stock market because many companies do not meet them.

Graham stated that applying some of his criteria can be rigorously restrictive, posing a significant challenge to their implementation in the Brazilian market. Artuso and Chaves Neto (2010) considered adjusting certain cutoff levels suggested by Graham, looking at the potential loss of information generated by applying the criteria in their original terms. In this regard, the research hypothesis of this study is:

Hipótese: Carteiras construídas com base nos critérios ajustados de Benjamin Graham podem gerar retornos anormais no mercado de ações brasileiro.

Hypothesis: Portfolios built based on Benjamin Graham's adjusted criteria can generate abnormal returns in the Brazilian stock market.

The notion that value investing only entails finding undervalued or "cheap" stocks becomes inaccurate, as the representativeness of value investment transcends this bias and reaches a more profound point of analysis. Deep analysis inherent in the value investment strategy would enable relevant informational gains about the business. Thus, this study aims to verify the utility of these criteria in Brazil and to adapt them to the national context in search of build winning portfolios that offer abnormal returns.

3 Method

The scope of this research encompasses all companies listed on B3 (Brazilian stock exchange) from the fourth quarter of 1998 to the second quarter of 2020. The analyzed period, consisting of approximately 22 years, represents the most extended possible timeframe based on the data availability in Refinitiv Eikon. To ensure the feasibility of the analysis, data from companies whose stocks ceased trading at any point or lacked the necessary data were excluded.

Given the selected timeframe, we employed a Python-programmed machine-learning model to form and rebalance the portfolios every quarter. We created a script to automate this task. We excluded all financial companies from the sample due to their unique regulatory requirements and specific capital structure characteristics. The Ibovespa index, IBrX 100 index, and Treasury Financial Notes (LFTs) were considered benchmark comparisons. The Selic rate was chosen as Risk-free for portfolio evaluation purposes because it closely approximates the zero-risk concept. The Brazilian government bond represents the lowest default probability in the local market, thereby representing low reinvestment risk and lower volatility.

3.1. A Novel Application of Graham's Criteria in Brazil

We considered their most recent original form to apply Graham's criteria (2007) in Brazil. The quarterly application was defined to ensure the proper portfolio rebalancing, aiming to include only winning companies according to the criteria. Furthermore, the rebalancing makes the portfolio simulation more aligned with real market practices and represents one of the main differentiators of this study compared to previous publications. In practice, the average investor tends to review their assets whenever there is a new balance sheet disclosure.

In the second step, we modified the original criteria to achieve better suitability and efficiency in the Brazilian market. This adaptation was necessary because the original criteria were developed and applied to a different US market. Differences in factors such as the number of companies, maturity, and performance significantly contribute to the divergence between these markets.

Palazzo et al. (2018) took a similar approach to analyze the Brazilian market and suggest a series of modifications to these criteria, indicating a possible need for adjustments in the Brazilian context. However, their study should have noticed the necessity of portfolio rebalancing, thereby presenting evidence with limitations. While the study demonstrated concern regarding the economic context, which was an advancement compared to previous research (such as Artuso & Chaves Neto, 2010, and Almeida et al., 2011), the authors limited the research and its practical application by setting fixed values as parameters, deviating from results that would be more closely aligned with the reality of the average Brazilian investor.

In this study, we present an advancement in that, in addition to suggesting a more efficient asset selection applicable in Brazil, we also focus on providing period-relative results closer to the reality of the local financial market. This advance is particularly relevant when considering that, in practice, investors do not tend to hold assets in a portfolio for approximately ten years, as treated by Palazzo et al. (2018). Conversely, this work applies adjusted criteria quarterly, resulting in potentially more helpful information for investors in the practical implementation of investment portfolios. Despite this, we clarify that this study does not consider operational costs and tax implications. It is a limitation of this analysis.

Regarding the number of assets in the portfolio, the research adopts the composition of an equal-weighted portfolio, which entails assigning equal weights to all available assets. In this regard, DeMiguel, Garlappi, and Uppal (2009) demonstrated that the performance of this type of portfolio consistently outperforms various other strategies. Other studies have argued for establishing an appropriate number of assets in the portfolio and concluded that a portfolio composed of 10 assets significantly reduces risk and yields superior results compared to other investments (Battaglia, 2013; Ceretta & Costa Jr, 1998; Demiguel et al., 2009). Therefore, this study employs the Greenblatt ranking methodology (2006) to select the best stocks for inclusion in the portfolio.

Based on the above, Table 1 presents the adapted criteria and the modifications made by Palazzo et al. (2018). It is important to emphasize that the need to adapt the criteria to the Brazilian market is based on the distinction between the characteristics of the Brazilian market and the US market. To exemplify, one of Graham's original criteria requires a company to have a 20-year history of uninterrupted dividend payments to be included in the portfolio, which proves restrictive in the Brazilian stock market.

Therefore, adapting these criteria aligns with the Brazilian context by using the median as a selection parameter. The selection based on the median was chosen based on the understanding that such a measure can capture the reality of each criterion within the context of Brazilian companies. Additionally, the median provides the best value estimation as it is less affected by extreme values (outliers), whether high or low.

The choice to calculate the medians with sensitivity for each sector (NAICS) reinforces the concern about offering results closer to the Brazilian investor's reality, as assuming a general median for sectors with distinct characteristics would be unfair.

Table 1

Graham's (2007) criteria adjusted to the Brazilian market.

Nº	Criteria of Graham (2007)	Criteria of Palazzo *et al*. (2018)	Criteria used in this study
1	Appropriate Size: Minimum revenues of US$100 million for industrial companies and minimum total assets of US$50 million for utilities.	Adequate Size: annual or annualized gross operating revenue greater than R$ 300,000,000.00 (three hundred million reais).	Adequate Size: Operating income above the median for listed companies in the industry each quarter. Due to the characteristics of the emerging market, we want companies that can generate operating profit. Revenue is often not properly "monetized", as seen with major retailers. Therefore, we consider operating profit a more suitable substitute for measuring the size of companies.
2	A sufficiently strong financial condition: a) In industrial companies, current assets must be at least twice the current liabilities. b) Long-term debt must not exceed current shareholders' equity. c) In the case of public service concessionaires, the debt must not exceed twice the share capital.	A sufficiently strong financial condition: Current ratio (Current Asset/Current Liabilities) with a median of 1.22.	A sufficiently strong financial condition: being above the industry's median Interest Coverage ratio in each quarter. Current liquidity involves a more subjective analysis than the interest coverage ratio. For some companies, high liquidity may be good, while for others, it may be detrimental. For some companies, a current liquidity of 1.0 might be high, for others, it might be low. The interest coverage ratio is a more direct measure to assess the ability to pay debt service.
3	Uninterrupted dividends for at least the last 20 years.	Uninterrupted dividends for at least the last five years.	Uninterrupted dividends for at least the last five years. Why not 10 or 20 years? Because, unfortunately, in Brazil, we cannot find companies with a very long history of dividend distribution due to specific corporate issues but also due to macroeconomic and political factors.
4	No losses in the last ten years, just profits.	No losses in the last five years, just profits.	No losses in the last five years, just profits.
5	Minimum growth of at least one-third in Earnings Per Share (EPS) over the past ten years.	Minimum growth of at least 2.66% each year.	Minimum growth of at least the median of industry earnings growth each quarter.
6	Price to Earnings (P/E) should not exceed 15 times the average earnings of the last three years.	The stock selection at level 7 for the P/E ratio.	The P/E ratio must be less than or equal to the industry median in each quarter.
7	Price to Book Value (P/BV) must not be greater than 1.5 times the book value of equity.	Selection of stocks with a P/BV ratio greater than 1.00 provided that their P/E x P/BV multiple was not greater than 7.00.	The P/BV ratio must be less than or equal to the industry median each quarter.
8	–	Liquidity: Thus, only the ten most liquid stocks were chosen among the stocks selected in each criterion.	Ranking: The ranking methodology was used to select the best firms concerning the medians of the criteria by sector.

Source: adapted from Graham (2007) and Palazzo et al. (2018).

3.2. Ranking of stocks for portfolio construction

We used a ranking strategy inspired by Greenblatt (2006) to build the portfolios. Therefore, we order the stocks each quarter to select those that are part of each portfolio (whether with 10, 20, or 30 assets). However, unlike Greenblatt (2006), who used only two criteria (Return on Assets – ROA – and Price-to-Earnings – P/E – ratio), we constructed the stock classification ranking based on the seven criteria proposed by Benjamin Graham (i.e., large companies with strong financial conditions, no losses, paying dividends, etc.).

Our methodology involves ranking the stocks each quarter according to the adapted criterion. For example, in the first criterion of size, companies are ranked based on the value of their revenues, with higher values indicating a closer position to the top. Table 2 presents the adaptation through the ranking strategy.

Table 2
Adaptation by ranking

N	Rankings by Criterion
1	Ranking by Revenue of firms with stock trading during the period.
2	Ranking by Financial Condition in each B3 sector.
3	Ranking by number of uninterrupted dividends for at least the last five years. Companies with all dividends received ranking 1.
4	Ranking by the amount of positive net income. Companies with all positive earnings were ranked 1.
5	Ranking by earnings growth in each B3 sector.
6	Ranking by P/BV ratio in each B3 sector.
7	Ranking by P/E ratio in each B3 sector.

Source: prepared by the authors..

Then, we added the positions in the seven rankings for each stock and divided this result by 7 to find the "average position" each stock obtained in the set of rankings using Graham's adapted criteria. We decided to use the mean and not the median of positions because it is sensitive to the presence of outliers. Moreover, this sensitivity matters in this case because we want to avoid companies that are very poorly classified in any of the criteria. Therefore, a company may score well in specific criteria but will be penalized if it performs unsatisfactorily in other criteria.

Table 3 exemplifies the choice of using the average. In the example, let us assume that when selecting the top five stocks among the six available, stock B presents an outlier in criterion #7 and would likely be excluded from the sample by the original criteria of Graham (2007). However, with our adaptation, this company is retained but downgraded from the 2nd to the last position due to its ranking of 50 in criterion #7.

Table 3

Example of application of the ranking's methodology

Stock	Rankings of Criteria							Statistics	
	#1	#2	#3	#4	#5	#6	#7	Mean	Median
A	1	1	1	1	1	1	1	1	1
B	2	2	2	2	2	2	50	8.85	2
C	3	3	3	3	3	3	3	3	3
D	4	4	4	4	4	4	4	4	4
E	5	5	5	5	5	5	5	5	5
F	6	6	6	6	6	6	6	6	6

Source: prepared by the authors..

Using rankings to construct portfolios based on Graham's adapted criteria is an innovation in this study, as it prevents a company from being excluded from the portfolio because it performed poorly in just one criterion. However, the methodology used here still penalizes the company for this. We used a method that allows it to remain in the sample but be penalized for poor performance in any analyzed criteria. Thus, the companies with the highest final rankings in the average ranking were selected to form the portfolios.

In Brazil, this strategy is essential due to the small number of listed companies (compared to the USA), which makes using the original criteria unfeasible. Thus, we do not reduce the sample and maintain the essence of selecting companies with better positions in the adapted criteria of Graham (2007). Using the average of the rankings, deliberately sensitive to outliers, causes the company to fall out of the top five positions. If we formed portfolios with five assets, the resulting portfolio would be A, C, D, E, and F. On the other hand, if the median were used, the selection would be A, B, C, D, E - which would not solve the problem.

The application of the ranking model involves the following steps:

1. The firms are ordered according to the specific criterion in each quarter Q of year Y. Using revenue as an example, we rank the companies as those with the highest revenue, followed by the second company, then the third, and so on.
2. Once all the rankings are done, the values are standardized so that the first company in the ranking presents a value of 1, and the last company in the ranking, for that criterion, presents a value of 100. In other words, we normalize stocks between the 1% and 100% percentiles to make the ranking averages easier to interpret.
3. The final ranking is obtained by calculating the average of the criteria rankings.

3.3. Models for calculating returns

After defining the rankings and forming the portfolios, it is necessary to calculate both the daily returns of the portfolio assets and the market returns to identify the abnormal returns of the assets. For this purpose, we used the market model, according to the same statistical model used by Ball and Brown (1968). The formulas are described by Equations 2 and 3.

$$R_{p,t} = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{P_{i,t}}{P_{i,t-1}} - 1\right) \qquad (2)$$

Where $R_{p,t}$ represents the equally weighted return of portfolio p in period t; P_t represents the closing price of stock i in period t; P_{t-1} represents the closing price of the period $t-1$; N is the number of assets in the portfolio.

$$r_{i,t} = \alpha_i + \beta_i r_{m,t} + \varepsilon_{i,t} \quad (3)$$

Where $r_{i,t}$ represents the return of stock i in period t; α_i represents the interceptor of firm i; β_i represents the coefficient of variation of firm i in period t; $r_{m,t}$ represents the market return in period t; $\varepsilon_{i,t}$ represents the error of firm i in period t.

We used the Ordinary Least Squares (OLS) model to estimate the regression. We had correct standard errors with Newey-West, as it is robust in the presence of autocorrelation of regression errors (the main problem of the asset pricing model presented).

3.4. Multifactor models for portfolio Alpha analysis

To evaluate and explain the possible abnormal return of the portfolios, we used a five-factor asset pricing model to test the generation of portfolio Alpha. This model was chosen for its more robust estimation, as it includes the liquidity risk premium () as the fifth factor, proposed by Amihud (2002), in addition to the three factors (market, Size, and value) of Fama and French (1993), and the momentum factor of Carhart (1997). The regression described in Equation 4 is performed to analyze the Alpha of the formed portfolios. Finally, the risk factors for the Brazilian market were obtained from the NEFIN/USP website.

$$r_t - r_t^f = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 WML_t + \beta_5 LIQ_t + \varepsilon_{it} \quad (3)$$

Where $r_t - r_t^f$ represents the portfolio return above the risk-free rate in period t; α represents the intercept, which economically expresses the portfolio's abnormal return; MKT_t represents the market risk factor; SMB_t represents the size factor; HML_t represents the value factor; WML_t represents the moment factor; LIQ_t represents the liquidity risk factor, and represents the error term of the regression.

4. Results

The initial results of the analysis confirmed suspicions that no company met all the original criteria proposed by Benjamin Graham during the period analyzed in this study. Because of this, it was impossible to calculate a series of returns, and the analysis moved on to calculating the returns of the portfolios formed by the adapted criteria. One factor that may have contributed to companies not meeting the criteria is the dividend criterion. According to DeAngelo, DeAngelo, and Skinner (2004), dividends are replaced by share repurchases and concentrated in large companies.

Table 4 summarizes the number of eligible companies for portfolio formation each quarter, starting from the fourth quarter of 1998 in Brazil, using the sectorial median criterion. The criterion that proved to be most restrictive was the dividend criterion, with an average of 30 eligible companies. Next, the most significant restriction was found in the criterion regarding the need to show profits in the last five years, with an average of 48 companies passing each quarter (not tabulated). The final criterion is the intersection of these criteria.

Table 4

Summary of companies eligible for adapted criteria to Brazil

	Size	CF	$Dividends_{5y}$	$Earnings_{5y}$	gEarnings	P/L	P/VP	Final Criterion
Mean	103,61	113,60	30,46	48,79	95,13	103,31	103,31	7,95
Median	119,00	147,00	14,00	49,00	114,00	119,00	119,00	4,00
SD	54,91	56,45	29,29	39,72	57,61	54,78	54,78	7,80
Min	1,00	0,00	0,00	0,00	0,00	1,00	1,00	0,00
Max	174,00	177,00	77,00	108,00	165,00	173,00	173,00	23,00

Source: prepared by the authors.

If the original criteria were considered, only from the first quarter of 2005 would it be possible to observe the entry of companies eligible to build the stock portfolio? At this point, an investor who intends to adopt such criteria and choose a fixed number of stocks (such as 10 or 20 stocks) would need to choose an alternative method for selecting the remaining stocks to complete their portfolio. This situation represents one of the flaws in Graham's methodology, which does not classify companies; it selects only those actions that "pass" the filters, excluding all others.

Another problem is determining which stocks go into the portfolio. For example, imagine that 20 stocks pass all of Graham's original criteria, and you want to form a portfolio with 10 stocks. Which ones would be selected? As there is no priority ranking, this task becomes complex. To solve this problem, we combined Graham's adapted criteria methodology with a ranking methodology similar to that of Greenblatt (2006).

4.1. Portfolio Performance Statistics

This section presents the results of adapting Benjamin Graham's criteria for Brazil. In the portfolio results, when the criteria do not yield eligible companies for portfolio construction in each period, we assume that the investor allocates their resources to risk-free assets.

Table 5 shows the descriptive statistics of the benchmarks and the Adapted Portfolio () which is composed of the Brazilian sample using the adapted Graham filters (sample of this study). We considered the returns of the Ibovespa, IBrX 100, and Brazilian government bonds (LFT) as benchmarks. The findings demonstrate that the average portfolio return (1.02%) was like the Ibovespa (1.02%), higher than the LFT (0.97%), and second only to the IBrX 100 (1.29%). When considering the median of returns as a performance measure, the portfolio formed in this study had the best performance (1.30%), surpassing all benchmarks (Ibovespa with 0.82%, LFT with 0.94%, and IBrX 100 with 1.13%). However, this portfolio had a higher standard deviation than all benchmarks (0.82%).

Additionally, we used the Sharpe ratio to compare the risk-adjusted returns for the portfolios and benchmarks. The best performance was obtained by the IBrX 100 (0.048411), followed by the Ibovespa (0.007042), and the Rp_Adap portfolio return series (0.0060976). This result demonstrates that the IBrX 100, an index with greater diversification, exhibits a higher risk-adjusted return measured by the Sharpe ratio.

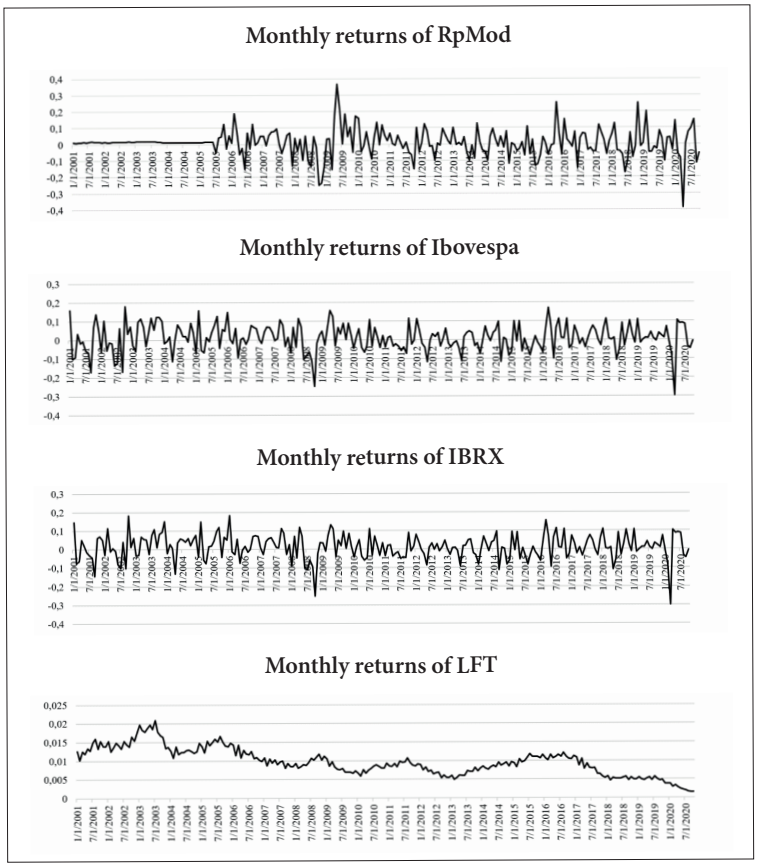
Table 5

Descriptive statistics of the portfolios

Statistics	Rp_{Adap} (%)	Ibovespa (%)	IBrX 100 (%)	LFT (%)
Mean	1,02	1,02	1,29	0,97
Median	1.30	0,82	1,13	0,94
Min	-38,55	-29,90	-30,09	0,16
Max	36,80	17,92	18,34	2,08
SD	0,820	0,710	0,661	0,38
Sharpe	0,0060976	0,007042	0,048411	–

Source: prepared by the authors.

