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Accounting for words: Financial Performance as a driver of Managers' Discussion in 10-Ks

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Abstract

This paper examines the impact of topics extracted from annual 10-K reports that are contextually focused by managers on the financial performance indicators of the firms. The paper goes beyond the conventional tone-based sentiment analysis and uses topic modelling to identify five economically significant themes in the Management Discussion and Analysis (MD&A) section with the help of Latent Dirichlet Allocation (LDA). We use a sample of publicly listed companies in the United States, and the dependence of financial ratios and managerial discussion content is investigated by a dynamic System Generalized Method of Moments (System GMM) model. The results indicate that the financial performance is selective in managerial disclosure. The profitability and efficiency indicators have a strong impact on the income, growth, and cost-related stories, whereas liquidity and solvency measures show a weak ability to explain. The performance in the market influences cost of operation discourses, as opposed to profitability discourses. Comprehensively, the findings reveal that the thematic organization of disclosures is strategically adjusted by the managers based on underlying financial conditions, which provides novel information about the role of narrative reporting in capital markets.

Key Words: Topic Modelling, Manager Discussion, Financial Performance, Ratios

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1. Introduction

In the ever-changing environment of financial markets, where an individual can become a very wealthy individual in the blink of an eye or lose everything in just a few seconds, it is essential to study what influences decision-making processes. Annual reports, especially the Management Discussion and Analysis (MD&A) part of Form 10-K filings, are one of the many sources of information that investors and analysts can refer to in providing a general picture of the financial health of the company and its future. The question arises, are financial performance indicators actually the source of the discussion in these disclosures on the part of the managers?

The capacity to interpret the subtlety of the Managers' Discussion and Analysis section of 10-K reports is of immense importance to both investors and stakeholders. The unraveling of the relationship between financial performance and the story told by management allows one to obtain rare insights into the process of decision-making and strategic priorities of a company. This, in its turn, may help to gain a competitive advantage in the constantly changing financial markets, allowing investors to be more knowledgeable about future opportunities and risks of a company.

The interconnection of both the financial performance and Managers' Discussion in 10-Ks is a glimpse into the heads of corporate managers and how they view the business environment. On the one hand, the research suggests that the disclosure of managers plays a crucial role in the stock returns of the equity market. Feldman et al. (2010) evidence that stock market response to SEC filings is notably linked to the tone of financial disclosure of the firm, and such response is more pronounced than the response to other financial performance measures. Tetlock et al. (2008) find that negative terms in the financial press have a negative relationship with earnings and stock prices of the firm. Likewise, Jegadeesh and Wu (2013) also study the tone of 10-k document by examining market-related financial performance of the firm in terms of volatility, turnover, and accruals, among others.

Particularly, Cohen et al. (2020) were concerned with investigating the effect of 10-k sentiments on a firm's performance in financial markets. Koelbl (2020) discovered that the higher the pessimistic (optimistic) language used in the MD&A, the lower (higher) the future firm performance. Berns et al. (2022), however, extended the scope of the information transfer that can be performed through the differences in the tone of the financial statements. The researchers reported a positive relationship between the shifts in the tone of the MD&A section of the 10-K filing and the follow-up capital investments and mergers and acquisitions (M&A) activity. Fedorova et al. (2022) have found that the mood expressed in the MD&A section is more predictive

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and stable in explaining and predicting the choices made by a company concerning M&A and internal investments than annual reports.

Conversely, the determinants of the tone of managers have received few attempts to study them. As an example, Gonzalez et al. (2021) have also demonstrated that the tone of information disseminated to the public can indeed be influenced by a CEO who has a high presence in the company. In particular, they can also avoid negative words and foster positive words in the released information. Also, boards that are more independent also embrace more negative wording in their communications. Importantly, power dynamics in a company may affect the language used in the information disclosed in the market. According to Nadeem (2021), a strong CEO can also employ their influence to influence the tone of the information, and more independent board members is more likely to use a less favorable tone in the information they provide to the market. As demonstrated by Hasan (2020), financial performance can also affect managerial faith and optimism that might affect the tone of the narrative disclosures. Specifically, management skills and financial results are significant variables, which can contribute to the readability and tone of narrative disclosures in 10-K reports.

According to Dias and Matias-Fonseca (2010), organizations do not treat the transmission of information released in annual reports impartially, and that the performance of an organization may influence how it distributes its results. In particular, the research determined that organizational performance is capable of impacting on the choice of language and the tone applied in their annual reports, meaning that the organizations are tactical in their communications. Aly, El-Halaby, and Hussainey (2018) present the financial performance on the basis of the returns on assets as having an affirmative influence on the tone of disclosure. In the recent past, Mushtaq et al. (2022) discovered that indicators of financial performance of the firm may positively affect the tone of the textual section of 10-K reports. The factors influencing the choice of managers in disclosing in such reports is important in the transparency and credibility of financial reporting of a company. Further research is required to investigate and discover these factors that would be detailed in offering more effective advice to successfully manage discussions.

