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Optimistic tone of MD&A and the relationship with reduced sales revenues in times of crisis

Tom otimista do MD&A e a relação com a redução das receitas de vendas em períodos de crises

Tono optimista de MD&A y la relación con la reducción de ingresos por ventas en periodos de crisis

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Abstract
In times of crisis, companies may want to maintain their attractiveness by inducing users of accounting information through the tone of their financial reports. In this context, the study verified whether non-financial companies in the United States adopt an optimistic tone in their Management's Discussion and Analysis (MD&A) when they face reduced sales revenue in years of crisis. Considering a period from 2005 to 2022, the results of the diff in diffs regression with panel data indicated that in times of crisis, companies with reduced revenue tend to adopt an optimistic tone in their MD&A, suggesting that this tone may be a strategic response to revenue declines. This result is corroborated when considering two different samples: for medium-sized companies in the United States and Brazil. The research highlights the importance of analysts and investors monitoring financial data, in addition to MD&A analyses, especially in times of crisis, in order to reduce uncertainty in investment decisions. Furthermore, the discussion among regulators regarding the need for regulations that promote improvements in MD&A is ratified, as well as the need to control periods of crisis in determining the tone of financial reports released by companies.
Keywords: MD&A; Optimism; Text analysis; Crises

Resumo
Diante de crises, empresas podem querer manter a atratividade induzindo os usuários da informação contábil por meio do tom dos relatórios financeiros. Nesse contexto, o estudo verificou se as empresas não financeiras dos EUA utilizam um tom otimista no *Management's Discussion and Analysis* (MD&A) quando enfrentam redução das receitas de vendas em anos de crises. Considerando um período de 2005 a 2022, os resultados da regressão Dif-in-Dif com dados em painel indicaram que, na crise, as empresas com redução nas receitas tendem a adotar um tom otimista no MD&A, sugerindo que esse tom pode ser uma resposta estratégica às quedas de receita. Esse resultado é corroborado ao considerar duas amostras distintas: para médias empresas dos EUA e para o Brasil. A pesquisa ressalta a importância de analistas e investidores acompanharem os dados financeiros, além das análises do MD&A, principalmente em períodos de crise, de modo a reduzirem as incertezas nas decisões de investimento. Além disso, ratifica-se a discussão de reguladores quanto à necessidade de normativas que promovam melhorias no MD&A, bem como se evidencia a necessidade de controle de períodos de crise em determinantes dos tons dos relatórios financeiros divulgados pelas empresas.
Palavras-chave: MD&A; Otimismo; Análise de texto; Crises

Resumen
Ante las crisis, es posible que las empresas quieran mantener su atractivo induciendo a los usuarios de la información contable a través del tono de los informes. En este contexto, el estudio comprobó si las empresas no financieras estadounidenses utilizan un tono optimista en *Management's Discussion and Analysis* (MD&A) ante la reducción de ingresos por ventas en años de crisis. Considerando 2005 a 2022, los resultados de la

regresión Dif-in-Dif con datos de panel indicaron que, en la crisis, las empresas con reducción de ingresos tienden a adoptar un tono optimista en MD&A, sugiriendo que este tono podría ser una respuesta estratégica a la caída de los ingresos. Este resultado se corrobora al considerar dos muestras diferentes: para las medianas empresas de Estados Unidos y para Brasil. La investigación destaca la importancia de que analistas e inversores monitoreen los datos financieros, además de los análisis MD&A, especialmente en períodos de crisis, para reducir la incertidumbre en las decisiones de inversión. Además, se confirma la discusión de los reguladores sobre la necesidad de regulaciones que promuevan mejoras en MD&A, así como la necesidad de controlar los períodos de crisis en la determinación del tono de los informes financieros emitidos por las empresas.
Palabras clave: MD&A; Optimismo; Análisis de texto; Crisis

1 Introduction

Adverse external situations, whether economic or health-related, can affect the financial health of organizations, since they are generally not predictable events for the financial market. An example of this was the real estate crisis in the United States, which occurred in mid-2008, the main consequence of which was the default on real estate mortgages, leading to calamities such as the bankruptcy of Lehman Brothers, one of the largest investment banks in the world, (Malik & Makhdoom, 2016).

In response to these collapses, the Dow Jones Industrial Average index fell more than 500 points in September 2008, recording the largest daily decline of that decade (Rodini, 2023), and the effect of the crisis spread to other countries, having a global impact (Patelli & Pedrini, 2014).

Another example of crises are health crises. In 2020, the world faced the instability generated by Covid-19, which, according to data published by the White House (White House, 2022), estimated an 8.9% drop in US GDP in the second quarter of 2020, the largest quarterly drop in the index in 70 years. Trading Economics (2023) reported its first annual decline, with a negative GDP of 2.8% since the mid-2008 crisis, which resulted in a negative percentage of 2.6%.

Crisis scenarios are defined by Kuckertz et al. (2020) as rare events characterized by catastrophic impacts that go beyond the scope of business planning and resilience models developed by organizations. So much so that possible decreases in demand can negatively affect the growth of sales revenue, pressuring companies to seek external financing, resulting in higher-risk financial situations (Fuertes-Callén & Cuellar-Fernández, 2018). Despite this, companies may have incentives to disclose to the market that their business continues to be an advantageous option for investments.

In this sense, one way of disclosing accounting information occurs through financial reports, including the MD&A. The purpose of this report is to provide information on the company's short- to long-term economic and financial situation, from the perspective of managers (SEC, 2023). The importance of the MD&A is such that previous research indicates that it is the report most read by analysts and investors seeking to understand and analyze the perspectives raised by companies (Bochkay & Levine, 2019; Marshall, 1998).

Another point to highlight in the MD&A is the tone of the information disclosure. Zeng et al. (2022), Jiang et al. (2019) and Baker and Wurgler (2007) analyzed management sentiment in published reports, observing evidence that high positive sentiment can bring benefits to the company, such as attracting more attention from analysts, implying more optimistic earnings forecasts.