Figure 1 shows the monthly return of the series over time. It is noticed that the portfolio presented concentrated volatility in some points. This occurred due to the rebalancing with risk-free assets and the inclusion of a few companies in the criteria. It is bearing in mind that only in 2005 did assets enter the adapted portfolio, which explains the initial behavior in Figure 1. Before that, the capital was invested in the LFT. It explains the low volatility of returns in the previous period. These results reinforce that applying Benjamin Graham's methodology to the national context requires caution, as it exposes the investor to the risk of few assets that pass the criterion.



Source: prepared by the authors.

Figure 1. Real monthly returns of the methodology adapted to Brazil

4.2. Portfolio Statistics by Ranking (10, 20, and 30 Assets)

Table 6 presents the descriptive statistics of the return series for portfolios formed by 10, 20, and 30 assets. Once again included the Ibovespa, IBrX 100, and LFTs as benchmarks. represents the return series of the portfolio formed by ten assets, and the same applies to 20 and 30 assets. According to the results, the portfolio formed by the top 10 ranking stocks had the highest average monthly return (1.77%) and a better median (1.86%) than the other portfolios and benchmarks.

The portfolios the top 10 companies formed exhibited the highest maximum monthly return (27.46%) among the portfolios and benchmarks. However, the standard deviation of the portfolios formed in this study is similar to that of the benchmarks. This result is justifiable due to diversification, as the Ibovespa and IBrX 100 are indices with more stocks.

The Sharpe ratio was included to control the risk-return relationship better. The best portfolio was formed with a ranking of 10 stocks, followed by the 20-stock portfolio and then the 30-stock portfolio, in that order. All ranking portfolios exhibited risk-adjusted returns above the benchmarks.

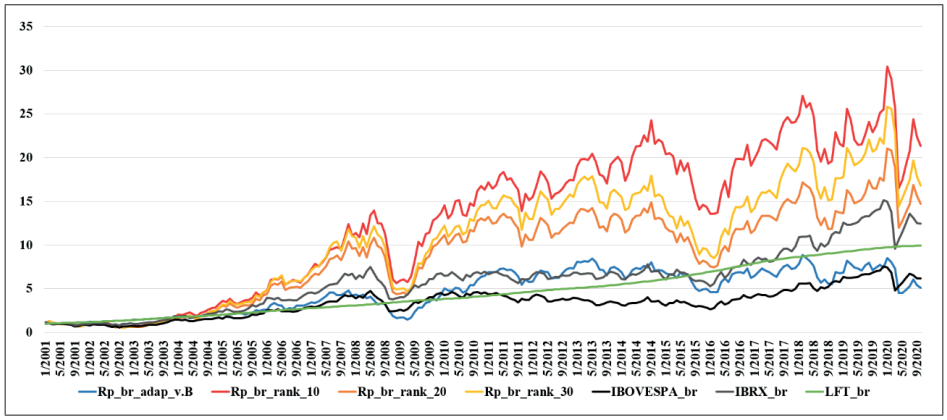
Table 6

Portfolio and benchmark returns statistics

	$Rp_{Rank_{10}}$	$Rp_{Rank_{20}}$	$Rp_{Rank_{30}}$	***Ibovespa***	***IBrX 100***	***LFT***
Mean (%)	1,77	1,61	1,67	1,02	1,29	0,97
Median (%)	1,86	1,37	1,55	0,82	1,13	0,94
Min (%)	-35,77	-36,51	-36,91	-29,9	-30,09	0,16
Max (%)	27,46	24,5	25,25	17,92	18,34	2,08
SD	0,0965	0,0958	0,0964	0,071	0,0661	0,0038
Sharpe	0,0829	0,0668	0,0726	0,007	0,0484	-

Source: prepared by the authors.

Analyzing the returns of the portfolios formed via an adapted model (Rp_{Adap}), and an adapted ranking (($Rp_{Rank_{10}}$, $Rp_{Rank_{20}}$ e, $Rp_{Rank_{30}}$), it is believed that the best way to visualize the results is through a graph of accumulated returns. Again, the leading market indices and high-liquidity, low-risk fixed-income assets were added for comparison in Figure 2.



Source: prepared by the authors.

Note: Rp_br_adap is the series of returns formed by the portfolio resulting from the modified Graham criteria. Rp_rank_10 are portfolios formed by Graham's criteria following the ranking methodology. The number 10 indicates the number of companies in the ranking. All other portfolios follow the same logic.

Figure 2. Cumulative returns of portfolios adapted to Brazil

The Y-axis shows the evolution for each R$ 1.00 (one Brazilian real) invested in the formed portfolios and benchmarks. The graph shows that the portfolio with modified Graham criteria (*Rr_mod*) had the worst result in comparison: R$ 1.00 invested in it at the beginning of 2001 would generate an accumulated wealth of just over R$ 3.00 in October 2020. However, the portfolios formed by rankings exhibited higher cumulative returns than the Ibovespa and IBrX 100. Considering the accumulated return, the best portfolios were those with ten stocks, followed by the 30-stock and then the 20-stock portfolios.

We expected that the 20-stock portfolio would yield higher returns than the 30-stock portfolio, as it has a greater concentration in companies in a mispricing situation: undervalued relative to their fundamental value. However, given the limitation of the return series, it is possible that there was a selection bias, where some companies with low-performing returns influenced the series.

Table 7 presents the annualized cumulative returns for each portfolio and benchmark and the number of times each portfolio outperformed the benchmark. Panel A presents the accumulated returns from 2001 to 2020. Panel B shows the number of times the benchmark was surpassed: over 20 years, the adapted Graham portfolios (Ranking 10, 20, and 30) outperformed the Ibovespa 9, 13, 13, and 13 times, respectively.

Table 7

Accumulated annual returns for each portfolioa

Panel A: Accumulated annual returns							
Year	Rp_{Adap}	Classificação 10	Classificação 20	Classificação 20	Ibovespa	IBrX 100	LFT
2001	17,96%	-9,68%	-12,47%	-11,27%	-11,02%	-0,90%	17,32%
2002	19,38%	-21,42%	-29,44%	-28,57%	-17,01%	5,72%	19,17%
2003	22,71%	140,42%	140,60%	139,43%	97,34%	78,48%	23,35%
2004	16,02%	91,29%	85,69%	87,58%	17,81%	29,85%	16,25%
2005	29,79%	40,22%	54,41%	62,88%	27,71%	37,33%	19,05%
2006	24,83%	44,38%	36,58%	41,02%	32,93%	36,06%	15,08%
2007	29,28%	67,76%	64,42%	68,87%	43,65%	47,83%	11,88%
2008	-61,37%	-49,30%	-54,09%	-55,53%	-41,22%	-41,77%	12,48%
2009	166,98%	142,91%	142,12%	136,57%	82,66%	72,84%	9,93%
2010	49,53%	19,78%	20,70%	25,81%	1,04%	2,62%	9,78%
2011	-11,13%	-7,48%	-17,25%	-11,04%	-18,11%	-11,39%	11,62%
2012	27,52%	15,13%	17,64%	19,38%	7,40%	11,55%	8,49%
2013	-1,54%	15,34%	7,50%	2,63%	-15,50%	-3,13%	8,22%
2014	-1,98%	8,30%	-3,75%	-2,82%	-2,91%	-2,78%	10,90%
2015	-29,74%	-34,00%	-37,71%	-38,46%	-13,31%	-12,41%	13,27%
2016	25,40%	32,77%	41,24%	44,26%	38,94%	36,70%	14,02%
2017	18,59%	26,29%	30,11%	34,10%	26,86%	27,55%	9,94%
2018	-8,30%	-10,25%	-7,27%	-4,18%	15,03%	15,42%	6,43%
2019	9,61%	18,08%	26,52%	22,11%	31,58%	33,39%	5,96%
2020	-31,68%	-16,27%	-15,33%	-22,14%	-18,76%	-17,87%	2,44%

Panel B: Number of times the benchmark is exceeded				
Benchmark	Rp Adap	Classificação 10	Classificação 20	Classificação 20
Ibovespa	9	13	13	13
IBrX 100	8	12	12	12
LFT	11	12	11	11

Source: prepared by the authors.

The methodology, adapted through rankings, has yielded returns that outperform the Ibovespa, IBrX 100, and LFTs. However, caution is still necessary when analyzing the portfolios, as it is crucial to consider the risk factors to which the investor is typically exposed to achieve such returns. The obtained return is compensation for the assumed risks. This analysis will be addressed in the following sections.

4.3. Analysis of abnormal returns

We need to analyze the return series using an asset pricing model to determine whether the stock selection strategy generates returns that traditional market risk factors cannot explain. In this case, we have adopted the five-factor model. This model incorporates the three factors from Fama and French (1992, 1993): market (MKT), Size (SMB), and value (HML), the momentum factor (WML) from Cahart (1997), and the liquidity risk premium factor (LIQ) from Amihud (2002). Equation 5 presents the model.

$$Rp_{Rank_n} - r_t^f = \alpha + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 WML_t + \beta_5 LIQ_t + \varepsilon_t \quad (5)$$

Rp_{Rank_n} is the portfolio's return being studied, and is the return on the risk-free asset. Alpha (α) is the central coefficient of interest: it can be interpreted as the average abnormal return of the strategy adopted in the studied period. is the stock market risk premium. In this case, it is already measured by the return on the market portfolio minus the return on the risk-free asset.

Next, SMB_t measures the risk premium of small-cap stocks compared to the return of large-cap stocks. HML_t measures the risk premium of value stocks, i.e., high book-to-market, compared to the return of growth stocks with high book-to-market. WML_t measures the risk premium of high-momentum stocks compared to low-momentum stocks. IML_t measures the risk premium of low-liquidity stocks compared to high-liquidity stocks. ε_it is the regression's error term, which can be interpreted as all variations not explained by abnormal return (α) and the identified risk factors (MKT_t, SMB_t, HML_t, WML_t, and IML_t). All the risk factors used for the Brazilian market were obtained from the NEFIN website.

The interpretation of the model results is straightforward: when the risk factor return varies by one percentage point, the portfolio return varies by β_n percentage points. In this case, if β_n equals 2, it means that when the risk factor varies by one percentage point, the portfolio varies by two percentage points. Thus, the interpretation of Alpha is sensitive to the scale at which the data are observed.

Regarding applying the five-factor model, we divided the return series into returns obtained by the 10-stock, 20-stock, and 30-stock portfolios. Table 8 shows the results of applying the five-factor model to the 10-stock, 20-stock, and 30-stock portfolios. We have observed that both the adapted portfolio and the 10-stock portfolio exhibited abnormal returns during the analyzed period, with the adapted portfolio showing the highest level of statistical significance with a p-value below 5%. On the other hand, the 10-stock portfolio exhibited statistical significance at a 10% level. These results can be observed through the positive and significant coefficients of the alphas in both regressions. However, the portfolios formed with 20 and 30 stocks did not generate statistically significant abnormal returns.

The analysis of the factors yields the following interpretation: the return of the adapted strategy is sensitive to the market factor (MKT), exhibiting a positive coefficient (between 0.9672 and 1.2240) with statistical significance at 1% in all analyzed strategies. Next, the size factor (SMB) indicates an association with returns (0.6792) at a 5% level for the adapted portfolio and the 10-stock portfolio (0.2761). For the portfolios containing 20 and 30 stocks, this relationship showed statistical significance at 1% and coefficients of 0.3824 and 0.4142, respectively. It should be noted that considering the models that include the size factor (SMB), a one-percentage-point variation in the size factor is associated with a variation of 0.5501% to 0.5796% in the portfolio returns, respectively.

Additionally, the momentum factor (WML) showed a negative and significant relationship (between -0.3979 and -0.1253) in all strategies. On the other hand, the value factor (HML) did not show statistical significance in any of the strategies. Moreover, the fifth factor (IML) was significant only in the 30-stock strategy (-0.2179) at a 10% level.

Table 8

Application of asset pricing models in the Brazilian market

Rp_{Adap}	**Coefficient**	**p-valor**		
alpha	0,0153	0,0289**		
MKT	0,9672	0,0000***	R^2	0,565
SMB	0,6792	0,0296**	Adjusted R^2	0,550
HML	0,1684	0,3577	Durbin-Watson:	2,029
IML	0,1468	0,6293	Jarque-Bera (Prob):	0,495
WML	-0,3979	0,0126**	Observations	151
$Rp_{Rank_{10}}$	**Coefficient**	**p-valor**		
alpha	0,0058	0,0784*		
MKT	1,2240	0,0000***	R^2	0,754
SMB	0,2761	0,0235**	Adjusted R^2	0,748
HML	0,0057	0,9370	Durbin-Watson:	2,247
IML	-0,1821	0,1272	Jarque-Bera (Prob):	0,951
WML	-0,1351	0,0347**	Observations	237
$Rp_{Rank_{20}}$	**Coefficient**	**p-valor**		
alpha	0,0039	0,2141		
MKT	1,1912	0,0000***	R^2	0,768
SMB	0,3824	0,0012***	Adjusted R^2	0,763
HML	0,0445	0,5231	Durbin-Watson:	2,288
IML	-0,1785	0,1215	Jarque-Bera (Prob):	0,679
WML	-0,1253	0,0424**	Observations	237
$Rp_{Rank_{30}}$	**Coefficient**	**p-valor**		
alpha	0,0051	0,1020		
MKT	1,1793	0,0000***	R^2	0,778
SMB	0,4142	0,0004***	Adjusted R^2	0,773
HML	0,0632	0,3560	Durbin-Watson:	2,196
IML	-0,2174	0,0552*	Jarque-Bera (Prob):	0,432
WML	-0,1707	0,0050***	Observations	237

Note: This table presents the estimation results of the five-factor asset pricing model for the Brazilian market. They were estimated for Adap, Rank10, Rank20, and Rank30. Standard errors were obtained using the robust Newey-West matrix, which is robust in the presence of error autocorrelation. *** = p-value < 1%, ** = p-value < 5%, * = p-value < 10%.

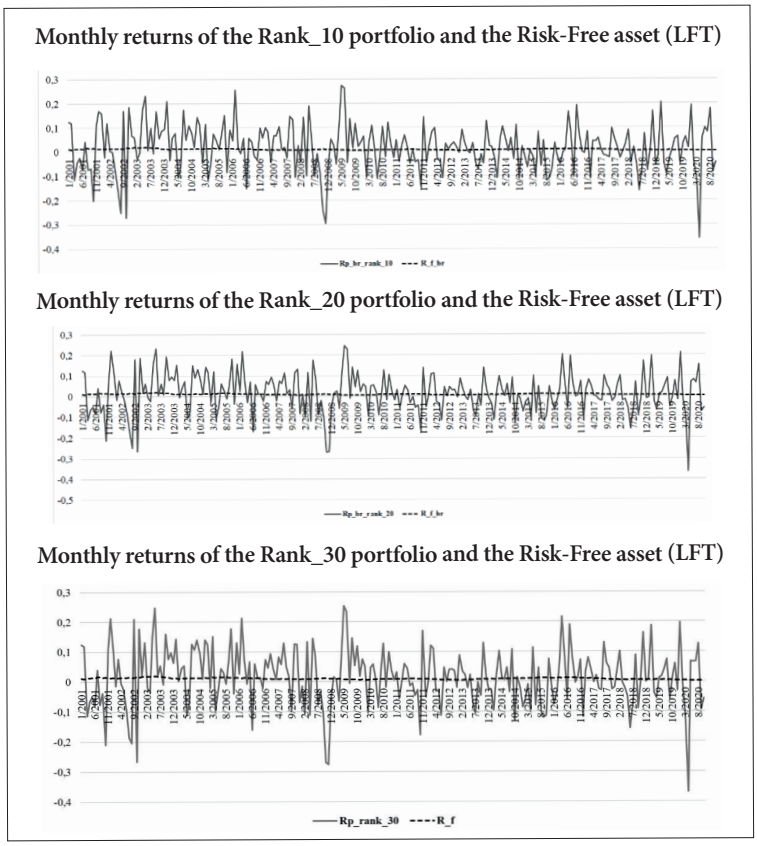
Source: prepared by the authors.

The results indicate that the strategy generated abnormal returns when applied in Brazil following the adapted portfolio strategy (suggested in this research) and the portfolio formed by ranking the top 10 stocks. This finding corroborates previous research that also found the possibility of generating Alpha (Frazzini et al., 2019).

It is essential to highlight some points. First, the regressions showed adequate R2 and adjusted R2 values in all strategies, suggesting that the model is appropriate and reasonably explains return variations. The adjusted R2 was higher than 0.55 in all strategies, surpassing 0.70 in the portfolios with 10, 20, and 30 stocks. The portfolio formed by ranking the top 30 stocks exhibited the highest explanatory power (adjusted R2 of 0.773). Therefore, return variations are explained by the risk factors, given their statistical significance.

Another essential point in this research is the significance of Alpha (α). This was only observed for 3 of the four portfolios, namely the Adapted and Rank10 portfolios. This suggests that for these portfolios, it is possible to affirm that the strategy generated Alpha (incremental return). Although the strategy performed well in Brazil, abnormal returns were statistically significant only in two strategies. This finding is not confirmed for the portfolios with 20 and 30 stocks.

These results explain the choice of the risk-free asset for the Brazilian market. Various research studies use the LFT, Selic, CDI, or longer-term government bonds (the latter presenting higher duration and default risks, which is why they are not commonly used as risk-free assets). Thus, one of the issues with this practice is that these assets have yielded high returns in Brazil, outperforming the stock market when analyzing the series since the 2000s. Figure 3 presents the monthly returns of the formed portfolios.

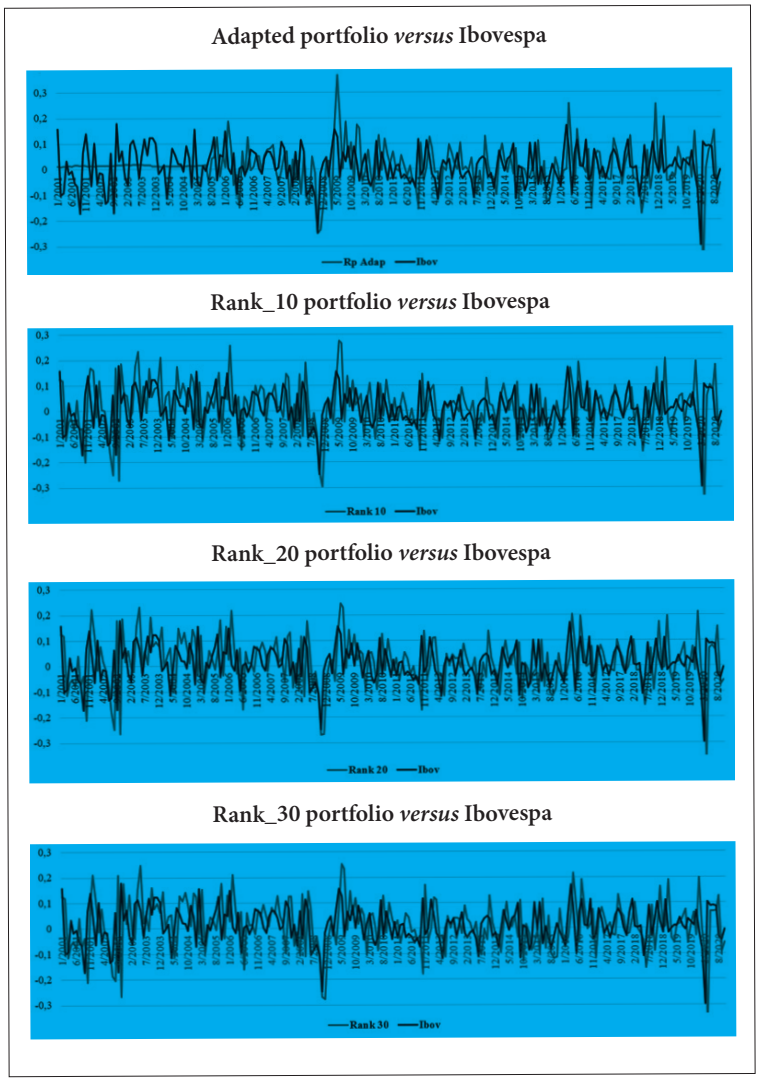


Source: prepared by the authors.

Figure 3. Monthly returns of portfolios (with 10, 20, 30 assets) and the risk-free asset

We notice that the series of ranking portfolio returns exhibit high volatility. Additionally, the risk-free asset has a high return. These two factors imply that the risk premium is, on average, close to zero. This is a relevant point that investors should consider when deciding to build a stock portfolio. This strategy tends to have better results in periods of lower interest rates (risk-free).

Finally, Figure 4 presents the returns of the portfolios, comparing them to the Ibovespa returns. We noticed a positive correlation between the series, but this correlation could be better; in some periods, the portfolios perform better than the Ibovespa (and the opposite is true).



Source: prepared by the authors.

Figure 4. Monthly returns of portfolios (with 10, 20, 30 assets) and Ibovespa

5 Conclusion

This study aimed to adapt Benjamin Graham's criteria to the Brazilian stock market using a ranking strategy to build winning portfolios that generate abnormal returns. The findings indicate that Graham's original criteria are too stringent for the Brazilian context, necessitating adaptations for practical application. By employing quarterly sector medians and a ranking methodology, we developed a strategy that allowed for a greater selection of eligible stocks, thereby making the criteria more applicable in the Brazilian market.

Our analysis revealed that portfolios constructed using the adapted criteria consistently generated Alpha, indicating superior performance relative to market benchmarks such as the Ibovespa, IBrX 100, and risk-free assets (LFTs). Specifically, the portfolios with 10, 20, and 30 assets demonstrated notable returns, with the 10-asset portfolio showing the highest Alpha. These results confirm that the adapted strategy can effectively generate risk-adjusted abnormal returns in an emerging market context.

Furthermore, the application of the five-factor asset pricing model underscored the robustness of the adopted criteria, as portfolios formed by ranking the top 10 stocks exhibited significant abnormal returns. However, portfolios with 20 and 30 stocks did not generate significant Alpha, suggesting that a more concentrated portfolio might be more effective.

The main contribution of this study lies in demonstrating the viability and efficiency of adapting Graham's criteria to the Brazilian market. By integrating these criteria with Greenblatt's ranking strategy, we provide a refined approach for investors, highlighting the importance of periodic adjustments and sector-specific medians. These findings are particularly relevant for market participants, offering practical insights into constructing value-driven portfolios in Brazil. This study contributes to the financial literature by bridging the gap between traditional value investing principles and the unique dynamics of emerging markets.

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Financial Reports Quality and Discretionary Accruals Management: Evidence from the Latin American Market

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Abstract

Objective: This study investigates the relationship between the quality of financial reports, as assessed by auditors, and quarterly earnings management in publicly traded companies in Latin America.

Method: The analysis was conducted using the Dunn-Bonferroni test on 457 companies from Argentina, Brazil, Colombia, and Mexico between 2015 and 2019. Discretionary accruals served as a proxy for earnings management, estimated using Pae's (2005) model with data from Thomson Reuters®. The indicators proposed by Tang et al. (2016) were used to assess the quality of financial reports.

Results: The findings show that discretionary accruals are significantly higher in the fourth quarter compared to other quarters, while the first quarter differs significantly from the second and third. Brazil, Colombia, and Mexico reported lower levels of earnings management and higher financial reporting quality than Argentina. These results suggest that countries with higher-quality financial reporting, as indicated by auditors' opinions, exhibit lower levels of quarterly earnings management, especially in the fourth quarter.

Contributions: This study provides valuable insights for regulators and auditors and emphasizes the variation in earnings management disclosures across interim periods and national contexts. It supports the development of higher-quality earnings disclosures in emerging markets, potentially attracting more analysts and investors.

Keywords: Earnings management; Discretionary accruals; Financial reporting quality; Auditor's opinion.

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1 Introduction

The output of a company's accounting system is its financial reports. Stakeholders are diverse people who use information for various purposes (Rahman *et al.*, 2022). A clear, strong, and reliable financial reporting system is necessary to make accounting information more reliable. High-quality information is crucial for better financial performance and company decisions (Mardessi, 2022).

The auditing process verifies the numbers and explanations used in financial reports to reflect the actual financial situation of a company. In this sense, the auditor's role is essential to ensure compliance with accounting standards since s/he alerts shareholders and regulators about potential fraud or errors in financial statements, promoting more informed decision-making and decreasing statements that use accounting standards to distort a financial context. Hence, auditors can increase the reliability and trustworthiness of financial reports through independent analyses (Silva & Rodrigues, 2016).

High-quality information reduces asymmetry between principals, agents, and suppliers. However, there is no predominant and generally accepted approach to measuring it (Luthan *et al.*, 2016), as several social, economic, political, and behavioral factors influence the fact that not everyone has the same qualitative and quantitative information (Moura *et al.,* 2017).

Thus, the quality of information concerns how relevant it is to support users' decisions and the impact of its informative power on a company's financial performance, whether through greater transparency, reliability, and timeliness or less earnings management (Christensen *et al.*, 2015). In this regard, to promote a fairer negotiation environment, independent auditors have an essential role in increasing confidence in this information when issuing their opinions on the accounting practices adopted by organizations, ensuring investors greater security (Hu, 2015).

Healy and Wahlen (1999) note that earnings management is when managers use their judgment of financial reports to influence the contractual results derived from the statements disclosed for their benefit. In this context, the literature highlights incentives beyond the remuneration of managers, such as Initial Public Offering (IPO) (Sletten *et al.*, 2018), exceeding financial requirements in loan contracts (debt covenants), and reducing the cost of regulation or increasing regulatory benefits (Healy & Wahlen, 1999). From another perspective, Noronha et al. (2008) list these incentives as contractual incentives, regulation, and capital markets.

Many studies analyze the quality of financial reporting and earnings management; however, most use data from European countries or the US. These studies show that cultural, economic, and legal factors affect earnings quality (Dechow *et al.*, 2010; Enomoto *et al.,* 2015) and the role of auditing in trying to restrict earnings management (Almarayeh *et al.,* 2020; Choi & Wong, 2007; Choi *et al.*, 2022; Lin & Hwang, 2010) and, therefore, the explanation for such behaviors may lie in country-specific factors.

Paulo (2007) reports that adjusting results to meet analysts' forecasts is one incentive for manipulating accounting numbers. The practice of manipulating results is more prevalent in markets with less trading, high capital concentration, and poor enforcement (Mota *et al.*, 2017) and, consequently, subject to macroeconomic impacts due to market instability (Viana, 2019), such as Latin American countries.

Given the previous discussion, this study aims to investigate the relationship between the quality auditors assign to financial reports and the management of quarterly results in publicly traded companies in Latin America.

From this perspective, few studies address the association between the quality of financial reports measured from the audit perspective and the level of quarterly earnings management in countries under different macroeconomic contexts. In particular, the significant differences between developed markets and emerging markets characterized by companies with a high level of shareholder concentration and a lower level of legal protection for shareholders (Azevedo *et al.*, 2021; Azevedo *et al.*, 2023; Claessens & Yurtoglu, 2013), exacerbate information asymmetry in such a market environment. Therefore, presenting evidence from the four countries with the highest Gross Domestic Product (GDP) in developing Latin America (i.e., Brazil, Mexico, Argentina, and Colombia) is relevant. According to the World Bank, these countries stand out for their growing participation in the global economy and are classified as emerging countries by the MSCI Emerging Markets Index.

Thus, this study's results contribute to the literature on the quality of financial reporting and earnings management by using data from developing countries with cultural, economic, and social characteristics that differ from those analyzed in previous studies, informing how this can affect the quality of accounting information. Thus, this study is expected to help regulators and auditors to be aware of the variation in earnings management disclosure in interim periods and different national contexts, restrict such practices, support the development of better earnings quality in emerging markets, and to attract more analysts and investors.

2 Literature Review

2.1 Information asymmetry, information quality, and auditing

A type of information asymmetry occurs before proposing and completing a deal, in which managers use their advantage over investors to report biased information, which is called adverse selection. Another type of information asymmetry is moral hazard, which occurs after a contract is signed. Because shareholders cannot observe a manager's behavior, there is a risk that s/he might act opportunistically, contrary to the organization's general objectives (Koetz *et al.*, 2012).

When there is a conflict of interests, in which each party tries to maximize his/her utility for his/her benefit, the so-called agency conflict occurs. Conflicts of interest can harm market operations, especially in countries with high shareholding concentration, as in emerging countries (Azevedo *et al.*, 2023; Balassiano, 2012). From this perspective, even though the global information environment has been improved as a result of the adoption of IFRS, the accounting system is an additional component of a country's institutional system, which, in turn, is composed of companies that receive incentives to disclose/not disclose financial information.

Countries with stricter regulations encourage more reliable information, followed by lower earnings management. This shows that a country's legal environment, combined with the companies' institutional characteristics, can directly influence the quality of accounting information and, consequently, the practice of earnings management (Marques & Ferreira, 2020).

The level of investor protection and the effectiveness of corporate governance mechanisms provided by companies to market participants in developing countries differ from those in developed countries, which encourages earnings management (Almarayeh *et al.,* 2020). Thus, the rise of a country's information asymmetry works as a monetary metastasis, in which the quality of companies' reports decreases, affecting the country's legal and financial system and driving away investors; i.e., information is not sufficiently transparent to ensure investors' confidence.

According to Miko and Kamardin (2015), auditors' ability to uncover irregularities in financial statements and report them to stakeholders can ensure the quality of financial reporting. In this context, auditing ensures the quality of accounting information companies report to external users and promotes an environment of security and transparency for decision-making (Barroso *et al*., 2021; Salehi *et al*., 2017).

2.2 Previous studies and hypotheses development

From the perspective of the quality of financial reporting based on auditing, Doran (1995) presented evidence that managers report higher profits in interim quarters when compared to the results at the end of the fiscal year. In parallel, the results of Bédard and Corteau (2015) suggest that auditors' reviews of interim reports may not be as effective as expected for controlling the quality of interim financial statements. This shows that, managers take advantage of audits in interim quarters not being as rigorous as in the fourth quarter, to manage earnings.

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However, Rodrigues *et al.* (2019) investigated the behavior of the quarterly earnings management level in Brazilian publicly traded companies between 2012 and 2017. They found that the level of accrual management is higher in the fourth quarter than in the first quarter, which shows a behavior of accrual reversal. This finding shows that managers take advantage of the last opportunity to use the discretion of accounting standards and numbers to achieve annual earnings expectations.

Thus, given that the studies previously mentioned present varied evidence of reversals, whether due to operational decisions, investments, or management of interim quarterly profits rather than the fourth quarter, further studies are needed to address the behavior of results during each quarter of the year. Therefore, the following hypotheses are presented:

H1: The level of discretionary accruals in the fourth quarter is significantly different from that in the intervening quarters.

H2: The level of discretionary accruals in the first quarter is significantly different from the second and third quarters.

Although changes in the accounting environment of emerging countries after the adoption of international financial reporting standards (IFRS) have improved the quality of the information (Holtz *et al*., 2014), stakeholders are still somewhat skeptical about predictive measures due to a concentration of privileged information (Boina & Macedo, 2018). From this perspective, markets with high information asymmetry, such as Latin America, have several tools for managing earnings through accruals, given that their pricing depends on market characteristics.

Thus, La Porta *et al.* (2002) highlighted weak shareholder protection and a poor corporate governance structure as characteristics of these markets that facilitate earnings management. Lopes and Walker (2008) add that because these markets are theoretically underdeveloped, they are less efficient in pricing information.

The literature shows that both company-level and country-level factors influence the role of auditing in constraining earnings management practices (Hung *et al.,* 2023; Mardessi, 2022). In this sense, the possibility that Argentina, Brazil, Colombia, and Mexico present high information asymmetry, which facilitates earnings management through accruals, leads to the analysis of the role of an audit in this context. Therefore, the following hypothesis arises:

H3: Companies in countries with high-quality financial reporting from the auditors' perspective present lower levels of quarterly earnings management.

Therefore, considering an emerging market with fewer monitoring mechanisms, a less developed capital market, and peculiar institutional characteristics, Latin America is a vast field for studies on earnings management and the quality of financial reports.

3 Method

In order to investigate the relationship between the quality auditors attribute to financial reports and quarterly earnings management in publicly traded companies in Latin America, we identified the level of quarterly earnings management by discretionary accruals in publicly traded companies in Argentina, Brazil, Colombia, and Mexico using the model of Pae (2005). Next, the indices proposed by Tang *et al*. (2016) were used to verify the quality of financial reports in each country from an audit perspective. This study focused on these four countries due to the availability of information to perform calculations and subsequent analysis of the dimensions listed.

Quarterly information from 2015 to 2019 from the Thomson Reuters ® database was used to calculate discretionary accruals and information from auditors' reports, supplemented by each company's investor relations reports. The time frame was determined considering the period after 2015 when the companies listed on the stock exchanges adopted the International Financial Reporting Standards (IFRS).

Companies in the financial sector were excluded due to their different characteristics, as well as companies that did not present all the information needed for the calculation. Thus, 457 companies remained after excluding the financial institutions from all the countries addressed in this study (Table 1).

Table 1

Sample description according to country

Country	Argentina	Brazil	Colombia	Mexico
Total Companies	**101**	**414**	**66**	**159**
(-) Companies from the financial sector	15	66	16	27
(-) Companies lacking information	15	108	8	28
(=) Total Companies in the sample	**71**	**240**	**42**	**104**
(*) Number of quarters in the analysis	20			
(=) Total Observations	**9.140**			

Source: study data.

Pae's (2005) model was the most appropriate for achieving this study's objective and analyzing its hypotheses. It uses operating cash flow variables and captures the reversal of accruals from previous periods (Paulo, 2007). After modifying the original Jones (1991) model, Pae's model increased its predictive power. Thus, the predictive power of this model improves by inserting the lagged total accruals (Dechow *et al*., 2012).

Earnings management detection models assume that TA = AD + AND, i.e., total accruals are equal to discretionary accruals plus non-discretionary accruals. In calculating total accruals using the Balance Sheet approach, the variables in Pae's (2005) model seek to identify the non-discretionary nature of accounting choices, with discretionary accruals being deduced using regression residuals, thus appearing as AD = TA - AND.

Thus, the specification model for discretionary accruals proposed by Pae (2005) has the following econometric configuration:

$$TA_{it} = \alpha_{it} + \alpha(1/A_{t-1}) + \beta_1(\Delta R_{it}) + \beta_2(PPE_{it}) + \beta_3(FCO_{it}) + \beta_4(FCO_{it-1}) + \beta_5(TA_{it-1}) + \varepsilon_{it} \quad (1)$$

Where:
TA_{it} = total *accruals* of company *i* in period *t*
ΔR_{it} = variation of net revenues of company *i* in period *t*-1 to period *t*;
PPE_{it} = balance of Fixed Assets of company *i* at the end of period *t*;
A_{it-1} = total assets of the company at the end of period *t*-1;
FCO_{it} = operating cash flow of company *i* in period *t*;
FCO_{it-1} = operating cash flow of company *i* in period *t*-1;
TA_{it-1} = total *accruals* of company *i* in period *t-1*;
ε_{it} = regression error;
All variables are weighted by total assets at the beginning of the period.

In which, total accruals are calculated as follows:

$$TA_{it} = (\Delta AC_{it} - \Delta Disp_{it}) - (\Delta PC_{it} - \Delta Div_{it}) - Depr_{it} \quad (2)$$

Where:

TA_{it} = total *accruals* of company *i* in period *t*;

ΔAC_{it} = variation of the company's current assets (current) from the end of the period *t*-1 to the end of period *t*;

ΔPC_{it} = variation of the company's current liabilities (current) from the end of period *t*-1 to the end of period *t*;

$\Delta Disp_{it}$ = variation in the company's cash and cash equivalents from the end of period *t*-1 to the end of period *t*;

ΔDiv_{it} = variation in the company's short-term financing and loans from the end of the period *t*-1 to the end of period *t*;

$Depr_{it}$ = amount of the company's depreciation and amortization expenses during period *t*;

All variables are weighted by total assets at the beginning of period t.

In this sense, the estimated value of discretionary accruals is obtained through model residuals (1).

The overall quality index method proposed by Tang *et al*. (2016), which identifies the financial report quality index (FRQI), was used to verify the quality of the countries' financial reports based on the opinions issued by auditors. This index is composed of 3 metrics: Quality of Auditors' Opinion (QAO), Quality of External Auditor (QEA), and Auditors' Fees (AF). The metrics are presented in Table 2.

Table 2
Financial reporting quality variables

Variables	Acronym	Measurement	References
Quality of Auditors' Opinion	QOA	Number of unqualified auditor opinions divided by the total number of companies audited	Tang *et al*. (2016)
Quality of External Auditor	QAE	Total number of companies audited by the Big Four, divided by the total number of companies audited	Tang *et al*. (2016)
Auditors' Fees	HA	Auditor fees divided by total assets	Tang *et al*. (2016)

Source: developed by the authors.

Financial statements are representations made by management. Investors use them to make decisions and rely on auditors to verify the credibility of these statements (Hung *et al.,* 2023). Auditing is expected to reduce information asymmetry and is therefore considered an integral part of the modern financial reporting mechanism.

Auditors' opinions are considered when evaluating an accounting system, as an auditor's analysis may result in an unqualified or qualified opinion. In this sense, the QAO index, following Tang *et al.* (2016), will indicate the number of companies with unqualified opinions in their reports; that is, it will indicate the total number of companies presenting unqualified opinions by the auditors of that country. A qualified opinion, with reservations, may be sufficient evidence indicating low-quality financial reports (Rahman *et al*., 2022); thus, the higher the number of reports with unqualified opinions, the better.

Regarding the QEA index, it assesses how many companies in a given country have had their reports audited by one of the Big Four. Although the Big Four are not immune to risk and failures, large auditing firms are considered to have greater independence, experience, and knowledge of the sector and investments in training and qualifying their auditors (Awuye, 2022). Thus, this class of auditors is assumed to be more prudent in protecting their brand since they have more at stake in the event of audit failures than auditors not belonging to the Big Four (Rahman *et al.*, 2022). Based on this analysis, auditors with these characteristics are expected to positively affect the quality of earnings, restricting the aggressive reporting of accruals and inducing clients to disclose economic losses promptly (Tang *et al.*, 2016).

The AF index measures the proportion of auditors' fees in relation to the company's total assets. More experienced and specialized auditors should be financially compensated for investments in their careers. If the risk in the financial statements is considered high, the audit firm will assign this task to more competent auditors who charge a higher fee (Hung *et al.*, 2023); thus, the greater the auditor's effort to minimize the risk of fraud or error, the higher the fees.

Given the indicators previously presented, we first rank the capital markets individually according to the values of the three FRQI variables. Next, the country with the highest score in each variable is assigned 1. The scores of the other countries are calculated proportionally to the maximum score. Subsequently, the scores of each indicator are equally weighted to calculate the FRQI and thus measure the audit quality index by country. Thus, the FRQI is the arithmetic average of the scores of the three variables for each country. Finally, the higher the score, the higher the quality of a country's financial reporting measured from an audit perspective.

Based on the information obtained after estimating discretionary accruals using Pae's (2005) model, according to regressions (1) and (2) discussed above, the Dunn-Bonferroni multiple comparison test or Dunn test was used to compare the dimensions of discretionary accruals between countries and quarters and, then, between the levels of quality of financial reports in each country. The objective was to better explore data from this study based on previous literature (Call *et al.*, 2014; Martins *et al.*, 2016; Rodrigues *et al.*, 2019).