Another impact observed in the literature is the tendency of investors to follow managerial sentiment, leading to a speculative overvaluation of the market, which improves the company's image at that particular moment, but in the future, when the true economic fundamentals are revealed, there is a fall in stock prices (Jiang et al., 2019, Baker & Wurgler, 2007).

In addition, Hoberg and Lewis (2017) identified that the MD&A is a publication that is subject to manipulation, especially in situations that may have negative consequences for the company, such as during economic crises, when companies face difficulties in growth opportunities (Ferrando et al., 2017).

Periods of crisis can be an incentive for companies to seek ways to legitimize themselves by explaining unfavorable results (Zeghal & Aoun, 2016). This phenomenon can be explained by the theory of information asymmetry, with the insights of Stiglitz (1972), reinforced by Grossman and Hart (1980), in which they understand that the entity holds all the information about its business, and that the share price today depends on the expected price in the future, therefore, it is necessary to signal information to the market so that creditors and investors have an expectation of a positive return and continue investing in the entity.

In this sense, Hsu and Yang (2022) observed that at the time of the Covid-19 pandemic, the quality of financial reports of companies in the United Kingdom was lower, since companies managed their results more, in an attempt to show that despite the negative scenario, expectations were optimistic.

Previous research identified a relationship between the tone of companies' disclosures and periods of crisis. Hoberg and Lewis (2017) found evidence that managers, in fraudulent situations, disclose positive information about the company's performance. While Zhou et al. (2022), when analyzing the Chinese stock exchange, identified a more positive tone from management in responding to the impact of the COVID-19 pandemic, especially in cases where the company had a lower level of liquidity. Thus, there are indications

that the tone of companies' reports may be related to a maneuver to soften an adverse situation, emphasizing positive expectations rather than the real economic and financial situation.

Therefore, it was possible to develop a study that used more than one crisis period in the time window, considering the disclosures in the MD&A, given its importance as a source of information for investors (Bochkay & Levine, 2019). In addition, it is a report without required standardization, so managers can express their expectations and projections regarding the company, and therefore, it is prone to manipulation (Jiang et al., 2019; Hoberg & Lewis, 2017).

Therefore, this research sought to answer the following question: what is the relationship between the optimistic tone of the MD&A and the reduction in companies' sales revenues in the context of crises? Therefore, the general objective of the study was to identify the relationship between the optimistic tone of the MD&A and the reduction in sales revenue during the crisis period faced by US companies, from 2005 to 2022, covering before, during, and after the financial crisis of mid-2008 and the Covid-19 crisis of 2019.

The results suggest that companies with a drop in sales revenue during periods of crisis tend to publish more optimistic reports. In practical terms, this finding signals to investors, analysts, and other users of accounting information the importance of paying attention to the interpretation of these reports when there are economic scenarios under unfavorable circumstances.

Thus, the research contributes to regulatory bodies, including the International Accounting Standards Board [IASB] and the Securities and Exchange Commission [SEC], given the recurring discussion regarding the need for improvements and standardization in the disclosure of management comments (Srinivasan & Marques, 2017), in order to externalize reliable information to the market.

The research also provides a theoretical contribution regarding the determinants of tone in MD&A reports, adding evidence regarding the stance of companies in information disclosures in controversial situations, in which there are risks of low performance, since there is evidence in theory (Grossman & Hart, 1980; Stiglitz, 1972) and in previous research (Alshorman & Shanahan, 2022; Zhou et al., 2022; Hoberg & Lewis, 2017) that there is a positive association between disclosures and the company's interest in demonstrating to its users a favorable situation, even in crisis scenarios.

2 Theoretical Framework

Accounting information is useful for users' decision-making. Given its importance, the IASB revised the Conceptual Framework, which discusses the qualitative characteristics required for information disclosed to the market (IASB, 2018). This normative concern aims to prevent possible manipulation by management and contribute to a more appropriate representation of the entity's economic and financial situation.

In order for the information disclosed by companies to follow the qualities proposed in the Conceptual Framework, some elements must be present, such as relevance, materiality and faithful representation, which reinforces the idea of complete, neutral and error-free information (Pelger, 2020). These characteristics are the basis for information to be useful in the decision-making process (Azar et al., 2019).

In this context, one of the pieces of information issued by entities is the MD&A. This document is considered important for information users (Bochkay & Levine, 2019), as its content demonstrates managers' perspectives and projections for the company.

According to the SEC (2023), MD&A requirements are intended to provide relevant textual, historical, and prospective disclosures, allowing investors and other users to assess the financial condition and results of operations, with special emphasis on future prospects. Therefore, it serves as a way to advise external users (Hoberg & Lewis, 2017), assisting analysts in forecasting future earnings (Bochkay & Levine, 2019).

However, there is no standard that provides guidance on the preparation of the MD&A, but there are documents, such as the Exposure Draft, published by the IASB (2021), and Regulation S-K (item 303), issued by the SEC (2020), which aim to improve the scope and quality of the information disclosed, in order to strengthen connectivity between the company and its stakeholders (IASB, 2021).

In this context, corporate communication should be understood as a multifaceted process, in which different actors interact at different levels and contexts (Brennan & Merkl-Davies, 2018). Thus, greater connectivity can strengthen relationships with capital market participants, ensuring continued financial support. Therefore, the proposals of the IASB and the SEC, by improving the scope of the MD&A, can satisfy the informational needs of stakeholders, aligning with the recommendations for more integrated and interactive communication between the company and its stakeholders.

However, considering that companies are organized in a nexus of contracts, based on assumptions of Agency Theory (Jensen & Meckling, 1976), which foresees the possibility of opportunistic actions by managers in the interests of shareholders, there are strong incentives to believe that MD&A information conveys managers' impressions that do not necessarily reflect the company's reality. This is because managers can promote positive impressions in their management narratives, using strategies to attract and influence various stakeholders, including creditors and investors (Aly et al., 2018).