4 Analysis of Results

4.1 Descriptive analysis

Before verifying the significance of the level of discretionary accruals per quarter and how the quality of each country's financial reports behaves in conjunction with the level of quarterly earnings management, it is important to analyze the descriptive statistics of discretionary accruals per quarter and country on a consolidated basis, as shown in Table 3, and the consolidated and detailed mean for all quarters, as shown in Table 4.

Table 3

Consolidated quarterly discretionary accruals statistics by country

	ADabs	N	Mean	Maximum	Minimum	Standard Deviation
Brazil	1T	1203	0,04163	1,14267	0,00001	0,06612
	2T	1203	0,04302	1,74860	0,00002	0,09422
	3T	1203	0,04604	1,49947	0,00003	0,08813
	4T	1203	0,07843	11,48478	0,00006	0,39057
Argentina	1T	355	0,31917	13,52990	0,00178	0,83115
	2T	355	0,31499	16,30925	0,00176	1,13744
	3T	355	0,36723	14,88018	0,00049	1,15761
	4T	355	0,31917	6,45830	0,00026	0,59433
Colombia	1T	210	0,04611	0,78527	0,00014	0,07420
	2T	210	0,03416	0,20520	0,00030	0,03827
	3T	210	0,02958	0,21565	0,00006	0,03651
	4T	210	0,04397	0,38222	0,00009	0,05841
Mexico	1T	520	0,04548	1,60899	0,00000	0,09957
	2T	520	0,04532	3,16265	0,00005	0,15385
	3T	520	0,03918	2,91277	0,00001	0,13200
		520	0,06717	4,34355	0,00004	0,23000

Source: Study data.

Table 3 shows that Brazil presents the highest number of observations due to the high number of companies in the sample. Additionally, the highest mean of the absolute values of discretionary accruals is obtained in the fourth quarter (0.07843), which may be a consequence of Brazil's highest maximum value in all periods analyzed in that country, also causing a greater dispersion around the mean in relation to the other quarters.

Additionally, such a behavior is similar to that of Rodrigues *et al.* (2019). They also reported the highest level of discretionary accruals in the fourth quarter, followed by the first quarter (0.04163), second quarter (0.04302), and the third quarter (0.04604) when analyzing the level of accruals in the Brazilian market. Such a behavior is aligned with Hypothesis 1.

Regarding Argentina, its means of discretionary accruals are higher than the other countries, with the third quarter (0.36723) being the period with the highest mean. The highest maximum value corresponds to Argentina. However, it is present in the second quarter (16.30925), though, contrary to Brazil's behavior, the highest dispersion of the mean is in the third quarter (1.15761).

Colombia's highest means of discretionary accruals are in the first and fourth quarters, 0.04611 and 0.04397, respectively. This behavior may represent a reversal of discretionary accruals, in which the values of previously managed periods are reversed in the following period, as verified by Rodrigues *et al.* (2019) and Awuye (2022). Additionally, the standard deviation of both quarters follows their means, at its highest in the first (0.07420) and then in the fourth quarter (0.05841).

In Mexico, discretionary accrual is similar to Brazilian accrual, in which the highest value is found in the fourth quarter (0.06717). However, the second highest value is found in the first quarter (0.04548), which is also higher than the second (0.04532) and third quarters (0.03918). This behavior is aligned with Hypothesis 2.

Table 4 shows in detail the mean discretionary accruals for each country and all specific quarters of all years covered in this study to better analyze the behavior of these quarters.

Table 4

Mean discretionary accruals for all quarters by country

ADabs	Brazil	Argentina	Colombia	Mexico
2015q1	0,05230	0,21570	0,07600	0,06123
2015q2	0,03200	0,17100	0,04000	0,04897
2015q3	0,06890	0,21340	0,04043	0,04253
2015q4	0,05170	0,31650	0,05190	0,09667
2016q1	0,03890	0,29057	0,03117	0,05168
2016q2	0,04280	0,25137	0,02795	0,07465
2016q3	0,03870	0,28385	0,02134	0,06391
2016q4	0,05680	0,31573	0,04046	0,05984
2017q1	0,03740	0,28114	0,04275	0,04339
2017q2	0,04600	0,26712	0,04170	0,03821
2017q3	0,04450	0,35668	0,02531	0,03376
2017q4	0,04930	0,42843	0,03709	0,05052
2018q1	0,03740	0,37449	0,04127	0,04060
2018q2	0,05570	0,50113	0,03673	0,03167
2018q3	0,03800	0,56955	0,02122	0,03259
2018q4	0,04820	0,31597	0,05047	0,03349
2019q1	0,04190	0,43394	0,03932	0,03050
2019q2	0,03830	0,38424	0,02442	0,03308
2019q3	0,04000	0,41259	0,03957	0,02308
2019q4	0,18670	0,21916	0,03992	0,09529

Source: Study data.

Table 4 shows that the fourth quarter totaled 12 appearances during the entire period; i.e., the fourth quarter showed the highest level of accruals in the study period for all countries, which is aligned with the findings of Das *et al.* (2009) and Gu *et al.* (2005). However, it is noteworthy that the highest mean of all periods is that of the third quarter of 2018 in Argentina (0.56955). This finding may explain the highest consolidated mean in Argentina, which is that of the third quarter and not the fourth quarter (see Table 3).

Note that the period between 2015 and 2019 coincides with Argentina's economic crisis. According to the International Monetary Fund (IMF), the peso (the Argentine currency) lost 40% of its value in 2018, which might explain the high level of accruals in the period.

Notably, with the exception of 2018 to 2019, the years 2015, 2016, and 2017 showed a decline from the fourth period of each year to the first period of the following year in all countries. This finding is aligned with the notion concerning the reversal of discretionary accruals presented by Collins *et al.* (1984), Jeter and Shivakumar (1999), Rodrigues *et al.* (2019), and Choi *et al.* (2022).

4.2 Analysis of quarterly earnings management and the quality of financial reporting

The Dunn test was first used to compare all countries and all quarters, analyzing the level of quarterly earnings management through discretionary accruals and the quality of financial reports in each country (Table 5). This test was chosen because it enables the comparison of various samples. Additionally, as it is a non-parametric method, it is suitable for analyzing data not normally distributed.

Table 5
Comparison of quarterly discretionary accruals

EM x Quarter	1	2	3	4
1	-			
2	2,68 (0,0036) **	–		
3	1,36 (0,0867) *	- 1,32 (0,09299) *	–	
4	- 2,99 (0,0014) ***	- 5,68 (0,0000) ***	- 4,36 (0,0000) ***	–

Note: Significant at *10%, **5%. ***1%. P-values between parentheses. The general P-value of the Dunn test was 0.0001.
Legend: EM – Earnings management.
Source: Study data..

Table 5 shows that the overall p-value indicated by the Dunn test is significant, indicating that all quarters are significantly different. Analysis of the significance of each quarter separately shows evidence not to reject Hypothesis 1, which proposes that the fourth quarter presents a different level from the remaining.

Regarding Hypothesis 2, the first quarter was significantly different from the second. Furthermore, the second and third quarters presented the smallest difference between the levels of earnings management.

These results corroborate the results of Rodrigues *et al.* (2019) regarding the significance of the fourth quarter and indicate that incentives are most significant in the last quarter. Regarding the first quarter, these results corroborate those of Jeter and Shivakumar (1999) by being statistically different from the intermediate quarters.

These findings highlight how, in the fourth quarter, companies are generally under more pressure to meet the financial targets set at the beginning of the year. Additionally, executives' variable compensation, linked to annual financial performance, might create a personal incentive to inflate fourth-quarter results through discretionary accruals. Given these factors, earnings management can be a device used to achieve the desired performance and can have an impact on stock prices (Wang & Ding, 2021) and profit distribution (Dichev & Owens, 2024).

By dealing with financial reports, Table 6 shows the level of quality of these reports, according to indicators proposed by Tang *et al.* (2016), separately by country and variable. Next, the mean for each country (FRQI) from 2015 to 2019 is presented.

Table 6

Financial reporting quality level by country

Country	QAO	QEA	AF	Mean
Brazil	0,97	0,83	0,14	0,65
Argentina	0,99	0,34	0,06	0,46
Colombia	1	0,52	0,06	0,53
Mexico	0,99	0,56	0,15	0,57

Source: Study data

Table 6 shows that the QAO index shows slight variation between the markets in each country and a good quality index of the reports. All the companies in Colombia present reports with auditors' unqualified opinions; that is, the financial reports are according to the accounting principles and, possibly, for this reason, do not present reservations. Even though it is the lowest index among the countries, Brazil's representation of 97% of unqualified opinions is considerably high for the universe of 240 companies addressed here.

Regarding the QEA index, the representation of Big Four firms in the Latin American market varies. One of the Big Four audits 87% of the Brazilian companies included in this study, while only 34% of the Argentinean companies addressed in this study are audited by the Big Four. As previously discussed, the period analyzed here encompasses the severe economic crisis faced by Argentina, which led to an increase in audit risks and reduced the presence of the Big Four in the country.

A comparison of the proportion of unqualified audit opinions (99%) and the representation of the Big Four in Argentina (34%) compromised the QAO. According to the results of Huguet and Gandia (2016), an auditor not belonging to the Big Four may issue an unqualified opinion (without reservations) without having performed rigorous tests or having sufficient technical knowledge to detect any deviation from accepted accounting practices that affect the quality of earnings.

The AF column indicates that Mexico has the highest mean fees in relation to the companies' total assets, followed by Brazilian auditors' fees, which represent 14% of the companies' total assets. However, this index is complementary to the QEA, given that Brazil (83%) and Mexico (56%) have the highest QEA and, consequently, the highest AF. When verifying the mean overall quality of the financial report of each country, Brazil obtained the highest mean (65%), followed by Mexico (57%), Colombia (53%), and Argentina (43%).

Thus, each variable was ranked and compared using the Dunn test to assess the significance of the results and compare the quality of financial reports in each country. In the case of the QAO variable, Brazil was ranked third, as it scored 3. Argentina and Mexico scored 2; hence, they were ranked second, and finally, Colombia scored 1. Table 7 presents the results.

Table 7
Qualified and unqualified opinion

QOA	1 C	2 A and M
2 – A and M	- 1,58 (0,0000) ***	–
3 – B	- 3,25 (0,0006) ***	21,79 (0,0000) ***

Note: Significant at *10%, **5%, ***1%. P-values between parentheses. General p-value from the Dunn test was 0.0001.

Legend: A – Argentina; B – Brazil; C – Colombia, and M – Mexico.

Source: Study data.

Table 7 shows that this study corroborates with the results of Tang *et al.* (2016) by showing both the overall p-value (0.0001) and the comparison of the rankings between the countries, which are all statistically different with 1% significance. However, the results diverge when it comes to data related to Brazil, as "qualified" opinions were less frequent than "unqualified" ones.

Table 8 shows a comparison between countries with companies audited by the Big Four and non-Big Four:

Table 8
Audited by the Big Four and Non-Big Four

QAE	1 B	2 M	3 C
2 – M	1,88 (0,0298) **	–	–
3 – C	3,25 (0,0006) ***	1,76 (0,0389) **	–
4 – A	- 4,19 (0,0000) ***	- 3,82 (0,0000) ***	- 3,19 (0,0000) ***

Note: Significant at *10%, **5%, ***1%. P-values between parentheses. General p-value of the Dunn test was 0.0001.

Legend: A – Argentina; B – Brazil; C – Colombia, and M – Mexico.

Source: Study data

Based on the overall p-value, the results indicate that the quality of financial reporting in all countries is statistically different at a 1% significance level when audited by the Big Four. Thus, this result corroborates the findings of Marques and Ferreira (2020), in which the country's legal environment and institutional characteristics can mean that the same auditing company in different countries can provide different levels of report quality.

Table 9 shows a comparison between auditors' fees across countries as a proportion of companies' total assets:

Table 9
Fees according to country

AF	1 M	2 B	3 A and C
2 - B	- 1,88 (0,0298) **	-	-
3 – A e M	- 2,63 (0,0000) ***	- 2,94 (0,0000) ***	-

Note: Significant at *10%, **5%, ***1%. P-values between parentheses. General p-value of the Dunn test was 0.0001.

Legend: A – Argentina; B – Brazil; C – Colombia, and M – Mexico.

Source: Study data..

The results show that the auditors' fees are statistically different in all countries, complementing the results of the QAO and QEA variables. This indicates that the three financial reporting quality variables are statistically different at 5% significance among all the countries addressed here, corroborating the results of Tang *et al.* (2016).

The indicators previously mentioned show differences in the quality of financial reports in the markets included in the sample. To the extent that these indicators are considered proxies for the result of the application of national accounting and auditing standards and systems, they suggest that there are substantial variations in the accounting and auditing practices of the emerging countries analyzed here. Given all the results presented, both by the information on quarterly earnings management by discretionary accruals and the multiple comparisons made by the Dunn test and by the results concerning the quality of financial reports and compared by the Dunn test, Hypothesis 3 failed to be rejected.

5 Conclusion

This study investigated the relationship between the quality auditors assign to financial reports and quarterly earnings management in publicly traded companies in Latin America. Hence, discretionary accruals for all quarters from 2015 to 2019 and the overall quality index of financial reports were estimated for 457 companies from Brazil, Argentina, Colombia, and Mexico.

The results indicated that Hypothesis 1 failed to be rejected, and The Dunn test showed that discretionary accruals in the fourth quarter significantly differed from those in the intermediate quarters. Additionally, the fourth quarter presented the highest mean of discretionary accruals.

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These findings shed light on how factors related to pressure to meet financial targets and variable executive compensation linked to annual financial performance might create incentives to inflate fourth-quarter results through discretionary accruals. In such a context, fourth-quarter earnings management can be a device used to achieve the desired performance.

The results also indicated that Hypothesis 2 failed to be rejected, given that discretionary accruals in the first quarter were significantly different from those in the second and third quarters. The non-rejection of Hypothesis 2 points to evidence of a reversal behavior of accruals in the first quarter as a result of management in the fourth quarter. It is important to emphasize that this study discussed the level of earnings management rather than the direction of management.

An analysis of the countries revealed that Argentina presented the highest level of earnings management, while Brazil, Colombia, and Mexico presented similar behaviors. Analyzing the quality of financial reports through the QAO, QEA, and AF indexes showed that Argentina presented the worst mean and Brazil the best. The Dunn test was used to rank the statistically different countries with a 95% confidence level.

Thus, Hypothesis 3 failed to be rejected, given that Brazil presented a low level of quarterly earnings management through discretionary accruals and the highest level of financial reporting quality through the average of the QAO, QEA, and AF indexes. In contrast, Argentina presented the highest level of quarterly earnings management and the lowest financial reporting quality index. It is worth mentioning that, according to IMF data, the period of analysis (2015-2019) included an economic crisis in Argentina.

An aspect worth highlighting is that the results suggest that countries with high-quality financial reporting, such as Brazil and Mexico, had the highest level of earnings management through discretionary accruals in the fourth quarter, though overall, they presented low levels of earnings management. On the other hand, Argentina did not show good quality financial reporting and presented the highest level of earnings management overall.

These results lead to two main conclusions. On the one hand, it is clear that an environment with good audit quality will not necessarily eliminate all the factors that lead to a low level of information quality or high levels of discretionary accruals management. On the other hand, it corroborates that the regulatory aspects of each country's formal and informal institutions are relevant in the discussion about the role of auditing in the quality of financial reports and accounting information.

In this sense, this study contributes to academia by demonstrating that earnings management through accruals differs across quarters and countries. Furthermore, it shows that stakeholders must pay attention when analyzing companies, given that both the quality of financial reports and the discretionary behavior of quarterly accounting figures can affect final decision-making. An adequate audit system can be an indicator of high-quality financial reports, and, therefore, ignoring these factors would lead to an incomplete view of the quality of companies' reports.

Despite the aforementioned contributions, some limitations must be acknowledged, such as the proxies used to measure the quality of financial reports, as they do not vary according to the financial data. Additionally, sufficient information for the analyses is also impaired in some countries. Therefore, future studies are suggested to verify the behavior of accruals and the quality of reports according to audit characteristics from the perspective of earnings management based on actual activities and address larger samples from divergent markets, such as the BRICS.

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Does debt diversification impact the value of companies? Evidence from Brazil

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Abstract

Purpose: The main objective of this work is to investigate the impact of debt diversification on the market value of Brazilian listed companies in the period 2010-2021.

Design/methodology/approach: We used a sample of 206 Brazilian listed companies from 2010 to 2021. Panel data regression models were estimated, with the dependent variable represented by the market value of firms through three different proxies and the explanatory variables through three different heterogeneity indices, in addition to control variables.

Originality: The use of different forms of debt is a phenomenon present in the reality of firms. However, how this characteristic of the debt structure affects the value of companies is a topic that still needs to be investigated in depth in emerging markets, considering the specificities of these markets. In Brazil, the credit market is characterized by high banking concentration and the significant presence of development banks, in addition to an institutional environment with lower creditor protection and lower levels of corporate governance, creating a distinct environment from previous research.

Findings: It was observed that the greater the heterogeneity of firms' debt, the higher the market value of companies, pointing to the importance of debt diversification in mitigating agency costs and increasing firms' efficiency. The results highlight the importance of considering the characteristics of the local market in the effectiveness of creditor monitoring.

Practical implications: This result contributes to the decision-making process of shareholders and managers in the Brazilian market, by showing which factors can maximize investments made and, consequently, increase the value of companies.

Keywords: Debt Structure; Capital Structure; Heterogeneity; Market Value; Agency Costs.

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1 Introduction

The capital structure of companies has been among the most researched topics in corporate finance in recent decades. In general, these studies are directly related to the choice of the composition between equity and debt used by the company to finance its activities. According to Kumar, Colombage, and Rao (2017), despite being a topic present in financial literature for decades and having various theoretical approaches, the importance of studies in this area arises from topics that are still underexplored, especially considering the characteristics of emerging markets.

According to Rauh and Sufi (2010), a significant portion of the studies in the field has so far used structural models that treat debt as a uniform source of funds, without distinguishing between different debt instruments. However, as noted by the authors, a significant number of publicly rated American companies have different sources of debt in their financial statements.

Colla, Ippolito, and Li (2013) also found evidence of various types of debt, and financial debt instruments can differ in several aspects, such as origin, maturity, collateral, among others. As a result, there is a common limitation in research since debt is treated as a homogeneous block in a significant portion of the literature, despite empirical evidence, without addressing potentially significant aspects for understanding the composition of a company's capital structure and its possible impacts on firm characteristics.

In Brazil, the literature on the subject focuses on studying the relationship between heterogeneity and the determinants of the debt structure of Brazilian companies (Póvoa & Nakamura, 2014; Eça, Gomes & Valle, 2022). However, there are still no studies that relate the possible impacts of multiple financing relationships on the market value of firms. The credit market in Brazil is characterized by great accessibility to credit lines due to recent developments over the past decades, despite high banking concentration and significant presence of development banks. Taking into account that Brazilian companies operate in this credit market with specific characteristics that differ from the debt market in other countries (for example, the United States) due to high banking concentration, the presence of development banks, and varying interest rates, and additionally, considering that according to Colla *et al*. (2013) debt specialization may be related to market characteristics, it is believed that the debt structure of companies has an effect on firm value through agency relationships and costs associated with conflicts of interest between creditors and shareholders. Thus, there are conditions to obtain evidence different from previous studies.

Based on agency theory (Jensen and Meckling, 1976), the channel through which debt diversity potentially affects firm value involves the agency relationship and the costs arising from conflicts of interest among different parties involved in the firm (managers, shareholders, and other investors, such as creditors). According to Jensen (1986), the use of debt to finance company activities, as opposed to equity, reduces agency costs by reducing the free cash flow available to managers. Therefore, the role of debt in reducing agency costs becomes evident, with debt diversification having the potential to further mitigate these costs through the disciplining effect of debt on managers and their ability to reduce the inefficient use of resources. Harvey, Lins, and Roper (2004) have found that in emerging markets, where managers and families routinely employ pyramid ownership structures, the disciplining effect of debt is concentrated in firms with high expected managerial agency costs (e.g. high levels of assets in place or limited future growth opportunities) impacting the creation of value by these companies.

Rajan (1992) points to another advantage related to the use of debt to reduce agency costs. Financial institutions have additional information about firms through access to financial transactions recorded in bank statements and other controls, such as information about the quality of receivables and customers of the debtor firm. Harvey *et al*. (2004) showed that actively monitored debt creates value for shareholders of firms that face potentially extreme agency costs. Expanding on this argument, as debt heterogeneity exposes the firm to scrutiny from different participants in the credit market, it can contribute to the reduction of agency costs. Financial institutions, underwriters, and credit rating agencies are examples of market participants that instill a disciplinary role in debt, and therefore, a lower agency cost and consequently a positive impact on firm value would be expected (Jadiyappa *et al*., 2020).

In this context, Jadiyappa *et al*. (2020) assert that it is possible to expect a positive relationship between debt heterogeneity and the market value of companies, considering that this structure with different types of debt tends to mitigate agency costs and alter managers' behavior during the decision-making process, thereby increasing the value of firms.

Similarly, the studies conducted by Kysucky and Norden (2016) and Platikanova & Soonawalla (2020) find that companies with relationships with multiple creditors have greater negotiating power and, thus, can negotiate better terms in rates and deadlines, a result also obtained by Eça and Albanez (2022) for Brazilian companies.

Thus, it would be expected that firms with multiple sources of financing and significant debt heterogeneity have more incentives to become efficient, resulting in lower agency costs due to greater alignment of interests between creditors and managers, and, therefore, can generate more value for shareholders. In addition, investors are expected to also consider the potential impacts of debt diversification on companies' bankruptcy costs and their access to the capital market in their investment decisions. Consequently, debt diversification may be potentially relevant for asset pricing.

On the other hand, another line of literature from agency theory argues that the effectiveness of monitoring decreases when there are multiple creditors, as this situation can lead to free rider problems and coordination problems in case of the need for financial restructuring (Carletti *et al*., 2007; Brunner and Krahnen, 2008). In practice, Carletti *et al*. (2007) state that, in the presence of multiple banking relationships, the amount of credit granted by each participant is reduced, so the monitoring incentives of each agent are lower, which may lead to the delegation of monitoring to other participants. If multiple creditors delegate monitoring to other agents, the total volume of monitoring will be lower, increasing the potential agency costs of debt. As a result, Jadiyappa *et al*. (2020) claim that the market value of companies may be reduced in the presence of debt heterogeneity.

The literature also points to another disadvantage of a more diversified debt structure, which is related to the difficulty of coordination among creditors in the event of a company's liquidation (Ivashina, Iverson, and Smith, 2016; John, Kaviani, Kryzanowski, and Maleki, 2018; Lou and Otto, 2020). Lou and Otto (2020) emphasize that companies with heterogeneous debt have higher bankruptcy costs due to a greater likelihood of disagreement among creditors regarding the recovery strategy of the debtor company, resulting in a coordination failure in case of default.

In this context, the main objective of this work is to investigate the impact of debt diversification on the market value of non-financial Brazilian companies in the period 2010-2021, using a database composed of Brazilian companies listed on the Brazilian stock exchange and present in the Capital IQ database.

As the main results, it was observed that the greater the heterogeneity of the firms' debt, the higher the market value of Brazilian companies, pointing to the role of debt in reducing agency costs, aligning interests, and making the company more efficient. These results indicate the relevance of diversifying the debt structure in the decision-making process for the choice of financing sources by managers and the importance of local market characteristics in the effectiveness of creditor monitoring. Thus, it is expected that the research will contribute to the decision-making process of shareholders and managers in the Brazilian market, by investigating which factors can determine the maximization of Investments.

2. Theoretical Framework

According to Rauh and Sufi (2010), corporate debt is characterized by heterogeneity due to the diversity of maturities, cash flow priorities, and sources of resources in a company's debt structure. The results obtained by the authors indicate that the use of multiple sources of financing is a primary characteristic of the debt structure and a reality for companies, although this aspect is disregarded in many other studies on the subject. Additionally, the results suggest that the same type of debt can vary depending on some basic characteristics, such as the right to preferential cash flow and the term of the transactions. Rauh and Sufi (2010) emphasize that an understanding of a company's capital structure will only be achieved when there is knowledge of the motivation behind companies using different sources, instruments, and debt with preferential rights.

Among the research related to debt heterogeneity, there is evidence both in favor of and against greater diversification of a company's debt, as it can bring advantages and disadvantages to the firm and generate shareholder value. Firstly, the positive aspects will be discussed, starting with the agency theory perspective.

Since the seminal articles by Jensen and Meckling (1976) and Myers (1977), research on the subject has focused on understanding the conflict of interests between shareholders and creditors and its implications for the capital structure of companies (Colla *et al.*, 2013). Jensen and Meckling (1976) initially defined that contractual relationships are at the core of firms, with relationships with employees, suppliers, shareholders, and customers equally important for operational continuity. Within this context, the authors emphasize that there are agency problems in these relationships, and consequently, effective monitoring is needed for all these contracts to mitigate the costs arising from conflicts of interest among different agents. Furthermore, Colla *et al.* (2013) highlighted the importance of potential conflicts of interest among different groups of creditors and how these conflicts shape the decisions of companies in choosing sources of financing.

In this context, considering that in the presence of information asymmetry and conflicts of interest, investors incur costs to obtain information, it only makes sense to incur these costs when there are sufficient incentives, such as a high volume of funds lent to a firm, or when there is a high degree of information disclosure. As a result, debt and company management structures are created to mitigate informational problems and promote incentives for monitoring (Colla *et al.*, 2013).

For Bolton and Scharfstein (1996), the relationship between firm value and debt diversification is crucial. They argue that the heterogeneity of the debt structure, along with the presence of secured creditors, plays a significant role in increasing firm value. This debt diversification not only reduces the cost of capital but also facilitates financial restructuring processes, resulting in higher firm valuation.

Rauh and Sufi (2010) also argue that debt diversity can potentially increase a firm's value by reducing risk, lowering the cost of capital, enhancing financial flexibility, and improving investor perception. However, it's important to note that the actual impact of debt diversity may vary depending on factors such as the firm's specific circumstances, industry dynamics, and prevailing market conditions. Rauh and Sufi (2010) suggest that firms with well-diversified debt portfolios may be viewed more favorably by investors, as they are seen as less vulnerable to specific risks or disruptions in financial markets. This positive perception can lead to a higher market valuation for the firm.

Similarly, for Colla *et al.* (2013), debt diversity potentially has a significant impact on firms' value. It can potentially decrease risk, lower the cost of capital, enhance financial flexibility, and reduce agency costs, all of which can contribute to an increase in firm value. However, the specific effects of debt diversity on firm value may vary depending on factors such as the industry, market conditions, and the firm's overall financial strategy.

In addition to understanding the importance of debt heterogeneity in the literature, there are studies that examine why companies structure their debt into various distinct forms (Park, 2000; Bolton and Freixas, 2000). According to Park (2000), structuring different contracts with creditors can serve as a mechanism to reduce total monitoring costs incurred and also minimize moral hazard. In other words, the use of external capital in companies to finance riskier activities is possible using monitoring to reduce problems arising from informational asymmetry, serving as an example of the motivation behind companies using various forms of debt.

From another perspective, Bolton and Freixas (2000) argue that the main distinction between bonds and bank financing lies in the ability to monitor by banks. Thus, in the case of low company profitability and an increasing possibility of default, financial institutions will have an easier time projecting the company's future profitability and cash flow due to closer monitoring compared to bondholders, and, therefore, can choose the best decision for receiving the invested capital.

Based on the cited literature, it is evident that the presence of more diversified debt can have a direct impact on companies in terms of monitoring. In this regard, Jadiyappa *et al.* (2020) state that a positive relationship can be expected between debt heterogeneity and the market value of companies since this structure tends to mitigate agency costs and alter the opportunistic behavior of managers during the decision-making process, increasing the value of firms. In summary, the use of various forms of debt and different creditors creates an environment with more effective monitoring, and such monitoring of activities by various distinct agents can be considered a disciplining measure on companies.

However, from another perspective, there are studies that indicate a possible negative impact of the presence of multiple creditors on companies. According to Carletti *et al.* (2007), companies that have debt with various financial institutions may experience reduced profit margins, financial and legal inefficiencies due to problems related to monitoring duplication and free riding. As Carletti *et al.* (2007) suggest, since monitoring is individually costly and not observable, each banking institution has an incentive to reduce monitoring efforts, believing that they will be compensated by the benefits of monitoring performed by other creditors.

Other studies also present arguments in favor of a more homogeneous debt structure. Brunner and Krahnen (2008) argue that companies with multiple creditors may face significant coordination problems in the event of the need for financial restructuring, with the potential for increased monitoring costs in a default environment.

From a similar perspective, Lou and Otto (2020) provide another argument in favor of a more homogeneous debt structure, considering that the participation and amount lent by each participant in the group of creditors tend to be smaller in companies with multiple relationships using third-party capital. In this scenario, creditors would have less incentive to monitor and track the economic and financial situation, and consequently, become less informed about key developments in the invested companies, directly impacting the quality and efficiency of strategic decisions.

In summary, there are factors that can affect the value of companies with greater diversification in their debt, such as monitoring inefficiencies, the presence of free riders, and possible increases in coordination costs in the event of default. Therefore, due to the increase in agency and coordination costs, these aspects could negatively impact the firm's value (Carletti *et al.*, 2007).

Therefore, this research aims to investigate the relationship between debt heterogeneity and the value of Brazilian companies, given the divergence of views in the literature and the specific conditions of the national market that may be potentially relevant to understanding the debt structure of firms in the country. Considering that Brazilian companies operate in this credit market with specific characteristics, such as high banking concentration, the presence of development banks (e.g. BNDES), and heterogeneous interest rates, and that the debt structure of companies influences firm value through agency relationships and costs associated with conflicts of interest between creditors and shareholders, there are conditions for obtaining evidence different from what previous studies have found.

Furthermore, drawing from the findings of Harvey *et al.* (2004) and acknowledging Brazil's notable presence of influential shareholder groups overseeing publicly traded firms, it is believed that there would be a lower propensity for free riding behavior in Brazil. Therefore, it is considered that in the country there are better conditions for monitoring efficiency through the use of different types of debt, which may impact the value of Brazilian companies.

Thus, this study proposes to investigate the relationship between debt heterogeneity and firm characteristics based on the markets in which these firms operate, with the hypothesis that the heterogeneity of the debt structure affects the market value of firms. It should be noted that this hypothesis has not been directly addressed by the majority of the literature, making it a distinctive aspect of the study, especially considering the characteristics of emerging markets.

3. Data

3.1 Data and Sample

The sample consists of Brazilian companies listed on the Brazilian stock exchange (B3). The data were collected from the Capital IQ database for the period from 2010 to 2021, with each observation referring to the end of the fiscal year. Additionally, the Economatica database was also used to collect data.

As a first step, companies in the utilities sector [Standard Industrial Classification (SIC) codes 4900–4949] and financial companies (SIC codes 6000–6999) in the Capital IQ database were excluded due to specificities in their financing format. As additional filters, companies with zero debt, companies with negative net equity (due to the financial deterioration of these companies, with natural potential for destruction of value), and firms with less than two consecutive years of data for analysis were also excluded.

Additionally, companies that did not have data related to the type of debt used in their debt structure in the Capital IQ database were removed, considering that they do not allow the calculation of the main variable in the proposed modeling. After applying all the filters, the final study sample consists of 206 companies.

3.2 Measurement of Debt Structure Heterogeneity

The first proxy is called the Herfindahl-Hirschman Index (HHI), the secondary measure used is the Excl90 index, and finally, the Ntype metric. It is worth noting that these indicators are used in the studies by Colla *et al.* (2013), Lou and Otto (2020), Platikanova and Soonawalla (2020), Mansi, Qi, and Wald (2021), and Eça and Albanez (2022).

In general terms, the Herfindahl-Hirschman Index (HHI) is used for each company *i* in each year *t*, with its calculation carried out in two stages. The first stage consists of summing the squares of the ratio between the volume of the various sources of debt present in the Capital IQ database and the total amount of debt for each firm *i* over the years *t*. According to previous studies, this work used the seven debt classifications present in Capital IQ, according to equation (1).

$$SS_{it} = \left(\frac{CP}{TD_{it}}\right)^2 + \left(\frac{DC_{it}}{TD_{it}}\right)^2 + \left(\frac{TL_{it}}{TD_{it}}\right)^2 + \left(\frac{SBN_{it}}{TD_{it}}\right)^2 + \left(\frac{SUB_{it}}{TD_{it}}\right)^2 + \left(\frac{CL_{it}}{TD_{it}}\right)^2 + \left(\frac{Other_{it}}{TD_{it}}\right)^2 \quad (1)$$

SS_{it} is the sum of the squared seven debt type ratios for firm *i* in year *t*; CP refers the volume of commercial paper issued in the international or domestic market; DC refers to the volume of drawn credit lines; TL represents the volume of term loans (such as working capital lines, fixed asset financing, credit operations provided by development banks, guaranteed accounts, and advance lines on exchange contracts); SBN is related to the senior amount of bonds and notes issued in the domestic and international market; SUB is equal to the volume of subordinated bonds and notes issued in the domestic and international market; CL refers to the volume of capital leases; *Others* equals the volume of debt not categorized in the previously described classifications; TD is the sum of total debt of firms.

After obtaining the results from the calculation of Equation (1), the next stage of the HHI index is derived from Equation (2):

$$HHI_{it} = \frac{SS_{it} - 1/7}{1 - 1/7} \quad (2)$$

SS_{it} (sum of squares) is obtained through the 7 categories of debt described in Equation (1).

The HHI index varies from 0 to 1. If the company uses only a single category of debt, the HHI index is equal to 1, while if the firm simultaneously uses all seven categories of debt in the same proportion, the HHI index is equal to 0. Thus, the lower the index, the greater the diversification of the company's debt.

With the purpose of assessing a company's economic specialization in a single type of debt, the Excl90 index will be used as an alternative indicator to HHI. The use of this proxy is in line with studies conducted by Colla *et al.* (2013), Lou and Otto (2020), Platikanova and Soonawalla (2020), Mansi *et al.* (2021), and Eça and Albanez (2022). Thus, the Excl90 index is a dummy variable for a company *i* in year *t*, which takes a value of 1 (one) when the firm has more than 90% of its debt concentrated in a single type of debt, indicating homogeneity, and 0 (zero) otherwise.

As proposed by Platikanova and Soonawalla (2020), in order to capture the use of different categories in a company's debt structure, the Ntype metric is also used. The index is composed of categorical variables according to Equation (3).

$$NTYPE_{it} = (1,2,3,4,5,6,7) \quad (3)$$

Through the seven categories of debt present in the Capital IQ database, the index varies from 1 (one) to 7 (seven). It assigns the minimum value of 1 (one) when the firm has only one type of debt and the maximum value of 7 (seven) for companies that have all debt categories in each period.

3.3 Econometric Model

To test the research hypothesis and assess the effect of debt heterogeneity on firm value, panel data regression models with fixed effects were used. In the proposed model, the dependent variable is defined by different proxies for the market value of companies, as firm value reflects the firm's ability to provide satisfactory returns to all stakeholders. Thus, 3 proxies are used to measure the market value of companies, aiming to provide greater robustness to the findings. The econometric models are constructed according to the general Equation (4) highlighted below.

$$ValorFirma_{it} = \beta_0 + \beta_1 HeterogeneidadeDívida_{it} + \beta_2 TAM + \beta_3 Div_{it} + \beta_4 Tang_{it} + \beta_5 Liq_{it} + \beta_6 Risk_{it} + \beta_7 Rent_{it} + \beta_8 Lev_{it} + \alpha_i + \alpha_t + \varepsilon_{it} \quad (4)$$

The dependent variable, , is represented by three different indicators: Tobin's Q, Price-to-Book (P/B) ratio, and Market-to-Book ratio. The explanatory variable, , is represented by three different proxies: HHI refers to the Herfindahl-Hirschman index; EXCL90 is equal to the debt specialization indicator, and NTYPE represents the debt specialization index.

Regarding the control variables: *Size* characterizes firm size; Div represents dividend distribution by companies; Tang characterizes tangibility; Liq represents the market liquidity of stocks; Risc refers to firms' systemic risk through the Beta index; Profit represents firms' profitability; Lev is equal to leverage.

The coefficient of interest in Equation (4) is denoted as . According to the proposed hypothesis, is expected to be significant, but the expected sign of the coefficient cannot be determined a priori and could be either positive or negative.

The variables included in the models are detailed in Table 1. Aiming to provide robustness to the findings, we used different proxies for the dependent, control and explanatory variables, in alternative econometric models.

Table 1
Dependent and Explanatory Variables

Dependent Variables	Code	Operationalization	Reference
Tobin's Q	*Tobin*	$q = \frac{\text{Market Value of Equity} + \text{Debt}}{Total\ Assets}$	Tobin (1969), Berger e Ofek (1995), Hennessy (2004), Jadiyappa *et al.* (2020)
Price-to-Book	*P/B*	Market Value of Equity to Book Value of Equity	Fama e French (1993), Jensen, Johnson e Mercer (1997), Hilliard e Zhang (2015)
Market-to-Book	*M/B*	Market Value of Total Assets to Book Value of Total Assets	Berger e Ofek (1995), Schlingemann *et al.* (2002), Albanez e Schiozer (2022)
Explanatory Variables	**Code**	**Operationalization**	**Reference**
Herfindahl-Hirschman Index	*IHH*	As presented in subsection 3.2	Colla *et al.* (2013), Giannetti (2019), Lou e Otto (2020), Platikanova e Soonawalla (2020)
EXCL90 Index	*EXCL90*	*Dummy equal to 1 for firms with more than 90% of debt concentrated in only one type, and 0 otherwise.*	Colla *et al.* (2013), Lou e Otto (2020), Platikanova e Soonawalla (2020)
Debt Specialization Index	*Ntype*	Categorical variable ranging from 1 to 7, representing the number of distinct debt categories of firms.	Platikanova e Soonawalla (2020)

Control Variables	Code	Operationalization	Reference
Size	*TAM_1*	Natural Log of Total Assets	Cameran e Campa (2020), Lin *et al.* (2019), Mansi *et al.* (2021)
	TAM_2	Natural Log of Total Revenues	
Dividend	*Div_1*	Dividends paid to Total Assets	Albanez e Schiozer (2022), Colla *et al.* (2013)
	Div_2	Dividends per share over share price	
Tangibility	*Tang*	Fixed Assets to Total Assets	Colla *et al.* (2013), Lou e Otto (2020), Platikanova e Soonawalla (2020)
Liquidity	*Liq*	Volume of shares traded in the year over total available shares	Batten e Vo (2019), Bekaert, Harvey e Lundblad (2007), Tran, Hoang e Tran (2018)
Risk	*Risk*	Market beta of the asset, which is equal to the slope coefficient of the linear regression between the annual return of the shares and the annual return of the market index (Ibovespa) for the last 60 months, calculated by Capital IQ.	Chen, Xu e Yang (2021); Lameira, Ness Jr e Macedo-Soares (2007); Peixoto (2012)
Profitability	*Rent_1*	EBITDA to Total Assets	Colla *et al.* (2013), Lou e Otto (2020), Platikanova e Soonawalla (2020)
	Rent_2	Net Income to Total Assets (ROA)	
Leverage	*Lev*	Total Debt to Total Assets	Cameran e Campa (2020), Mansi *et al.* (2021), Platikanova e Soonawalla (2020)

Notes: Total Debt is the sum of interest-bearing short and long-term liabilities; EBITDA represents earnings before interest, taxes, depreciation, and amortization; ROA refers to the Return on Assets, measured by the ratio of net income to total assets; the Market Value of Equity is defined as the sum of the quantity of shares multiplied by the price for each class of shares, obtained from Economatica; Debt is the book value of current liabilities minus current assets plus the book value of long-term debts; the Market Value of Assets is defined as Total Assets minus Book Equity plus Market Equity. Information regarding items from the financial statements of the companies and necessary for the elaboration of the main variables of the model was extracted from the Capital IQ database.