From a behavioral perspective, the optimistic tone in corporate disclosures can be seen as a reflection of managerial optimism (Merkl-Davies & Brennan, 2011), including when considering reports prepared by management. This tone can be influenced by intrinsic psychological tendencies of managers, who often tend to be overly optimistic (Davis et al., 2015). In this context, the optimistic tone tends to be considered as a proxy

for managerial optimism, suggesting that the way managers communicate company performance can be shaped by their own beliefs and expectations regarding the future (Ataullah et al., 2018).

In addition, the relationship between managers and users of accounting information tends to be permeated by information asymmetry. This condition can lead the company's administrator to manipulate the tone of the information disclosed (Zhang et al., 2022), influencing the users' perception. That said, even if the MD&A contains accurate data, when the tone is optimistic, it ends up minimizing situations that would be relevant for the decision-making of investors and other stakeholders (Zeng et al., 2022). This means that low quality in managerial comments increases the asymmetry between users and managers, affecting decisions (Lemeunier, 2021).

In this context, one trend is the low quality of the MD&A, which intends to soften the company's situation, through an optimistic text (Caserio et al., 2020), and even with the absence of negative information that could cast light on the company's current economic and financial reality.

However, there is a tendency for managers to seek to communicate and highlight to the market a favorable image about the company's prospects, signaling lower business risk (Castro et al., 2019), in addition to strategically influencing investors' perception (Bassyouny et al., 2022; Pouryousof et al., 2022). When information users are exposed to excessive positive feelings, they can have as a consequence a strong negative predictor of returns in the stock market (Zeng et al., 2022; Jiang et al., 2019).

More specifically, Hoberg and Lewis (2017) emphasize that MD&A may be susceptible to manipulation. This is consistent with what was identified by Hsu and Yang (2022) and Zhou et al. (2022); during the Covid-19 pandemic, companies with less liquidity presented a more positive tone or reduced the quality of their reports to avoid disclosing negative situations.

In addition, the study by Hilton and O'Brien (2009) had already shown that managers used positive biases in MD&A disclosures to soften a negative situation that the organization faced when making an investment and not having the expected results. This means that the use of an optimistic tone in MD&A may be predominant when the company is exposed to crisis conditions. This is because in these scenarios, there is a tendency for business growth to be negatively affected, increasing uncertainty regarding future expectations (Fuertes-Callén & Cuellar-Fernández, 2018; Shatonhoka, 2015).

In history, several crises have had negative impacts on companies, including the real estate crisis in the United States, which compromised the liquidity of investment funds, leading to an increase in government rates, making it impossible for creditors to pay off mortgages, resulting in bankruptcies of real estate funds and affecting the global economy (Rodini, 2023). In addition, there is the crisis caused by Covid-19, with negative economic impacts worldwide, with government restrictions on borders, causing a global recession (Nicola et al., 2020).

In these scenarios, managers can seek to maintain the disclosure of the company's good performance, using strategic resources, such as a positive tone in the communication of accounting information, with the purpose of projecting an optimistic image of the company to the market even in the face of adverse circumstances (Alshorman & Shanahan, 2022; Zhou et al., 2022; Hoberg & Lewis, 2017).

And, based on this foundation, considering the possibility of softening the possible negative effect of periods of crisis on the company's economic and financial situation, in terms of information, the following research hypothesis is proposed:

H_1: In periods of crisis, when the company experiences a reduction in sales revenue, the tone of the MD&A tends to be optimistic.

3 Methodology

3.1 Study delimitation and method

To select the sample, the study considered the list of companies belonging to the Fortune Global 500 in 2023, which includes the 500 largest companies in the world in terms of revenue (Marquez-Illescas et al., 2018) and with the best market performances (Malik & Makhdoom, 2016). Such characteristics encourage the analysis of the tone of managerial narratives in times of crisis, since these are companies that exert significance in capital market decisions, as suggested by previous research (Tailab & Burak, 2021; Patelli & Pedrini, 2014).

Of the total of 500 companies listed, the initial cut is made up of 136 US companies (Table 1), justified by the fact that US companies are recognized for adopting rigorous corporate governance practices, ensuring that they are among the best managed and responsible in the disclosure of information (Malik & Makhdoom, 2016).

Another point to be considered is the robust regulatory and enforcement system in the United States (Caserio et al., 2020), ensuring high standards of transparency and compliance, resulting in higher information quality. This also reduces the need to include additional control variables, commonly required in less developed markets, simplifying the analysis and increasing the accuracy of the results.

To ensure comparability of annual reports, this study analyzes the texts of companies with a fiscal year closing date up to December 31, 2022 and with a trading date stored by Refinitiv® prior to or equal to 2005. Therefore, 62 companies were excluded, some of which were in the financial sector, resulting in a final sample of 74 companies.

Table 1
Definition of the final sample

Procedures for selecting the final sample	Number of companies
Initial sample	136
(–) Financial	27
(–) Lack of accounting data and reports	35
(=) Final number of companies	**74**

Therefore, the study extends from 2005 to 2022, with emphasis on the following periods of crisis: the financial crisis of 2007 and 2008 and the Covid-19 crisis between 2020 and 2021. The sectors in the sample, as well as the number of companies that make up each one, can be seen in Table 2, showing that approximately 46% of the companies are part of the Industry sector.

Table 2
Number of companies per sector

Sectors	Companies	Sectors	Companies
Wholesale Trade	7	Other Services	1
Retail Trade	12	Health and Social Assistance	3
Construction	1	Hospitality and Food Services	1
Industry	34	Public Utility Services	1
Telecommunications	7	Professional Services	2
Mining, Oil and Gas	3	Transportation and Storage	2
TOTAL		**74**	

The economic and financial information and MD&A sections were collected annually from the Refinitiv® database, consisting of a final database of 1,332 observations. It is important to note that the MD&A sections were manually extracted from 10-K reports. This process involved mapping and splitting the corresponding pages.