It should be noted that the choice of the fixed effects model with clustered robust standard errors, instead of the random effects model, is due to the theoretical premise of the latter model in which there is the assumption that there is no correlation between the unobserved heterogeneity of the regression and the remaining independent variables. According to Angrist and Pischke (2008), this assumption can be considered unrealistic in studies related to the finance field. Nevertheless, even though there is consensus in the finance literature about the greater adequacy of the fixed effects model, given its theoretical assumptions, the Hausman test is presented, which also confirmed the choice of the fixed effects model.

Additionally, the metric variables were winsorized at the 2.5% and 97.5% percentiles to mitigate the effect of outliers. The possible existence of multicollinearity problems was analyzed through correlation analyses between the explanatory variables.

4. Results

4.1 Descriptive Analysis

Table 2 presents the results of descriptive statistics for all the variables used in the models and for the variables used in the HHI measure.

Table 2
Summary statistics

Variables used in the models							
Variable	Observations	Mean	SD	Min	Max	Q25	Q75
TOBIN	1204	0,870	0,790	0,023	2,675	0,365	1,142
P/B	1204	4,503	4,765	0,023	8,731	0,232	3,895
M/B	1204	1,877	0,844	1,060	4,647	1,291	2,134
EXCL90	1204	0,278	0,443	0,000	1,000	0,000	1,000
NTYPE	1204	3,002	1,150	1,000	6,000	2,000	4,000
HHI	1204	0,582	0,261	0,111	1,000	0,380	0,817
SIZE_1	1204	7,270	15,831	0,026	22,722	0,554	4,758
SIZE_2	1204	11,161	20,517	0,118	31,684	1,061	9,284
DIV_1	1204	0,027	0,026	0,000	0,100	0,000	0,023
DIV_2	1204	0,435	0,994	0,000	5,272	0,000	0,382
TANG	1204	0,255	0,209	0,000	0,729	0,077	0,356
LIQ	1204	0,058	0,092	0,011	0,477	0,021	0,068
RISK	1204	0,589	0,620	-0,572	2,313	0,173	0,879
PROFIT_1	1204	0,097	0,085	-0,100	0,252	0,042	0,140
PROFIT_2	1204	0,193	0,149	-0,012	0,596	0,100	0,263
LEV	1204	0,315	0,187	0,019	0,718	0,188	0,427
Variables used in the HHI measure							
CP/TD	1204	0,009	0,024	0,000	0,026	0,003	0,014
DC/TD	1204	0,017	0,027	0,000	0,033	0,005	0,025
SBN/TD	1204	0,213	0,076	0,082	0,346	0,167	0,256
SUB/TD	1204	0,030	0,009	0,000	0,056	0,007	0,033
TL/TD	1204	0,667	0,115	0,521	0,932	0,624	0,789
CL/TD	1204	0,048	0,055	0,000	0,097	0,011	0,067
OTHER/TD	1204	0,017	0,047	0,000	0,093	0,007	0,035

Notes: The calculation of the variables used in the models was detailed in Table 1; CP/TD: Commercial paper divided by total debt; DC/TD: drawn credit lines divided by total debt; SBN/TD: Senior Bonds divided by total debt; SUB/TD: Subordinated Bonds divided by total debt; TL/TD: Term Loans divided by total debt; CL/TD: Capital Leases divided by total debt; OTHER/TD: debt not categorized in the previously described classifications divided by total debt.

Regarding the main results in Table 2, the values obtained for the main explanatory variables stand out. On average, the variable HHI had a value of 58.2%. According to Póvoa and Nakamura (2014), firms with heterogeneous debt structures tend to have this index below 70% in the Brazilian scenario. Therefore, it can be concluded that the companies in the sample tend to have greater debt heterogeneity. When comparing, the level of debt diversification within the Brazilian sample appears to be on par with, or even exceeds, that observed in developed economies. According to Colla *et al.* (2013), the average IHH in the US market is 0.70, whereas based on the findings by Lou and Otto (2020), the average IHH stands at 0.66.

Through the descriptive analysis, it is observed that the study's sample includes companies ranging from those with total concentration in a single debt type (HHI = 1) to firms with significantly heterogeneous third-party leverage, with indicators close to 0 (HHI = 0.11). It is also possible to note that the most used type of debt is term loans (such as working capital lines, fixed asset financing, credit operations provided by development banks, guaranteed accounts, and advance lines on exchange contracts) and senior bonds and notes issued in the domestic and international market.

To further analyze the degree of leverage of the listed firms in the country, an analysis of the Q25 and Q75 percentiles was carried out as part of the descriptive analysis. Descriptive statistics for the HHI variable indicate that in addition to the presence of companies with distinct and opposite levels of debt heterogeneity, there is a good distribution of the debt structure of the companies, with values of 0.38 and 0.82 for Q25 and Q75, respectively.

Considering that, by definition, the HHI variable has a minimum value of 0 and a maximum value of 1, and also that the values obtained for the Q25 and Q75 percentiles are reasonably distant and distributed over a reasonable portion of the variable's range, it can be observed that Brazilian firms use different levels and concentrations of debt by type. Therefore, despite the trend towards a more diversified debt structure in the sample based on the average HHI variable, the degree of heterogeneity is well distributed among Brazilian firms with no significant concentration.

Similarly, the explanatory variable NTYPE indicates that, on average, companies use approximately 3 different debt types to finance their activities. However, just as indicated by the HHI index, there are different degrees of heterogeneity in the sample. The categorical variable NTYPE can take values from 1 to 7, with a value of one (1) when the company has only one debt type and seven (7) when the firm uses all distinct forms of third-party capital financing.

Thus, based on the maximum value of six (6) obtained for the NTYPE variable, there are companies with high usage of different types of debt, but it is noted that there is no company in the sample that uses all seven (7) debt types detailed in the literature and available for capital raising in the Brazilian market. The minimum value of one (1) in the descriptive statistics indicates the presence of companies using only one debt type.

As found for the HHI index, Q25 and Q75 of the NTYPE variable, as well as the maximum and minimum values, indicate the absence of concentration in debt utilization by Brazilian publicly traded firms, with Q25 representing the use of 2 distinct sources of third-party capital and Q75 highlighting the use of 4 debt types.

Finally, it can be observed that only 28% of the companies have more than 90% of their debt concentrated in just one category, as indicated by the EXCL90 dummy statistics.

4.2 Panel Data Models Analysis

Tables 3 and 4 differ in the use of different proxies for control variables employed in the econometric model. In Table 3, the results were obtained using the first options for control variables: size_1, dividend_1, and profitability_1. Regarding the results found for the dependent variables, columns (1), (2), and (3) are associated with the estimations produced for the Tobin's Q proxy (TOBIN). Additionally, columns (4), (5), and (6) present the values for the Price-to-Book ratio (P/B), and the last columns, (7), (8), and (9), are related to the Market-to-Book ratio (M/B).

Columns (1), (4), and (7) represent the results of estimations with the Herfindahl-Hirschman (HHI) as the independent variable. In columns (2), (5), and (8), estimations are for the EXCL90 Index as the independent variable, and finally, columns (3), (6), and (9) present the results of estimations for the Debt Specialization Index (NTYPE).

Table 3

Regressão em Painel com Efeitos Fixos

	TOBIN			P/B			M/B		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
HHI	-0,042**			-0,053**			-0,039**		
	(0,072)			(0,079)			(0,075)		
EXCL90		-0,037*			-0,058***			-0,038*	
		(0,040)			(0,342)			(0,041)	
NTYPE			0,009**			0,027**			0,013**
			(0,020)			(0,172)			(0,021)
SIZE_1	0,142**	0,141**	0,143**	1,393***	1,352***	1,361***	0,125**	0,124**	0,124**
	(0,032)	(0,032)	(0,032)	(0,274)	(0,275)	(0,276)	(0,033)	(0,033)	(0,033)
DIV_1	4,692***	4,698***	4,700***	22,661***	23,049***	22,974***	4,858***	4,862***	4,846***
	(0,827)	(0,826)	(0,828)	(7,134)	(7,137)	(7,150)	(0,862)	(0,862)	(0,864)
PROFIT_1	2,651***	2,647***	2,658***	4,501*	4,642*	4,626*	2,935***	2,931***	2,940***
	(0,287)	(0,288)	(0,287)	(2,481)	(2,484)	(2,482)	(0,300)	(0,300)	(0,300)
TANG	0,979***	0,972***	0,967***	1,020	0,807	0,818	0,516**	0,512**	0,509**
	(0,209)	(0,209)	(0,208)	(1,805)	(1,801)	(1,801)	(0,218)	(0,218)	(0,217)
RISK	0,022	0,022	0,022	-0,071	-0,079	-0,079	0,022	0,021	0,021
	(0,024)	(0,024)	(0,024)	(0,206)	(0,206)	(0,206)	(0,025)	(0,025)	(0,025)
LIQ	0,899***	0,904***	0,893***	3,825**	3,677**	3,702**	1,014***	1,019***	1,012***
	(0,214)	(0,214)	(0,214)	(1,845)	(1,849)	(1,845)	(0,223)	(0,223)	(0,223)
LEV	-0,023*	-0,027*	-0,014*	-5,163**	-4,887**	-4,938**	-0,721**	-0,716**	-0,720**
	(0,148)	(0,148)	(0,148)	(1,279)	(1,281)	(1,282)	(0,155)	(0,155)	(0,155)
Observations	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204
R^2	0,749	0,749	0,749	0,848	0,847	0,847	0,756	0,756	0,756
R^2 Adjusted	0,695	0,695	0,695	0,815	0,814	0,814	0,704	0,704	0,704
F Statistics	13,87	13,86	13,83	25,85	25,80	25,78	14,41	14,44	14,39
p-value	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman Test									
Chi2	54,06	51,53	64,96	49,06	47,02	26,28	43,27	39,94	38,58
Prob>chi2	0,000	0,000	0,000	0,000	0,000	0,003	0,000	0,000	0,000

Notes: *p<0.1; **p<0.05; ***p<0.01; The calculation of the variables was detailed in Table 1.TOBIN: Tobin's Q indicator; P/B: Price-to-Book ratio; M/B: Market-to-Book ratio; EXCL90: Economic specialization index, calculated using a dummy equal to 1 when there is 90% or more concentration in a single debt type; NTYPE: Debt specialization index, developed from categorical variables ranging from 1 to 7; HHI: Herfindahl-Hirschman index, a proxy for debt structure heterogeneity; SIZE_1, equal to the natural logarithm of Total Assets; DIV_1: dividends, equal to the amount of dividends paid on total assets; TANG: tangibility; LIQ: liquidity; PROFIT_1: profitability, equal to EBITDA over total assets; LEV: leverage, equal to total debt over total assets.

Based on the coefficients presented in Table 3, two out of the three main variables of interest in the study, HHI and EXCL90, have negative and significant values with the proxies for the market value of Brazilian firms. In other words, the greater the homogeneity of debt, the lower the pricing of shares of the companies in the study. That is, companies with a higher degree of debt heterogeneity have a higher market value, highlighting the impact of using different forms of financing on the generation of value for companies.

For example, based on the regression estimators presented in Table 3, a reduction of 0.10 in the Herfindahl-Hirschman Index (HHI) is associated with an increase of 0.0042 in the market value calculated by the TOBIN proxy or an increase of 0.0053 by the P/B metric, and finally, an addition of 0.0039 to the M/B index. Similarly, from the data in Table 3, a negative relationship is also observed between the EXCL90 indicator and the market value of firms. This proxy represents the degree of specialization of companies in the use of different types of debt. According to the results obtained, when a company is overly dependent on a specific type of debt (EXCL90 = 1), on average, there is a reduction of 0.037 in its market value measured by the Tobin's Q metric. Using the P/B and M/B proxies, the same negative and significant relationship is observed. For example, companies with a high degree of debt homogeneity (EXCL90 = 1) decrease, on average, by 0.058 and 0.038 in their market value, respectively.

Finally, it is worth highlighting the independent variable NTYPE, as despite having the opposite sign to the others (HHI and EXCL90), according to the definition of this proxy, similar interpretations of the results are observed. NTYPE is composed of categorical variables with values ranging from one (1) to seven (7), being equal to one (1) when only one type of debt is used, and equal to seven (7) when all types of debt highlighted in this study are used. Thus, as the NTYPE variable estimators have positive and significant values, this means that an increase in debt heterogeneity is related to an increase in the market value of firms, a result consistent with the other heterogeneity proxies.

In summary, the results show that greater diversification of debt types used by companies is associated with an increase in market value, according to the results presented for all debt heterogeneity proxies.

The results in Table 3 are consistent with Kysucky and Norden (2016) and Platikanova and Soonawalla (2020), indicating a positive and significant relationship with firm value. According to Kysucky and Norden (2016) and Platikanova and Soonawalla (2020), companies with a more diversified debt profile have relationships with multiple creditors. Consequently, they gain greater negotiation power in obtaining credit, benefiting from better terms, rates, and durations, with can affect firm value.

Therefore, according to Bolton and Scharfstein (1996) and Colla *et al.* (2013), the findings in this study can be explained by the role of debt diversification in reducing bankruptcy costs. That is, the heterogeneity of debt and the presence of secured creditors can increase firm value, both by reducing the cost of capital and by facilitating financial restructuring processes.

Specifically in the Brazilian context, the evidence found by Eça and Albanez (2022) suggests that companies with heterogeneous debt profiles have lower credit costs. Therefore, considering that the cost of credit is relevant to the investment decision-making process of investors, firms with a more diversified debt profile have a higher market value than others.

From another perspective, the main results differ from the studies of Carletti *et al.* (2007) and Jadiyappa *et al.* (2020), as these authors present evidence found in other markets for a negative relationship between debt heterogeneity and firm value. The main argument for a negative association between variables highlights the possibility of reducing the effectiveness of monitoring companies using various debt types. Therefore, the lower efficiency of monitoring would occur due to the presence of free-riding creditors and the potential increase in coordination costs in the event of default in companies using a diversified debt structure. Thus, since such characteristics are relevant to investors' decision-making processes, the pricing of companies with more heterogeneous debt would be reduced.

Particularly in the Brazilian context, considering the characteristics of the Brazilian credit market, such as high banking concentration, the presence of subsidized credit lines, and interest rates above the world average, it is believed that there is a lower likelihood of free riders. According to Stigler (1974), group size is a relevant characteristic for observing free-riding behavior among group participants, the presence of a small private banking competition and the existence of BNDES (Brazilian Development Bank) provide a possible explanation for the results. Additionally, based on the evidence found by Harvey *et al.* (2004) and considering that in Brazil there is a concentration of relevant shareholder groups in the control of publicly traded companies, it is believed that there would be a lower propensity for free riding behavior.

Table 4 presents the results of the alternative econometric model, using other proxies for the control variables (omitted results): size2, dividends2, and profitability2. The model presents similar results to those in Table 3, indicating that greater diversification of the debt profile leads to a higher market value for Brazilian companies.

Table 4
Panel Regression with Fixed Effects (Alternative Control Variables)

	TOBIN			P/B			M/B		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
HHI	-0.043**			-1.238***			-0.032**		
	(0.074)			(0.614)			(0.077)		
EXCL90		-0.037**			-0.083**			-0.033**	
		(0.040)			(0.338)			(0.042)	
NTYPE			0.013**			0.139**			0.017*
			(0.020)			(0.170)			(0.021)
Observations	1.204	1.204	1.204	1.204	1.204	1.204	1.204	1.204	1.204
R^2	0.737	0.737	0.737	0.851	0.851	0.851	0.746	0.746	0.746
R^2 Adjusted	0.681	0.681	0.681	0.819	0.819	0.819	0.692	0.692	0.692
F Statistics	13.03	13.04	13.03	26.62	26.50	26.52	13.67	13.68	13.66
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman Test									
Chi2	34,45	36,85	41,78	43,57	41,71	39,02	47,25	53,22	15,01
Prob>chi2	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,008

Notes: *p<0.1; **p<0.05; ***p<0.01; The calculation of the variables was detailed in Table 1.TOBIN: Tobin's Q indicator; P/B: Price-to-Book ratio; M/B: Market-to-Book ratio; EXCL90: Economic specialization index, calculated using a dummy equal to 1 when there is 90% or more concentration in a single debt type; NTYPE: Debt specialization index, developed from categorical variables ranging from 1 to 7; HHI: Herfindahl-Hirschman index, a proxy for debt structure heterogeneity.

Therefore, in general terms, this means that changes in debt diversification levels lead to variations in the stock prices of publicly traded companies in Brazil, confirming the research hypothesis. Although there are divergent views on the impact of debt heterogeneity on firm value when using Agency Theory and free riding problems as a theoretical framework, the results indicate a positive and significant relationship between debt heterogeneity and firm market value in the different models tested.

In contrast to similar studies conducted in different credit markets (Carletti *et al*., 2007; Jadiyappa *et al*., 2020; Tripathy and Uzma, 2022), the estimated coefficients obtained have opposite signs to those found in the literature. Therefore, contrary to the values presented for the Brazilian market, there is no literature from other countries that points to a positive and significant relationship between debt heterogeneity and firm market value. Possible explanations may consider the specificities of the Brazilian market, such as the presence of few financial institutions, relevant concentration of shareholder groups in the control of publicly traded companies, the high relevance of subsidized credit lines, and the high cost of credit.

In addition to filling a less-explored area in the literature, the coefficients presented in this study bring relevant considerations for the decision-making process related to corporate finance. By exploring for the first time in Brazil the relationship between debt structure and firm market value, this study allowed for the comparison of results obtained in the national context with similar research conducted in other countries (Denmark, India, and Indonesia). Thus, it expands the discussions on the relevance of specific credit market characteristics in the choice of financing sources by companies.

5. Conclusions

The main objective of this work was to investigate the impact of debt diversification on the market value of non-financial Brazilian companies in the period 2010-2021, using a database composed of Brazilian companies listed on the Brazilian stock exchange. Panel data regression models were estimated, with the dependent variable represented by the market value of firms through three different proxies and the explanatory variables through three different heterogeneity indices, in addition to control variables specific to firms.

The main results indicate that an increase in debt structure heterogeneity is associated with an increase in the market value of Brazilian firms. Given the main analyses conducted and the prior literature, it is believed that, due to the specific characteristics of the local credit market, the association between debt diversification and firm market value differs from the negative relationship observed in other markets.

Despite the high degree of development of the credit market in Brazil, it is worth noting the following peculiarities of the national scenario: high banking concentration, significant participation of development banks through subsidized credit lines, relevant shareholders concentration and higher cost of credit compared to the global average. Taking these Brazilian characteristics into account, it seems there may be a reduced likelihood of free rider behavior in Brazil. The possible explanation for the results presented is based on the work of Stigler (1974), where the author states that the size of the group is directly associated with the existence of free-riding behavior. Consequently, creditors and investors are aware of the lower risks associated with monitoring and following firms when investing in Brazilian firms.

In general, the results highlight the role of firms' debt structure in the process of maximizing market value. Therefore, by presenting unprecedented empirical evidence in the country that differs from the results obtained in other markets regarding the relationship between debt structure and the market value of companies, this study will assist shareholders, managers, and investors in the decision-making process. Assuming that financing decisions are made to optimize the creation of value on invested capital, the use of a heterogeneous debt profile may mean maximizing the market value of companies in the Brazilian context.

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Earnings Management and Guidance: A Study on Brazilian Companies

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Abstract

Objective: This study investigates whether earnings management practices explain how Brazilian companies achieve disclosed guidance.

Method: The sample consisted of companies listed on Brasil, Bolsa, Balcão (B3 S.A.) from 2010 to 2020. These companies' forecasts (guidance) for accounting and performance indicators were collected and compared with actual figures, generating the variable error in achieving guidance. Earnings management levels were analyzed using accrual-based and operational activities.

Results: Regression analysis indicates that companies use accrual-based earnings management to meet disclosed guidance when projections exceed actual results. Conversely, when guidance falls below actual results, companies employ operational activity-based management.

Contributions: This study' adds to the discussion on guidance and earnings management by introducing a variable to capture the error in achieving disclosed guidance, highlighting its innovative contribution.

Keywords: Earnings Management; Guidance; Public Companies.

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1. Introduction

The quality of accounting information provided in financial statements possesses fundamental characteristics that enhance its value, with the primary purpose of offering stakeholders accurate data to safeguard their interests. However, measuring the quality of accounting information cannot rely on a single variable, as multiple attributes must be considered. The most frequently addressed attributes include relevance, persistence, conservatism, and earnings management (Barth, Landsman & Lang, 2008; Lopes & Walker, 2008; Almeida, Sarlo Neto, Bastianello & Moneque, 2012).

Earnings management is only possible because the current legislation allows managers to adopt criteria and practices known in the literature as accounting choices. Thus, the outcome, the main product of accounting information, may result from discretionary accounting adjustments.

In this context, managers can make accounting choices to maximize the wealth of all parties or opt for recognition/measurement criteria that do not necessarily reflect their companies' actual economic situation to achieve goals driven by personal motivations (Rodrigues, Melo & Paulo, 2019).

From this perspective, a manager may respond to what s/he assumes to be the behavior of investors and creditors toward reported profits, aiming to meet market expectations, even if the results merely reflect accounting structure. Thus, the feedback phenomenon influences the managers' choice of accounting practices (Hendriksen & Van Breda, 1999).

Thus, managers can steer accounting practices based on specific incentives alongside the discretion and subjectivity inherent in accounting choices. Guidance stands out as a stimulus particularly linked to the capital market. As highlighted by Souza, Sanches, Sbardellati, and Neumann (2018), guidance is a forward-looking information tool companies use not only to meet the capital market's demands for transparency but also to enhance trust and credibility among various stakeholders by disclosing relevant information about their current or future situation.

Managers may be encouraged to manipulate accounting numbers to achieve specific reference "targets," above or below the actual results obtained in the period, to meet the expectations of economic agents regarding guidance. In this context, Jaggi and Sannella (1995) and Kasznik (1999) investigated U.S. companies and found that managers are driven to manage results to align with their forecasts. According to Krishnan, Pevzner, and Sengupta (2012), disclosing projections (guidance) from the auditors' perspective increases the likelihood of earnings management.

Silva *et al*., (2016) and Souza *et al.,* (2018) analyzed the relationship between guidance and earnings management and found that Brazilian studies focus on the determinants of its disclosure and characteristics (Brandão, Assunção, Ponte & Rebouças, 2013; Brandão, De Luca & Vasconcelos, 2014; Folster, 2016).

Even though projections are associated with factors such as lower stock volatility, high confidence levels and proximity to market professionals, increased company coverage, stock prices closer to fair value, reduced cost of capital, and projection alignment (Hirst, Koonce & Venkataraman, 2008), there is a limited number of Brazilian studies analyzing the relationship between earnings management and the disclosure of guidance (Silva *et al.,* 2016; Souza et al., 2018). Furthermore, studies on earnings management are essential for monitoring the quality of accounting information.

Evidence of guidance disclosed by companies regarding accounting and performance indicators was compared with actual numbers, generating the variable "error in achieving guidance indicators." Next, we verified whether earnings management practices explain the companies' achieving guidance indicators. The literature also reports other variables that may explain the error in achieving guidance.

The methodological aspects listed above distinguish this study from those by Silva *et al.* (2016) and Souza *et al*. (2018), which investigate only the relationship between guidance disclosure and earnings management. This study further identifies how earnings management explains the disclosure and achievement of disclosed guidance.

Thus, the following guiding question was chosen to clarify the subject under study: Do **earnings management practices explain the achievement of guidance disclosed by Brazilian companies?**

This study is expected to contribute to academia and the market by providing empirical evidence on the practice of earnings management by Brazilian companies aiming to achieve the disclosed guidance.

The results may also serve as a report for companies and regulatory bodies, such as the Brazilian Securities and Exchange Commission (CVM), by encouraging the publication of guidelines that limit the companies managing market expectations, curbing earnings management practices, and enhancing the quality of accounting information.

The Brazilian environment tends to be conducive to opportunistic practices, as contrary to developed markets, emerging markets like Brazil are characterized by political and economic instability and an institutional framework that offers low legal protection for minority investors (Martins & Barros, 2021). Thus, unlike the international studies previously mentioned, this study is expected to contribute to the literature by investigating earnings management practices within the Brazilian context.

This study's findings are expected to encourage academic reflection on how companies' forecasts influence expectations. The objective is to propose methods for companies to disclose forecasts compatible with their capabilities and reduce the incentives for engaging in earnings management practices.

Furthermore, this study innovates by linking earnings management to a dummy variable that indicates whether a company is suspected of managing its results to meet forecasts. This variable was adapted from Medeiros, Paulo, Melo, and Mota (2019), who investigated analysts' forecasts and compared the guidance disclosed by the companies with actual numbers. Methodologically, the procedure involved assessing whether the interaction between the suspicion dummy and earnings management practices explains Brazilian companies' achieving forecasts, enabling the identification of opportunistic practices.

2. Theoretical Framework

2.1 Earnings Management

Users of financial statements must be assured that the information a company reports, on which they base their decisions, is accurate and reflects the company's economic reality. Thus, statements should provide relevant information about an entity's economic and financial performance and position, supporting decision-making. Alfraih, Alanezi, and Alanzi (2015) identified relevance as one of the critical attributes of the quality of accounting information.

The quality of accounting information can be defined as the extent to which reported earnings faithfully represent a company's economic situation and the degree to which the results presented reflect basic accounting concepts (Mazzioni & Klann, 2018).

The quality of accounting information is a concept that can be measured through different variables, with five being the most common: relevance, persistence, conservatism, impression management, and earnings management (Barth, Landsman & Lang, 2008; Lopes & Walker, 2008; Almeida *et al.*, 2012).

According to Healy and Wahlen (1999), earnings management results from managers making specific accounting choices to influence stakeholders' interpretation of a company's performance or to achieve specific contractual targets based on accounting variables.

According to Gunny (2005), managers can use three categories of earnings management: fraudulent accounting, accrual management (by choosing accounting methods), and operational activities management (by making economic decisions). Note that, contrary to Gunny (2005), some authors argue that earnings management occurs within the limits of the law and that otherwise, it constitutes fraud (Dechow & Skinner, 2000; Martinez, 2001), which is defined by the National Association of Certified Fraud Examiners (1993) as the intentional act of deceiving stakeholders and causing them financial loss.

Operational activities management occurs when managerial decisions deviate from an entity's regular operations and are intended to achieve specific performance targets (Gunny, 2005; Roychowdhury, 2006; Paulo, 2007).

Operational decision management is also a way to manipulate accounting information to persuade users to believe that the company's financial goals were achieved during its operations.

Regarding the categories of earnings management, Martinez and Cardoso (2009) note that few studies focus on management from the perspective of operational activities. In Brazil, Cupertino et al. (2016) and Rodrigues, Paulo, and Melo (2017) stand out, but a substantial body of empirical research focuses on accruals management.

It is important to emphasize that discretion when using accruals is inherent to the accounting process, and accounting choices permeate business relationships (Araújo, 2019). Ideally, measurement and disclosure choices should be as faithful as possible to represent a company's actual context. However, whenever there are conflicts of interest between agent and principal, discretion allows managers to make personal judgments for purposes that do not necessarily provide an accurate and fair overview of a firm's economic, financial, or equity situation. Thus, a propensity for earnings management practices increases due to contractual, regulatory, and capital market-related incentives facilitated by a corporate context of informational asymmetry between managers and stakeholders (Baptista, 2008).

Capital market-related incentives involve the potential practice of earnings management through profit manipulation to impact a firm's value (Holanda, 2012). Such manipulation may reduce the stock price or maintain it at a high level (Baptista, 2008). Such incentives are associated with the pursuit of meeting targets and the expectations of analysts and investors—in other words, the company attempts to avoid disappointing the market (Baptista, 2008).

In this regard, one of the main profit targets managers aim to achieve is the analysts' forecasts (Degeorge, Patel & Zeckhauser, 1999). According to Yu (2008), these forecasts significantly influence investors' decisions. Paulo (2007) notes that for this reason, analysts' forecasts become one of the strongest incentives for earnings management.

Several studies have found evidence that companies that meet or exceed earnings from prior periods or analysts' forecasts achieve higher returns (Barth, Kasznik & McNichols, 2001; Myers, Myers & Skinner, 2007). Therefore, reporting earnings close to analysts' forecasts becomes a goal for managers and other market participants (Medeiros et al., 2019). Thus, managers may be encouraged to manipulate accounting figures to meet analysts' forecasts (Martins, Paulo & Monte, 2016; Zhang, Perols, Robinson & Smith, 2018).

Like analysts' forecasts, the company's management prepares projections about its future performance using quantitative and qualitative information, which may include accounting values, production volumes, and other metrics referred to as guidance. A guidance report signals to the market a performance level intended to be achieved as the company shows its willingness to commit to this target before shareholders. Thus, its manager assumes responsibility for generating sufficient cash flow to meet these commitments, including those related to the capital market.

Similarly to analysts' forecasts, as the company discloses its guidance, managers may be incentivized to manipulate accounting figures to meet specific reference "targets," which may be above or below the actual results for the period. Meeting market expectations by achieving disclosed projections can maximize their well-being and/or the firm's value. Thus, managers may be motivated to manage earnings to obtain expected returns, whether for themselves or the firm.

2.2 Guidance

The term guidance is a simplified form of earnings guidance and, according to Mahoney (2008), refers to a company's forecast of specific financial results or figures. Guidance may include revenue projections, cash flow, profit margins, or expectations regarding capital expenditures and other value drivers. It is disclosed to external users and provides quarterly and/or annual forecasts of corporate value drivers, typically issued by publicly traded companies with shares listed on stock exchanges.

Companies disclose forecasts to achieve returns through reduced stock price volatility and increase market value. Souza *et al.* (2018) note that these projections impact the capital market, affecting stock prices and the cost of capital. Brennan and Merkl-Davies (2013) argue that companies intentionally manage the content of their guidance reports when communicating with the financial market to influence stakeholders.

Guidance disclosure is optional in Brazil, but the companies choosing to do so must include it in the Reference Form, an increasingly more common practice in recent years. Note that if a company decides to disclose guidance, it must ensure equal disclosure for all investors.

Brandão *et al.* (2014) investigated the characteristics of guidance disclosed by the largest publicly traded companies (by market value in 2011). They found that 44.8% of the companies disclosed forecasts, with 38.5% also analyzing previous forecasts.

Arantes, Dias, and Soares (2020) analyzed the effects of guidance disclosure on corporate behavior and evaluated the sectors and companies listed on B3 from 2010 to 2017. The results indicate that forward-looking information can influence stakeholders, with 39% of the companies disclosing guidance, a practice more common in regulated sectors. Additionally, they found a predominance of qualitative reports.

Unlike earlier researchers, Silva et al. (2016) sought to examine whether Brazilian companies that disclosed guidance in 2014 managed their earnings more intensively than those that did not. They found evidence that companies disclosing guidance engage in earnings management more intensively than their counterparts not disclosing guidance.

From the same perspective, Souza *et al.* (2018) investigated whether guidance disclosed by companies listed in the Ibovespa index influences earnings management through accounting choices involving discretionary accruals. The study's sample included 43 companies with shares listed in the Ibovespa index between 2011 and 2016. The results indicated that guidance disclosure influences earnings management when the projections include variables related to financial performance (profits or EBITDA).

Studies addressing Brazilian companies have found evidence of varying levels of earnings management between companies that disclose guidance and those that do not (Silva *et al.*, 2016; Souza *et al.*, 2018).

Analyzing the relationship between earnings management and guidance disclosure, Kraft, Lee, and Lopatta (2014) investigated whether companies are more likely to meet their projections by using discretionary accruals when insiders (CEO, CFO, and COO) plan to buy or sell their shares. The authors found that higher levels of earnings management are associated with an increased likelihood of meeting the disclosed guidance.

Lin, Radhakrishnan, and Su (2006) investigated whether managers use earnings management and guidance to meet market analysts' expectations. They found that conservative guidance disclosure combined with positive discretionary accruals increases the likelihood of meeting or exceeding analysts' earnings forecasts. Athanasakou, Strong, and Walker (2008) analyzed companies in the United Kingdom and obtained comparable findings.

In the same vein, Zhang *et al.* (2018) examined the use of earnings management (through accruals and actual activities) and guidance. They found that companies meeting analysts' forecasts over a short period tend to manipulate their results through accruals. In contrast, companies that meet forecasts over a more extended period use both types of management, with earnings management through accruals being even more intense.

Athanasakou *et al.* (2008), Silva *et al.* (2016), Zhang *et al.* (2018), and Souza *et al.* (2018) support the findings of Lin *et al.* (2006). They argue that managers engage in earnings management to meet forecasts of future performance, fulfill analysts' expectations, and achieve positive results or targets that lead to higher compensation for managers.

Jaggi and Sannella (1995) and Kasznik (1999) investigated U.S. companies and found that managers are encouraged to manage earnings to meet their own forecasts. According to Krishnan et al. (2012), who analyzed the auditors' perspective, the disclosure of projections (guidance) is associated with a higher propensity for earnings management.

The studies by Jaggi and Sannella (1995), Lin et al. (2006), Athanasakou et al. (2008), Krishnan et al. (2012), and Zhang et al. (2018) in the international context, and by Silva et al. (2016) and Souza et al. (2018) in Brazil show that managers are encouraged to achieve specific targets to meet market expectations. Additionally, the disclosure of guidance possibly drives earnings management practices, as managers might use accounting choices to present established targets or reduce earnings variability, thereby conveying a lower perception of risk. Based on this premise, this study proposes the following hypothesis:

Research Hypothesis: **Brazilian companies adopt earnings management practices to achieve the disclosed guidance.**

Thus, managers are motivated to make accounting choices that aim to manage earnings and avoid or smooth projection errors after guidance disclosure. Guidance is one of the market-related incentives for intensifying earnings management practices.

3. Method

This is a quantitative study, as statistical techniques are used to analyze data (Richardson & Peres, 2008); descriptive, because it describes the characteristics of a specific population or phenomenon or to establish relationships between variables (Gil, 2010); and documentary, considering that it relies on content disclosed in the annual reports and specific forms of the sampled companies.

The sample included companies listed on B3 from 2010 to 2020. A total of 399 companies were analyzed, yielding 4,389 observations. One hundred and five companies disclosed earnings guidance in at least one fiscal year, while 274 did not.

Initially, we verified whether the companies had disclosed guidance. Next, companies that disclosed guidance were assigned to a group and those that did not were assigned to another group. Finally, the disclosure of guidance was verified in the first group.

Consequently, guidance disclosed by the companies regarding accounting and performance indicators was collected, including EBITDA (i.e., EBITDA data, adjusted EBITDA, EBITDA margin, and adjusted EBITDA margin), net income, operating cash flow, and net revenue. These variables were selected based on Folster (2016) and Souza *et al.* (2018), where these indicators were used as metrics for calculating guidance. Table 1 provides an overview of the guidance disclosed for these variables by the companies in the sample.

Table 1
Guidance disclosure according to the study variables

Disclosure	No. of companies	No. of observations
EBITDA	30	114
Net Revenue	34	121
Net Income	8	21
Operating Cash Flow	3	8

Source: developed by the authors

Thirty out of 125 companies that disclosed guidance between 2010 and 2020 provided guidance on EBITDA, while 34 disclosed projections for net revenue, 8 for net income, and 3 for operating cash flow. The remaining companies did not provide any guidance or disclose other indicators.

Note that of the 691 observations from companies that disclosed guidance during the period, 114 refer to EBITDA, 121 refer to net revenue, 21 refer to net income, and eight refer to operating cash flow. The remaining did not disclose guidance nor cover other indicators.

Next, the error in achieving the guidance disclosed by the companies in the sample was estimated by adapting the methodology used by Martins *et al.* (2016), Mota *et al.* (2017), and Medeiros *et al.* (2019), who assessed the achievement of analyst projections. The error in achieving the disclosed guidance consists of comparing the projected value of the variable with its actual value and determining how much the guidance deviated from the actual outcome. The operationalization of this variable is presented in Table 2.

Next, as done by Mota *et al.* (2017) and Medeiros et al. (2019), the levels of earnings management were assessed according to accounting choices and operational decisions using the Modified Jones model (1995), Pae model (2005), Paulo model (2007), and Roychowdhury model (2006). The first three models were used to estimate discretionary accruals, and the latter to measure the management level through operational decisions.

The Modified Jones model (1995) controls the effect of changes in a company's economic circumstances on accruals and reduces increases in accounts receivable due to variations in sales. The model proposed by Pae (2005) enhances the predictive power of the Jones and Modified Jones models by including variables that represent operational cash flow and the natural reversal of prior accruals (Paulo, 2007). According to Rodrigues, Melo, and Paulo (2018), the model by Paulo (2007) addresses the theoretical issues found in previous models (Sectorial, Jones, Jones Forward-Looking, KS, Pae), aiming to correct them; the reason why it was adopted in this study. Note that the model by Paulo (2007) controls the effects of cash flows, earnings, accrual reversals, the non-linearity of accounting conservatism, and the economic sector.

The Roychowdhury model (2006) made a significant contribution to research in the United States related to operational manipulations by providing evidence of operational activity manipulation through abnormal levels of operating cash flow (CFO), discretionary expenses (DESP), and production costs in the capital markets of that country (PROD). These estimated values also form an aggregated measure used in this study, REM1, representing the estimation errors of production costs and operating expenses. This measure indicates that firms with higher REM1it use operational decisions to present results that exceed their actual value.

Given the need to study a set of companies over a specific period, regression analysis with panel data was used for hypothesis testing. This analysis assumed a dependent relationship in which the error in achieving the disclosed guidance (dependent variable) is influenced by the level of earnings management (independent variable). Due to a lack of data for some companies between 2010 and 2020, the samples addressed form an Unbalanced Panel.

The models used the error to achieve the guidance for two dependent variables: EBITDA and net revenue. The other variables—net income and operating cash flow—were excluded from the regression analysis due to a lack of statistically significant observations.

Control variables that involve financial performance and specific characteristics, such as size (TAM), return on assets (ROA), leverage (ALAV), issuance of American Depositary Receipts (ADR), audit firm (BIG4), and corporate governance level (GOV) were used. These variables are commonly used in studies on earnings management (Roychowdhury, 2006; Paulo, 2007; Cupertino *et al.*, 2016; Paulo & Mota, 2019) and guidance (Brandão *et al.*, 2013; Brandão *et al.* 2014; Macedo Neto, Vasconcelos, De Luca & Figueirêdo Júnior, 2014; Folster, 2016; Souza *et al.*, 2018).

Equation 1 represents the general model adopted in this study.

$$ERROR_{it} = \beta_1 + \beta_2 GR_{it} + \beta_3 Dummy_SUS_{it} + \beta_4 Dummy_SUS_{it} x\ GR_{it} + \beta_5 Dummy_ADR_{it} + \beta_6 Dummy_BIG4_{it} + \beta_7 Dummy_GOV_{it} + \beta_8 TAM_{it} + \beta_9 ROA_{it} + \beta_{10} ALV_{it} + \varepsilon it \quad \textit{(Equation 1)}$$

Table 2 lists the variables used in the model and presented in Equation 1.