To analyze the data, descriptive statistics of the variables were performed; Spearman's correlation, since the variables do not present a normal distribution; analysis of the assumptions of multicollinearity, with the VIF technique, autocorrelation with the Wooldridge test and heteroscedasticity using the White test; and econometric tests via the difference in differences (diff in diffs) regression technique with panel data, in which the Hausman test was also applied to define the fixed or random effect models. All tests were performed using the Stata® software.

3.2 Econometric Model and Definition of Variables

To analyze the effect of crises on the tone of the MD&A, the econometric model presented in Equation 1 was considered:

$$Optim_{i,t} = \alpha_0 + \beta_1 x Crisis_{i,t} + \beta_2 x VarRev + \beta_3 x Crisis*VarRev_{i,t} + \beta_4 x ROA_{i,t} + \\ + \beta_5 x Age_{i,t} + \beta_6 x Size_{i,t} + \beta_7 x Lev_{i,t} + \\ + \beta_8 x Persis_{i,t} + \beta_9 x Sectors_{i,t} + \varepsilon_{i,t} \quad (1)$$

In which:

$Optim_{i,t}$ = refers to the optimistic tone of MD&A, obtained through Diction7® software, which considers positive aspects of language, using terms with positive implications such as “pride”, “powerful”, “successful”, “wisdom”, etc., reducing terms related to difficulty, guilt, and denial, such as “bankruptcy”, “harmful”, “unemployment”, etc. This way of observing optimism was used by other studies (Du Toit & Delport, 2021; Du Toit & Esterhuyse, 2021; Oliveira et al., 2021; Alalwani & Mousa, 2020; Alli et al., 2018; Carsten et al. 2018; Pit t et al., 2018; Caylor et al., 2017; Iatrides, 2016).

$Crisis_{i,t}$ = dummy variable, representing 1 for the years of crisis and 0, otherwise. The periods of crisis considered were 2007, 2008, 2020, and 2021.

$VarRev_{i,t}$ = dummy variable, representing 1 when the variation of sales revenue is negative and 0, otherwise. Revenue variation was measured considering net sales revenue between t-1 and t (Alshorman & Shanahan, 2022; El-Deeb et al., 2022; Hsu & Yang, 2022).

$Crisis*VarRev_{i,t}$ = consists of moderation between periods of crisis and the reduction of net sales revenues, obtaining value 1 for the years of crisis in which the company recorded revenue reduction and 0, otherwise. Crisis times tend to negatively impact companies' sales, leading to significant financial challenges (Fuertes-Callén & Cuellar-Fernnández, 2018). In this context, companies with financial difficulties are more likely to adopt an optimistic tone in their MD&A reports as a strategic approach to information dissemination in order to mitigate negative perceptions or reassure investors (Caserio et al., 2020). Thus, although the tone of a MD&A may be a useful indicator about the company's financial situation, there is a tendency for this tone to be more optimistic during periods of crisis and falling sales revenues, due to the fact that the manager wants to maximize the value of the company and communicate positively with investors (Boudt & Thewissen, 2019).

$ROA_{i,t}$ = corresponds to the return on the assets. It is a variable used to predict company performance (Alshorman & Shanahan, 2022; Iqbal & Riaz, 2022; Aly et al., 2018; Tailab & Burak, 2018), measured by the relationship between profit before extraordinary items and average assets between the beginning and the end of the fiscal year, expressed as a decimal value (Alshorman & Shanahan, 2022; Boudt & Thewissen, 2019). Extraordinary items refer to events or transactions that are uncommon in the normal activity of a company, such as accounting changes, discontinued operations and their taxes from these transactions. A positive relationship with the optimistic tone of the reports is expected because, according to Caserio et al. (2020), in financially stable companies, MD&A's optimistic tone usually offers a precise indication of performance in the current year. In this sense, Patelli and Pedrini (2014) observed that the tone of managers is aligned with the company's past and future performance, as well as Alshorman and Shanahan (2022) who noticed a consistency between the tone used by CEOs in their letters to shareholders and financial performance of companies.

$Age_{i,t}$ = company age is measured by the difference between the year the company began to be listed on the stock exchange and the year of the annual reports (Yang et al., 2022; Yuan et al., 2022; Wu et al. 2021). Older companies have a long history of promoting management comments (Bradshaw et al., 2012), enabling the consistent tone of narratives. In addition, they are concerned about their reputation (D'Amato & Falivena, 2019; Muttakin & Khan, 2014; Diamond, 1989) and, while maintaining an optimistic tone on their MD&A, can communicate stability and confidence, attracting and retaining investors (Pouryousof et al., 2022). Therefore, a significantly positive relationship is expected.

$Size_{i,t}$ = company size was calculated by the natural logarithm of the total asset recorded at the end of fiscal year, with its original value in thousands of dollars (Alshorman & Shanahan, 2022; Aly et al., 2018; Zhou et al., 2022). Larger companies are associated with a higher level of results management in their financial reports (Hsu & Yang, 2022) and, because they are under greater attention from analysts and the public (Zeghal & Aoun, 2016), may be more likely to use positive words in their management narratives (Dutta et al., 2019). This approach can be a strategy for maintaining consistency in the tone of communications, aiming to mitigate negative perceptions and preserve investors' trust. Thus, a positive association between this variable and the optimistic tone is expected.

$Lev_{i,t}$ = company leverage, calculated by the division between the total liability and the total asset of the company (Alshorman & Shanahan, 2022; Zhou et al., 2022; Aly et al., 2018; Zeghal & Aoun, 2016). Leverage is a proxy for the company's risk (Koelbl, 2020). More leveraged companies tend to be perceived as riskier, more speculative and in financial difficulties (Ayuningtyas & Harrymawan, 2021; Jiang et al., 2019), and may be sensitive to market reactions (Ahmed & Elshandidy, 2020). In this context, they can be incentivized to present a more optimistic MD&A in order to maintain investor confidence (Pouryousof et al., 2022). Thus, a significantly positive relationship between the optimistic tone and leverage is expected.