Table 2
Study variables

Type	Description	Acronym	Expected sign	Operationalization	Reference
Dependent	Error in achieving the disclosed guidance	ERROR	–	(VARPrevisto – VARReal / |VARPrevisto|)	Martins *et al.* (2016); Medeiros *et al.* (2019); Mota et al. (2017)
Independent	Earnings management level	GR	–	Modified Jones (1995) Pae (2005) Paulo (2007) Roychowdhury (2006)	Dechow, Sloan and Sweeney (1995); Souza *et al.* (2018); Viana Júnior, Domingos and Ponte (2017)
Control	Return on Assets (ROA)	ROA	–	EBITDA/Net Income	Folster (2016); Macedo Neto *et al.* (2014); Souza et al. (2018)
Control	Financial leverage	ALV	–	Passive/Active	Sousa *et al.* (2018)
Control	Company's size	TAM	–	Natural logarithm of market value	Souza *et al.* (2018)
Control	ADR Issuance	ADR	–	1, if the company is listed on a foreign stock exchange 0, otherwise	Macedo Neto et al. (2014)
Control	Audit Firm	BIG4	–	1, if the company is audited by Ernest & Young, Deloitte, PwC, or KPMG 0, otherwise	Zhang *et al.* (2018)
Control	Corporate Governance Level	GOV	–	Valor 1, if the company is listed on one of the differentiated levels of corporate governance at B3 0, otherwise	Macedo Neto et al. (2014)
Independent	Dummy_Suspeita	Dummy_SUS	–	1, if achievement of guidance is between -5% and 5% 0, otherwise	Medeiros *et al.* (2019)

Source: developed by the authors.

Data were processed using Excel, Stata, and SPSS.

4. Results

Table 3 presents some descriptive statistics for the operational variables to provide a general understanding of the sample's nature.

Table 3
Descriptive statistics

Variable	No. of observations	Mean	Standard Deviation	Coeficiente de variação	Mínimo	Mediana	Máximo
ERROR	183	0.0565	0.1367	2.4193	-0.1554	0.0201	0.3906
Tam	151	13,5227	1,8213	0,1346	9,0742	13,8860	15,7454
ROA	136	3,3219	3,1882	0,6559	0,4287	2,1798	12,2639
Alav	177	0,6329	0,1780	0,4969	0,2909	0,6267	1,0235
Dechow *et al.* (1995)	161	0,0006	0,0539	87,8004	-0,1011	0,0078	0,0941
Pae (2005)	174	0,0014	0,0379	270,5057	-0,0847	0,0061	0,0642
Paulo (2007)	174	0,0002	0,0083	43,6965	-0,0152	-0,0008	0,0178
PROD	174	-0,0037	0,0473	-127,9765	-0,0899	0,0013	0,0848
DESP	176	0,0001	0,0138	124,7807	-0,0276	0,0004	0,0230
REM1	174	-0,0007	0,0510	-74,9316	-0,1030	0,0017	0,0824

Source: developed by the authors

Regarding the ERROR variable, Table 3 shows that, on average, companies deviate by 5.65% when guidance is compared with the actual results. Thus, on average, companies achieve 94.35% of the guidance reported in the Reference Form. However, some companies show figures that are far from expected, as reflected in the maximum and minimum values highlighted in the table.

Regarding the dummy variables, almost half of the companies achieve the disclosed guidance (DummySusp), and less than 16% are ADR issuers (DummyADR). Meanwhile, most companies are audited by Big Four firms (DummyBIG4) and are listed in differentiated segments (DummySegList).

The variables Size (TAM) and ROA exhibit high standard deviations relative to the mean, indicating a heterogeneous sample, with variables varying significantly across companies. On the other hand, the Leverage (ALAV) variable does not show the same level of variation. Souza *et al.* (2018) obtained similar results.

Note that the proxies for earnings management are the variables with the lowest standard deviations and means within the range discussed by other authors, such as Medeiros *et al.* (2019) and Paulo and Mota (2019). They identify the standardization of accounting practices and capital market regulation as limiting factors for financial result manipulations. As a result, these variables show lower data variability around the mean.

Consequently, the normality test showed a non-normal distribution. Thus, Spearman's non-parametric correlation is recommended for the analysis (Levin & Fox, 2004). Table 4 presents the Spearman correlation matrix for the study variables.

Table 4

Spearman's Correlation Matri

Variable	ERROR	Dummy Susp	Dummy Adr	Dummy Big4	Dummy SegList	TAM	ROA	ALAV
ERROR	1	**-0,3807**	-0,0741	**-0,1443**	**-0,2140**	**-0,3822**	0,0327	**0,1917**
DummySusp	**-0,3807**	1	0,0207	0,1148	**0,1821**	**0,2841**	-0,1237	**-0,2532**
DummyAdr	-0,0741	0,0207	1	0,0496	**0,1520**	**0,3473**	0,0717	**0,1706**
DummyBig4	**-0,1443**	0,1148	0,0496	1	-0,0055	**0,3048**	**-0,1688**	**-0,3123**
DummySegList	**-0,2140**	**0,1821**	**0,1520**	-0,0055	1	**0,4708**	0,0017	**-0,2875**
TAM	**-0,3822**	**0,2841**	**0,3473**	**0,3048**	**0,4708**	1	-0,0593	**-0,3764**
ROA	0,0327	-0,1237	0,0717	**-0,1688**	0,0017	-0,0593	1	**0,3840**
ALAV	**0,1917**	**-0,2532**	**0,1706**	**-0,3123**	**-0,2875**	-0,3764	**0,3840**	1
Dechow *et al*. (1995)	-0,0044	0,0784	0,0331	0,0350	0,0659	0,1404	**0,1595**	**-0,1583**
Pae (2005)	-0,0520	0,1154	0,0122	0,0762	0,1050	0,1268	0,0482	**-0,2421**
Paulo (2007)	-0,0618	-0,0110	**0,1403**	0,0171	**-0,1423**	0,0393	0,0220	-0,0566
PROD	**0,2081**	0,0289	0,0689	-0,0710	-0,0263	0,0025	0,0763	**0,2091**
DESP	-0,0734	0,1838	0,0651	0,0683	0,1928	**0,2457**	-0,1377	**-0,2723**
REM1	**0,1891**	0,0718	0,0818	-0,0429	0,0376	0,0729	0,0465	**0,1260**

Continuation...

Variable	Dechow *et al.* (1995)	Pae (2005)	Paulo (2020)	PROD	DESP	REM1
ERROR	-0,0044	-0,0520	-0,0618	**0,2081**	-0,0734	**0,1891**
DummySusp	0,0784	0,1154	-0,0110	0,0289	0,1838	0,0718
DummyAdr	0,0331	0,0122	**0,1403**	0,0689	0,0651	0,0818
DummyBig4	0,0350	0,0762	0,0171	-0,0710	0,0683	-0,0429
DummySegList	0,0659	0,1050	**-0,1423**	-0,0263	0,1928	0,0376
TAM	0,1404	0,1268	0,0393	0,0025	**0,2457**	0,0729
ROA	**0,1595**	0,0482	0,0220	0,0763	-0,1377	0,0465
ALAV	**-0,1583**	**-0,2421**	-0,0566	**0,2091**	**-0,2723**	**0,1260**
Dechow *et al.* (1995)	1	**0,6941**	**0,3502**	0,1292	**0,1470**	**0,1570**
Pae (2005)	**0,6941**	1	**0,3098**	-0,0510	**0,2144**	0,0021
Paulo (2007)	**0,3502**	**0,3098**	1	**-0,1581**	-0,0062	**-0,1510**
PROD	0,1292	-0,0510	**-0,1581**	1	0,0884	**0,9500**
DESP	**0,1470**	**0,2144**	-0,0062	0,0884	1	**0,3670**
REM1	**0,1570**	0,0021	**-0,1510**	**0,9500**	**0,3670**	1

Legend: values in bold indicate statistical significance.

Source: developed by the authors

First, it is worth noting that no high correlation was found, which reduced the likelihood of linearity among the variables. As expected, the correlations in Table 4 show that the variables ERROR and DummySusp showed a negative and significant correlation. This result aligns with the notion that if the error falls between -0.05 and 0.05, the company is suspected of managing results to meet the disclosed guidance. In this sense, the smaller the ERROR variable—indicating that actual guidance is closer to the disclosed guidance—the more likely the company is suspected of managing results to achieve the target. A negative and significant correlation was also found between the ERROR variable and the variables DummyBIG4, DummySegList, and SIZE, suggesting that the engagement of specific audit firms, participation in differentiated corporate governance segments, and company size are correlated with the degree of "accuracy" in guidance disclosure. Furthermore, the ERROR variable showed a positive and significant correlation with the LEV variable, indicating that more indebted companies are more prone to deviate from projections. Regarding the variables PROD and REM1, a positive and significant correlation was found, suggesting that the error in achieving the disclosed guidance is explained by management through operational decisions.

Similar to what was found for the ERROR variable, the DummySusp variable showed significant coefficients with the variables DummySegList, SIZE, and LEV, but with opposite signs. Such results suggest that companies participating in differentiated listing segments, larger companies, and less indebted companies tend to disclose more accurate projections.

The discretionary accruals estimated by the models of Dechow et al. (1995), Pae (2005), and Paulo (2007) are positively and significantly correlated. Additionally, discretionary accruals are positively correlated with DummyADR and negatively correlated with ROA and LEV. A comparison of these findings with those of Souza et al. (2018) shows similar results in terms of significance and the sign of the ROA variable and only similar significance for the LEV variable.

Panel data regression analysis was used to test the hypothesis. It allows for the examination of a set of companies over a specific period, assuming a dependency relationship in which the error in achieving the disclosed guidance (dependent variable) is influenced by the level of earnings management (independent variable), as outlined in the methodology. The unbalanced panel minimizes sample survival bias, as a company must disclose the same indicator across all the years in the period.

The DummySusp variable was used to control for companies suspected of managing their results to meet forecasts. To strengthen the evidence in this study, an interactive variable, which combined DummySusp with the level of earnings management, was created. The significance of this variable represents the combined magnitude of suspicion and earnings management variables.

Additionally, the variables TAM, ROA, ALAV, Dummy ADR, Dummy Big4, and DummySegList were included in the model to enhance its predictive power by incorporating variables that may influence companies' efforts to achieve the disclosed guidance.

The Chow, Breusch-Pagan LM, and Hausman tests were conducted to determine the most appropriate model (fixed effects, random effects, or POLS). The Chow test compares the POLS model with the fixed effects model and rejects the POLS hypothesis. Subsequently, the Breusch-Pagan LM test, which contrasts the POLS model with the random effects model, also rejects the hypothesis of pooled regression (POLS). Finally, the Hausman test compared the fixed effects model with the random effects model, identifying the latter as the most suitable.

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Table 5

Regressions derived from the General model

General Model						
$ERROR_{it} = \beta_{1+}\beta_2 GR_{it} + \beta_3\, Dummy_SUSP_{it} + \beta_4\, Dummy_SUSP_{it}\, x\, GR_{it} + \beta_5 Dummy_ADR_{it} + \beta_6 Dummy_BIG4_{it} + \beta_7 Dummy_SegList_{it} + \beta_8 TAM_{it+}\beta_9 ROA_{it} + \beta_{10} ALAV_{it} + \varepsilon it$						
	Model 1	Model 2	Model 3	Model 4[1]	Model 5	Model 6
Variable	Coefficient					
Dechow *et al*. (1995)	0,0012					
Pae (2005)		-0,1013				
Paulo (2007)			-3,2709*			
Prod				1,2361**		
Desp					0,5349	
REM1						1,0705***
DummySusp	-0,0839***	-0,0967***	-0,0942***	-0,0648**	-0,0966***	-0,0989***
DummySusp x Dechow *et al*. (1995)	0,3006					
DummySusp x Pae (2005)		0,2117				
DummySusp x Paulo (2007)			5,2634*			
DummySusp x Prod				-1,1973*		
DummySusp x Desp					-0,1787	
DummySusp x REM1						-1,1350**
DummyAdr	0,0976	0,0886	0,0923	0,0500	0,0876	0,0990*
DummyBig4	-0,0872	-0,0424	-0,0192	-0,0275	-0,0396	-0,0242
DummySegList	0,0161	0,0058	-0,0103	0,0375	0,0003	0,0136
TAM	-0,0326**	-0,0297**	-0,0289**	-0,0109	-0,0309**	-0,0327***
ROA	-0,0016	-0,0004	-0,0003	-0,2164	-0,0003	0,0010
ALAV	0,2389	0,2458	0,2874**	0,4324**	0,2525*	0,2398*
Constant	0,2823	0,2979	0,2973	0,0015	0,3039	0,2848
Description						
Observations	108	120	120	110	120	120
Prob > chi2	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
R^2 overall	0,5239	0,5124	0,5295	0,4944	0,5135	0,5736

Legend: (*) Significant at 10*; (**) Significant at 5%; (***) Significant at 1%.

The number of observations was reduced because, unlike other models, the Modified Jones Model, used to estimate accruals, incorporates accounts receivable data, affecting the final number of observations.

Model 4: Only observations of errors in achieving the disclosed guidance for the EBITDA variable were considered, as earnings management through operational decisions involving production levels would not impact net revenue.

Source: Developed by the authors

All models exhibit similar levels of explanatory power, with the lowest and highest explanatory power found in those where the level of earnings management was estimated using the Prod model (R^2 = 49.44%) and REM1 (R^2 = 57.95%), respectively.

Note that the variables DummySusp and TAM showed significant coefficients with negative signs in all models except the Prod model. As expected, this result for DummySusp aligns with the findings in the Correlation Matrix, as DummySusp is derived from ERROR. When ERROR falls between -5% and 5%, the company is considered suspect, and "1" is assigned. If the company is classified as non-suspect, "0" is assigned. As outlined in the methodology, the pursuit of new investments, the complexity of operations, and the need to convey stability and transparency prompt larger companies to strive to meet their disclosed guidance, thereby showing fewer errors in their projections.

Only two variables were significant at the 5% level and with the expected signs— DummySusp and TAM— in Models 1 and 2, where discretionary accruals were respectively estimated according to Dechow et al. (1995) and Pae (2005).

Significance was found in Model 3 for discretionary accruals estimated using Paulo's (2007) model, DummySusp, DummySusp x Paulo (2007), and the control variables TAM and ALAV. The accruals estimated by Paulo's (2007) model showed a negative and significant coefficient at the 10% level, indicating that companies manage their earnings through accounting choices to meet the disclosed guidance. Furthermore, reinforcing this finding, the interactive variable was also significant at the 10% level.

These results indicate that the disclosure of guidance drives the practice of earnings management, as managers use accounting choices to meet established targets or reduce profit variability, thereby conveying a lower perception of risk to the market. This finding aligns with the studies of Lin *et al.* (2006), Athanasakou et al. (2008), Silva, Pinto, and Paulo (2016), Zhang *et al.* (2018), and Souza *et al.* (2018). Thus, the disclosure of projections (guidance) represents a greater propensity for earnings management (Krishnan *et al.*, 2012).

The significance and signs expected for the DummySusp and TAM variables have already been discussed. Contrary to expectations, variable ALAV showed a significant coefficient at the 5% level with a positive sign, suggesting that leveraged companies tend to project unrealistic outcomes and fail to meet projections. These companies might be motivated to disclose optimistic projections to attract capital and/or pessimistic projections to surprise the market with positive results.

Significance was found in Model 4 for abnormal production levels, DummySusp, DummySusp x Abnormal Production Levels, DummyADR, and the control variable ALAV. Abnormal production levels showed a positive and significant coefficient at 5%, indicating that companies manage their earnings through operational decisions. Furthermore, reinforcing this finding, the interactive variable was significant at 10%. While the coefficient for accrual-based earnings management was negative, it was positive for management through operational decisions, and the interactive variables were significant in both models. This indicates that companies use accrual-based earnings management when projections exceed actual results to meet disclosed guidance. However, companies resort to operational activity management when the guidance is below actual results.

The significance and signs expected for DummySusp, TAM, and ALAV were already discussed for most models. The DummyADR variable showed statistical significance at 10%; however, its sign, like ALAV's, differed from the expected. Nevertheless, the results of ADR-issuing companies suggest that they tend to project values higher than what they achieve, driven by market expectations because they were included in a select group of companies.

Only three variables were significant at 10% and with the expected signs in Model 5, where the level of earnings management was estimated based on abnormal discretionary expenses: DummySusp and TAM, as well as ALAV, which had no expected sign. All of these variables already had their significance and expected signs discussed previously.

Finally, significance was found in Model 6 for the aggregate measure of abnormal production levels and discretionary expenses, DummySusp, DummySusp x Aggregate Measure, DummyADR, and the control variables TAM and ALAV. Abnormal production levels showed a positive and significant coefficient at 1%, indicating that companies manage their earnings through operational decisions. Furthermore, this finding is supported by the interactive variable, which was significant at 5%. However, its result is ultimately inconclusive due to a lack of significance for the abnormal discretionary expenses variable.

5. Final Considerations

This study aimed to investigate whether earnings management practices explain the achievement of disclosed guidance by Brazilian companies. Thus, actual figures were collected and compared with disclosed guidance, generating the variable error in achieving guidance. Next, whether earnings management practices explain the error in achieving guidance was verified, and other variables that may explain the error in achieving guidance were identified in the literature. The Modified Jones Model (Dechow et al., 1995), Pae (2005), Roychowdhury (2006), and Paulo (2007) models were used to measure earnings management practices.

The general objective was achieved by applying panel data analysis. The models' dependent variables were the error in achieving the guidance according to two metrics: EBITDA and net revenue. The hypothesis tested was that companies adopt earnings management practices to meet their forecasts. A dummy variable, DummySusp, was included to identify whether companies are suspected of using earnings management practices to meet their forecasts (guidance).

The discretionary accruals, estimated using Paulo's (2007) model, and the abnormal production levels, estimated using Roychowdhury's (2006) model, and the interactive variables with DummySusp, showed significant coefficients, indicating that companies manage their earnings to meet disclosed guidance. These results align with the findings of Lin *et al* (2006), Athanasakou *et al*. (2008), Silva *et al*. (2016), Zhang *et al*. (2018), and Souza *et al*. (2018). Furthermore, they reinforce the assertion by Krishnan et al. (2012) that the disclosure of guidance increases the propensity for earnings management practices. Thus, the study's hypothesis that Brazilian companies use earnings management practices to meet disclosed guidance was confirmed, and the study's general objective was achieved.

However, while the coefficient for accrual-based earnings management was negative, it was positive for operational decision-based management. This indicates that companies use accrual-based management to meet disclosed guidance when projections exceed actual results. Conversely, companies resort to operational activity management when guidance is below actual results. As Cohen and Zarowin (2010) noted, managers may employ multiple earnings management strategies depending on each choice's associated costs. According to Silva *et al.* (2016), operational decision-based management, which negatively impacts a company's future cash flows, entails higher long-term costs than accrual-based management. Additionally, accrual-based management is constrained by audits and internal controls. These results emphasize that studying a single type of earnings management in isolation may not lead to robust conclusions. These findings fulfill this study's second specific objective.

This study contributed to enriching the discussion on guidance and earnings management. It also proved that investors and regulatory and supervisory bodies in the Brazilian capital market should seek alternatives to detect and/or inhibit opportunistic managerial practices in companies. These efforts could involve promoting the disclosure of projections more aligned with the companies' capacities or curbing earnings management practices aimed at meeting disclosed guidance, which necessarily implies improving the quality of accounting information.

Furthermore, this study enriched the literature on the use of earnings management to meet disclosed guidance by considering (i) the limited availability of studies on earnings management and guidance, (ii) the inclusion of a variable to capture the error in achieving disclosed guidance, reinforcing this study's innovative nature, (iii) evidence of the trade-off between earnings management strategies employed by Brazilian companies, and (iv) the investigation of earnings management practices within the Brazilian context—an emerging market. These characteristics distinguish this study from studies conducted in developed countries.

This study's limitations include the reduced number of observations, which underscores the need for companies to advance their understanding of the actual value of disclosing guidance to the market. Furthermore, regulatory bodies have a role to play in fostering this understanding and facilitating such progress (Silva, 2019).

Finally, future studies should include additional models for estimating earnings management, use alternative variables to estimate the error in achieving disclosed guidance, and compare the Brazilian context with those of other countries.

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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.

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