$Persis_{i,t}$ = representative variable of profit persistence. Calculated by the standard deviation logarithm of a series of four previous years of companies' results. The purpose of the variable is to control possible effects from scenarios in which companies with a history of low persistence can have incentives to present an optimistic tone in the reports. The study dependent variable, therefore, is the optimistic tone of MD&A reports extracted from 10-K forms. This report contains the discussion of major management executives on past performance and future perspectives of the company (Li, 2008), and management may use narrative strategies to manipulate disclosed information, influencing investors and other stakeholders (Laskin, 2018). In addition, MD&A has often been used in past research (Pouryousof et al., 2022; Caserio et al., 2020; Aly et al., 2018).

$Sectors_{i,t}$ = binary variable that represents the category of each sector, suggesting that the results are not dominated by a single sector (Aly et al., 2018; Alshorman and Shanahan, 2022). The environment of the sector in which the company operates can be significantly affected due to crises (Zhou et al., 2022). The inclusion of this variable allows the observation of the relationship between the company's sector and the optimistic tone adopted in the MD&A. For this, the sectors of Wholesale Trade, Retail Trade, Industry, Construction, Telecommunications, and Mining, Oil and Gas were highlighted. Due to the number of observations, the sectors of Other Services, Health and Social Assistance, Hospitality and Food Services, Public Utility Services, and Professional Services were grouped into a single sector, "services".

The optimistic tone in the report was captured through Diction7® software, designed for analyzing texts exclusively in English. The MD&A reports were imported on Adobe (*.pdf) Diction7®. The software processes the text, seeking exact correspondence of the contained words, considering only individual or hyphenated words. The whole document was analyzed, and abbreviated words or words with spelling errors were excluded. To calculate optimism, Diction7® standardizes six distinct variables, which are combined to form terms of compliment, satisfaction and inspiration, subtracting terms related to guilt, difficulty, and denial. Subsequently a 50 constant is added, followed by a statistical correction that references the lexicon normative database. Details about the calculation and aspects considered by Diction7® can be obtained in Hart and Carroll (2015).

Although there is criticism of the use of Diction® (Loughran & McDonald, 2015), its validity and effectiveness were tested to capture tone analysis in the field of finances (Tailab & Burak, 2021; Fisher et al., 2019; Wisniewski & Yekini, 2015). Additionally, its application is facilitated in large samples and has robust

empirical validity (Patelli & Pedrini, 2014), as well as operational attractions such as the readability of formulas, ease of use, objectivity, reliability and especially its validity (Sydserff & Weetman, 2002).

4 Presentation and analysis of results

4.1 Descriptive analysis of data

Initially, the research observed the descriptive behavior of the continuous variables, as shown in Table 3.

Table 3
Descriptive Statistics

Variables	Mean	Median	SD	Min	Max
Optim	48.76	48.78	1.59	35.35	58.73
ROA	7.16	6.60	6.44	-34.58	57.41
Age	27.80	29	9.68	0	44
Size	24.27	24.41	1.41	19.45	27.41
Lev	0.64	0.63	0.18	0.11	1.33
Persis	20.31	20.37	1.64	14.55	24.19

Descriptive analysis allows you to verify that the optimism variable does not have extreme variability in the data, because even if there is amplitude between the minimum and maximum values, the standard deviation is low and the proximity between the mean and the median suggests a symmetrical distribution. This may indicate that companies tend to maintain an optimistic tone in their disclosures. This finding is in line with the literature that demonstrates the potential benefits of sustaining a positive feeling in corporate communications (Pouryousof et al., 2022; Zeng et al., 2022; Jiang et al., 2019), i.e. positively influencing investors and attracting greater attention from analysts who end up making more accurate earnings predictions for the market.

In addition, descriptive analysis allows one to observe that the average and median variables are close, showing that the data is not strongly influenced by extreme values, indicating a symmetrical distribution. However, the amplitude between the minimum and maximum values highlights the variability or dispersal of the data. In this sense, the results for ROA (return on assets) and Age are more evident, indicating the presence of different profiles and situations in the organizations analyzed. The amplitude in the ROA variable highlights a wide variation in the financial performance of companies. With a minimum ROA of -34.58%, some companies are facing negative financial results, while the maximum ROA of 57.41% indicates that other companies are getting positive returns on their assets. This amplitude suggests a significant disparity in the financial performance of companies in the sample. Regarding Age, there are very young companies, with 0 years, and more established companies, of up to 44 years. This indicates considerable diversity in the seniority of companies in the sample.

Although the variable of interest is binary, about 4% of sample observations are in the context of companies with reduction in sales revenues during periods of financial crises and Covid-19. This can be explained by the profile of the selected companies in the sample, being the largest companies, in terms of revenue, listed in Fortune Global 500. Nevertheless, it is understood that the verification of the relationship between company growth and an optimistic tone in a crisis context, even considering good-performance companies, can show the strength of the impact of this condition on the tone of the reports issued by the companies.

More specifically, Table 4 presents the descriptive statistics of the data, organizing the main variables of the research, “optimism” and “variation of sales revenue”, throughout the period and in the period of crisis, for each sector.

Table 4
Descriptive Statistics of optimism (Optim) and variation of sales revenue (VarRev.) by sector

	Optim	VarRev. (2005 to 2022)	VarRev. in the Crisis	Optim	VarRev. (2005 to 2022)	VarRev. in the Crises
	Wholesale Trade			**Other Services**		
Mean	48.93	0.44	-0.10	49.32	0.06	-0.03
Median	48.75	0.07	0.00	49.40	0.04	0.00
Standard deviation	1.40	2.37	0.90	0.77	0.05	0.06
Minimum	45.36	-0.73	-10.04	46.97	-0.02	-0.20
Maximum	53.13	24.35	0.73	50.48	0.20	0.00
	Retail Trade			**Health and Social Assistance**		
Mean	48.78	0.08	-0.02	50.85	0.22	-0.06
Median	48.92	0.07	0.00	50.31	0.17	0.00
Standard deviation	1.41	0.11	0.07	2.44	0.18	0.12
Minimum	41.57	-0.35	-0.39	48.28	-0.11	-0.52
Maximum	51.43	0.68	0.35	58.73	0.78	0.00

	Optim	VarRev. (2005 to 2022)	VarRev. in the Crisis	Optim	VarRev. (2005 to 2022)	VarRev. in the Crises
	Construction			**Hospitality and Food Services**		
Mean	49.46	0.11	0.04	48.48	0.11	-0.02
Median	49.6	0.16	0.00	48.73	0.11	0.00
Standard deviation	0.45	0.29	0.16	1.03	0.09	0.08
Minimum	48.28	-0.55	-0.21	46.17	-0.11	-0.24
Maximum	49.98	0.63	0.55	49.82	0.24	0.11
	Industry			**Public Utility Services**		
Mean	48.72	0.06	-0.03	48.23	0.24	-0.12
Median	48.73	0.05	0.00	48.53	0.06	0.00
Standard deviation	1.40	0.18	0.12	1.19	0.55	0.46
Minimum	37.96	-0.53	-1.57	43.87	-0.28	-1.97
Maximum	56.98	1.57	0.40	49.36	1.97	0.07
	Telecommunications			**Professional Services**		
Mean	47.94	0.11	-0.03	49.63	0.18	-0.05
Median	48.21	0.06	0.00	49.63	0.15	0.00
Standard deviation	2.10	0.16	0.10	1.24	0.25	0.14
Minimum	35.35	-0.21	-0.89	46.63	-0.27	-0.60
Maximum	50.77	1.02	0.21	53.32	0.84	0.04
	Mining, Petroleum and Gas			**Transport and Storage**		
Mean	48.47	0.09	-0.03	47.79	0.07	-0.02
Median	48.64	0.12	0.00	48.08	0.07	0.00
Standard deviation	0.83	0.35	0.23	1.25	0.07	0.05
Minimum	45.62	-0.62	-1.44	44.82	-0.12	-0.21
Maximum	49.73	1.44	0.42	50.08	0.21	0.01

Through Table 4 it appears that in the entire period, on average, the sectors had positive growth. However, when observing the movement of sales variation in the crisis period, it is evident that only the construction sector has growth, all others being negatively impacted by crisis periods. It also draws attention to the construction sector, which presented lower variability of the optimistic tone of reports during the entire period analyzed.

4.2 Econometric Analysis

Next, the normality hypothesis in the distribution of the continuous variables was verified through the Shapiro-Wilk test. After observing that the variables did not follow a normal distribution, the non-parametric correlation test was applied: Spearman's. This test was performed between the continuous variables; but between the continuous variables and dummy variables, the biserial correlation test was applied. The results are detailed in Table 5.

Table 5
Correlation analysis between optimism (Optim) and dependent and control variables

Variables	Optim (optimism)	Crisis*VarRev (revenue during crisis)	ROA (return on assets)	Age	Size	Lev (leverage)
Crisis*VarRev	-0.0034					
ROA	-0.0693	-0.1652***				
Age	-0.1085***	0.1119***	0.0992***			
Size	-0.1546***	0.0308	0.0794***	0.4728***		
Lev	0.0456	0.0812***	-0.3426***	0.0568	0.0871***	
Persis	-0.2018***	0.1022***	0.1342***	0.4204***	0.8110***	0.0221***

Note: ***, ** and * the statistical significance at 1%, 5%, and 10%, respectively.

The results of Table 5 indicated that there is no significant correlation between the optimistic tone of the MD&A and the years of crisis in which the company has a reduction in sales revenues. It is noteworthy that the purpose of this test is to emphasize the correlation between two variables, however the business environment is dynamic, so more than one factor can, concomitantly, explain the behavior between variables, as observed in the following regression tests panel.

Moreover, there has been a significant relationship between optimism and the age and size variables, indicating that older and larger companies tend to have less optimistic MD&A reports. This trend may reflect a more conservative approach that established and large companies adopt in their disclosures in order to preserve their reputation (D'Amato & Falivena, 2019; Muttakin & Khan, 2014).

Regarding persistence, evidence suggests that cases of companies with less persistence of results are those that have a more optimistic tone in reports. These findings are consistent with research that points

out that the tone of management plays an important role in the disposition of financial executives to report earnings, as they may have incentives to present information in order to create a more positive perception among readers (Paul & Sharma, 2023; Boudt & Thewissen, 2019; Davis et al., 2012).

The findings in Table 5 show that *Crisis*VarRev* (revenue during crisis) has a significant relationship with ROA (return on assets), Age and Lev (leverage). This suggests that years of crisis in which the company has a decrease in sales revenues are associated with lower financial performance, a higher level of leverage and less resilience in older companies. This may be consistent with the fact that during these periods, business growth and profitability tend to be impacted negatively, leading to an increase in leverage as companies seek more financing to maintain their operations (Shaharuddin et al., 2021; Fuertes-Callén & Cuellar-Fernández, 2018; Shatonhoka, 2015). In addition, companies with more market time may face challenges to innovate and adapt quickly in times of crisis, compromising their ability to maintain or increase sales revenues compared to younger companies (Assefa et al., 2022; Ebersberger & Kuckertz, 2021).

It also draws attention to the significant and positive relationship between persistence and the representative variable of revenue reduction in a crisis period, indicating that companies with persistent results are those with a drop in sales during crises. This result suggests that companies, even having revenue reduction, are adopting results management strategies in order to avoid greater volatility of this value in face of the market.

Finally, the diff in diffs regression test was run with panel data with random effects, whose results are evidenced in Table 6.

Table 6
Diff in diffs regression with panel data

Variables	Coef.	z
Crisis	0.120	1.45
VarRev	-0.019	-1.13
Crisis*VarRev	0.248	6.30***
ROA	0.001	0.29
Age	0.003	0.27
Size	0.140	1.44
Lev	0.083	0.20
Persis	-0.136	-2.43**
Wholesale trade	-0.464	-0.77
Retail trade	-0.610	-1.14
Industry	-0,644	-1,27
Telecommunications	-1.426	-2.96***
Mining, Oil & Gas	-0.773	-1.43
Construction	48.568	18.50***
F	2.07**	
R^2	0.1081	
Wooldridge test	3.372*	
Shapiro Wilk	11.568***	
VIF	2.18	
White Test	83.88	
Hausman test	11.28	

Note: ***, ** and * the statistical significance at 1%, 5%, and 10%, respectively.

Regarding the regression assumption tests, the hypothesis of homoscedasticity was not rejected, but the normality of residuals and autocorrelation were. To address the problem of autocorrelation, identified at a significance level of 10%, the random effects estimation method with robust standard errors was used, grouping by individual (Fávero, 2015).

The estimator with grouping by individual (vce cluster) specifies that the reported standard error allows for intragroup correlation (STATA, 2024). Grouping on the panel variable produces an estimator that is robust to cross-sectional heteroscedasticity and to correlation in the panel (serial), equivalent to that proposed by Arellano (1987). Regarding multicollinearity, the results did not show an individual VIF value exceeding 2.18, indicating that there is no evidence to justify the removal of any variable from the model. Finally, the Hausman test indicated a preference for the use of random effects models.

The regression results showed that there is no statistically significant relationship between the crisis and the variation in sales revenue with the optimistic tone of the reports. However, when considering the reduction in the company's sales during the crisis period, the relationship is positive and significant. Therefore, the results do not allow us to reject the research hypothesis, indicating that in periods of crisis, when companies face a reduction in their sales, there is a tendency to maintain an optimistic tone in their MD&A.

This means that in response to financial challenges, such as those caused by crises (Fuertes-Callén & Cuellar-Fernández, 2018; Ferrando et al., 2017; Shatonhoka, 2015), managers of unhealthy companies can use the tone of their reports to seek impression management strategy, using more positive words, compared

to growing companies. These findings are in agreement with those found by Hsu and Yang (2022), Zhou et al. (2022), Caserio et al. (2020) and Boudt and Thewissen (2019).

This strategy may be an attempt to convey a perception of lower business risk and positively influence investors (Pouryousof et al., 2022; Castro et al., 2019). This is in line with agency theory, which suggests that managers may have incentives to mislead shareholders, which may be reflected in the abnormal tone of corporate narratives (Paul & Sharma, 2023; Hoberg & Lewis, 2017).

In turn, the use of an optimistic tone in the MD&A, together with a scenario of falling sales, may not reflect the company's financial and economic reality at the time, which may have adverse repercussions for the capital market. This includes information asymmetry, atypical stock returns, price volatility, and incorrect stock valuation. Furthermore, the usefulness of reports as a reliable source of information diminishes, potentially eroding investor confidence and adversely affecting the stability and integrity of the financial market (Rezaee et al., 2024; Pouryousof et al., 2022).

Furthermore, the tone of companies' informational reports can impact decisions of those who receive this information. In this sense, for example, an optimistic and inconsistent tone in management narratives can negatively influence the accuracy of analysts' forecasts, as shown in studies on communication strategies (Berns & Simons, 2022; Liang & Wu, 2022). These findings contribute to the debate on the credibility of MD&A narratives, indicating that in adverse external contexts, companies can manipulate narratives to hide weak performances (Caserio et al., 2020; Ben-Amar & Belgacem, 2018).

However, in contrast to these results, Patelli and Pedrini (2014) identified that the optimistic tone present in CEOs' letters is congruent with past and future performance, concluding that under difficult macroeconomic conditions, the incentives to strategically distort information are low. The authors adopt Habermas's (1987, 1984) theory of communicative action, which argues that social actors rely on reasoned arguments to reach mutual understanding, and companies can use their communications to promote a shared vision rather than simply manipulate perceptions.

Finally, the results suggest that companies with lower earnings persistence tend to present an optimistic tone in their MD&A reports. This is consistent with studies that suggest that managers use a more optimistic tone in financial reports as an impression management strategy to maintain a positive image of the company in the capital market, even when financial results indicate instability or uncertainty (Paul & Sharma, 2023; Caserio et al., 2020; Boudt & Thewissen, 2019; Davis et al., 2012).

Although this finding is contrary to some previous research which provides evidence of a positive association between the tone of financial disclosures and earnings persistence (Rahman, 2023; Li, 2008), it is worth highlighting the crisis scenario, which may favor the search for a more optimistic tone in reports, even in the face of falling sales.

4.3 Robustness Tests

In order to corroborate the results of the research, or even refute them, robustness tests were performed considering two other samples of companies. To this end, we considered 74 mid-sized companies in the US, classified as such by the criterion of having a trading date stored by Refinitiv® prior to or equal to 2005 and a fiscal year-end date up to December 31, 2022, and whose logarithm of total assets recorded at the end of the fiscal year was around the calculated average.

Brazilian publicly traded companies that publish Management Reports in English were also considered, since this aspect is essential for the use of the Diction® software. The sample for Brazil was defined as 26 companies.

Although the Management Report and the MD&A are narratives complementary to the financial statements, providing an insight into the company's performance and strategies (SEC, 2023; Hoberg & Lewis, 2017; Silva et al., 2007), they differ in their regulatory frameworks.

In Brazil, the Management Report is required by Law 6,404/1976, while the MD&A is common in international contexts and regulated by the SEC in the United States. The MD&A is subject to the SEC's requirements for the publication of certain matters (such as investment and earnings prospects), something that, despite the rules in place in Brazil, does not occur in the Management Report (Pagliarussi & Scotá, 2009; Bryan, 1997).

Tables 7 and 8 show the distribution of companies by sector in the US and Brazilian samples, respectively. What can be seen is that although the number of companies varies, the composition of the sectors is similar to the original research sample.

Table 7

Number of companies by sector in the US mid-sized company sample

Sectors	Companies	Sectors	Companies
Wholesale Trade	4	Health and Social Assistance	3
Retail Trade	2	Administrative Services	2
Real Estate	6	Hospitality and Food Services	4
Industry	36	Professional Services	8
Telecommunications	4	Transportation and Storage	5
TOTAL		**74**	

Table 8
Number of companies by sector in the sample of companies in Brazil

Sectors	Companies	Sectors	Companies
Wholesale Trade	1	Telecommunications	2
Retail Trade	1	Mining, Petroleum and gas	1
Construction	1	Administrative Services	1
Real Estate	1	Public Utility Services	5
Industry	10	Transportation and Storage	3
TOTAL		**26**	

To perform the regression tests, in the US sample, the sectors Real Estate, Industry, Telecommunications, Hospitality and Food Services, Professional Services, and Transportation and Storage were presented individually. However, given the number of observations, the Wholesale Trade and Retail Trade sectors were grouped together, as were the Health and Social Assistance and Administrative Services sectors. In the case of the Brazilian sample, the sectors Industry, Public Utility Services, and Transportation and Storage remained individually presented, while Wholesale Trade, Retail Trade, Construction, and Real Estate were grouped together, as were Telecommunications, Mining, and Administrative Services.

Therefore, difference in differences regression was applied to these samples, the results of which are presented in Table 9.

Table 9
Diff in diffs Regression – for the second US sample and for Brazil

	USA			Brazil	
Variables	**Coef.**	**Z**	**Variables**	**Coef.**	**z**
Crisis	-0.077	-0.99	Crisis	-0.006	-0.05
VarRev	0.065	0.84	VarRev	0.302	1.29
Crisis*VarRev	0.217	2.65***	Crisis*VarRev	0.690	2.24**
ROA	-0.003	-2.18**	ROA	0.012	1.75*
Age	0.017	2.18**	Age	-0.031	-1.72*
Size	0.037	0.55	Size	0.671	4.48***
Lev	0.040	0.24	Lev	0.024	0.05
Persis	-0.010	-0.26	Persis	-0.019	-0.21
Wholesale & Retail Trade	-0.020	-0.04	Wholesale & Retail Trade	1.180	2.34
Real Estate	0.540	1.01	Industry & Construction	0.237	0.35
Industry & Construction	0.306	1.02	Health and Social Assistance & Administrative Services	-1.504	2.73***
Health and Social Assistance & Administrative Services	1.042	2.68***	Public Utility Services	0.744	1.41
Hospitality and Food Services	0.854	1.94*	F	2.44**	
Professional Services	0.660	1.76*	R^2	0.1656	
Transportation and Storage	0.957	2.62***	Wooldridge test	0.377	
Constant	47.271	30.73***	VIF	1.97	
F	2.18**		White test	101.96**	
R^2	0.1287		Hausman test	19.89**	
Wooldridge test	2.480				
VIF	2.02				
White test	80.50				
Hausman test	4.06				

Note: ***, ** and * the statistical significance at 1%, 5%, and 10%, respectively.

For both countries, the results corroborate the idea that companies with reduced sales revenues during periods of crisis present an optimistic tone in their reports, even considering US companies of different sizes, and different environments such as Brazil.

The results in Table 9 suggest that the relationship between ROA (return on asset) and Age with the tone of the reports is the opposite when compared to the US and Brazil. The tests indicated that companies with an optimistic tone are those with lower performance and older in the US, while in Brazil the results are the opposite. Additionally, in Brazil, size was statistically significant and positive in relation to the tone of the companies' Management Report.

5 Final Considerations

Aiming to contribute to research and discussion on the influence of biases in the tone of financial reports, specifically the MD&A, this study analyzed the relationship between the optimism bias present in the tone of these reports and the reduction in sales revenue during periods of crisis faced by companies, including the 2008 financial crisis and the Covid-19 pandemic.

Overall, the results of the research indicated that, in periods of financial crises or pandemics, companies with falling sales revenue tend to adopt a more optimistic tone in their MD&A narratives. Thus, the research hypothesis was not rejected, suggesting the use of the optimistic tone as an impression management strategy to favorably influence the perception of investors and the capital market. This result was corroborated even when applying the research to two other samples: for medium-sized companies in the USA and for companies in Brazil, which strengthens the findings.

Thus, the study provides practical contributions by pointing out to analysts that the optimistic tone of MD&A reports may be a defensive strategy against declining revenues during crises, rather than an indicator of financial health. This may result in more accurate earnings forecasts. Additionally, it signals to investors the need to adjust their expectations and assessments, considering not only the numbers presented, but also the tone of the communication. By highlighting the malleability in the tone of the MD&A, it contributes to regulatory bodies, including the IASB and SEC, reinforcing the ongoing discussion on the need to improve the quality of the information disclosed in these communications. Finally, it contributes to the literature for understanding how companies adopt a more optimistic tone in their MD&A reports in periods of crisis and reduced sales revenues, aligning with theories and previous studies that indicate a tendency for companies to present a favorable situation, despite external adversities.

To improve and expand this study, future research could address the limitations and delimitations used, seeking to advance the analyses. One limitation of this study is the profile of the companies selected in the sample, which consists of the largest companies, in terms of revenue, listed in the Fortune Global 500 in 2023. Future research could explore samples with a larger number of countries, improving the models for predicting the tone of the MD&A, as well as considering other behavioral biases discussed in the literature, such as overconfidence and realism. This would help to better understand the factors that influence the tone of these reports.

In addition, another limitation of the research concerns the approach adopted to analyze the tone of MD&A reports, which, in this study, did not consider the complexity and interactions between multiple actors involved in corporate communication, as discussed by Brennan and Merkl-Davies (2018). The choice to analyze the relationship between the tone of the texts and sales, instead of the tone and the stock price, was motivated by the interest in verifying whether companies with lower revenues, and consequently lower profits, change the tone of the MD&A to influence the perception of analysts and investors during periods of crisis. This approach focuses on the *ex-ante* impact, observing revenue as an early indicator and expecting an indirect effect on the capital market. However, future research could consider the external and direct impact on the market, through the impact on the behavior of the stock price, which would be an *ex-post* analysis.

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