Besides the sentiment, contextual relationship of word flow, and how sentiment varies according to the context may be of importance. Notably, the flow of words in terms of tone (positivity or negativity) is not sufficient to identify performance-based indicators and evaluate the movement with financial markets. In particular, the contextual analysis is a more detailed method which presupposes studying the material of textual data to find patterns and themes. This may involve recognizing certain words or phrases, evaluating the percentage of each of the topics, and

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determining patterns of structure of the text. The content analysis can be applied to get an understanding on a broad spectrum of phenomena, such as political discourse, consumer behavior, or financial markets. Overall, the scope of qualitative discussion in financial reporting is wide and includes the modern and future financial performance of the organization, recent events in the company, methods that the company uses, the efficiency of management, the competitive environment, and the macroeconomic environment (Huang et al., 2018).

In addition, Calomiris and Mamaysky (2019) demonstrate that the impact of sentiment is not universal among the topics, and therefore this sentiment break down can be especially valuable in investment decisions, therefore, relocating asset prices. Lu and Chesbrough (2022) then derive pertinent topics that are related to open innovation practices of companies and examine the relationship between open innovation practices of companies and the financial performance of such companies. Moreover, investors can have a thumbs-up by ignoring the majority of news content and sentiment, and to rely on the good news sentiment in order to build profitable trade strategies. Uhl and Novacek (2021) analyze how the shift in the influence of various topics on stock prices impacts the stock returns and the study establishes a significant relationship between the top news sentiment and stock returns in various periods. A rich context and syntax structure can reduce the error of measurement during the classification of the tone of words and topics in newspaper headlines (Babolmorad & Massoud, 2020). It demonstrates that word flow context is also significant in order to define overall indicators performance.

Though this topic may be of significant interest, a gap in the research on this topic exists. To the best of our knowledge, no previous studies have been carried out to examine the connection between financial ratios and the topics discussed by the managers in the 10-k reports. Our study aims to fill this research gap by investigating the context of the information reported in 10-k reports, the topics and economic concepts discussed by manager. The present research is an extension of the prior studies (Jegadeesh & Wu, 2013; Krishnamoorthy, 2018; Boubaker et al., 2019; Cohen et al., 2020; Mousa et al., 2022; Rijba et al., 2021) that have investigated the effect of corporate disclosure on various financial performance measures. In addition, Mushtaq et al. (2022) demonstrated the strong connection between 10-k report textual part and indicators of financial performance of a company. On the contrary, we consider how the financial indicators and characteristics of the firm influence issues (context-related sentiments) that are presented in the company 10-K report.

The reason of investigating this way is intriguing since financial performance metrics are likely to be a crucial source of information that could guide the setting of a 10-K report of a company, especially within the Management Discussion and Analysis

(MD&A) section. As an example, the growth of the revenue, profitability, and cash flows of a company can be emphasizing factors to define the context of the MD&A section. The financial performance indicators are informative and supportive quantitative data that can be utilized to analyze and investigate manager sentiments and the particular issues discussed in a 10-K report of a company. Applying the stakeholder theory, managers should inform stakeholders about the financial performance of a firm in different ways, among them annual reports, including the 10-K report. Financial ratios are the ratios used in the analysis of financial health of a given company and determining its strengths and weaknesses. For instance, when the financial ratios indicate that the company has diminished in terms of profitability, managers might make the decision of addressing the 10-K report on their strategies of improving profitability and cost reduction. On the same note, when financial ratios of a company reveal that there is a high degree of debt within the company, managers can deliberate on how to manage the debt and how to improve the financial position of the company. Moreover, financial performance of a company may influence the interests of various stakeholders in different ways. Indicatively, the shareholders can be more focused on the company profitability and the profitability on their investments whereas employees can be more focused on the job security and career promotion. In this regard, financial ratios can assist managers to determine the interests of the various stakeholders and customize their 10-K reports to meet the interests of different stakeholders. Thus, it can be concluded that financial ratios may affect the topics that managers' report about in 10-K reports.

In addition, we add to the research by Jegadeesh and Wu (2013), Kang et al. (2018), Mushtaq et al. (2022), who studied the effect of corporate financial performance indicators on positivity and negativity, and Bonsall and Miller (2017), Hasan (2020), Nadeem (2021), who conducted research on the readability of 10-k reports. On the contrary, we examine how the financial performance of firms affects the setting of qualitative disclosures i.e. topics being discussed in 10-k reports. In light of these speculations, we formulate the research aim as the driving force behind the discussion of the managers on 10-K reports is the financial performance of the company.

The study aims to explore how the financial ratios influence the topics addressed by managers in 10-K reports of the U.S firms through the use of computerized content analysis method. In particular, we focus on financial ratios as the profitability, liquidity, solvency, efficiency, and market performance indicators to analyze how they affect the discussion of issues in 10-K reports. The empirical analysis of the study enables us to determine the financial ratios which play an influential role in the issues debated by managers in the U.S 10-K companies. This gives information on what motivates the communication strategies by the managers and enables better

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understanding of the investors and stakeholders regarding the financial performance of the company and its future.

The results of the given study can be not only applicable to the current knowledge base in the area of financial markets but also have some practical consequences to investors, analysts, and regulators. First, the context of a 10-K report of a company can aid financial analysts and investors to determine the financial health and performance of the company. The knowledge acquired in this research can assist the stakeholders to discover possible risks, gauge the strategic priorities of a company and to estimate the prospects of a company in a more precise way. Second, connection between financial performance and the narrative of the managers, the stakeholders can determine whether the financial performance is biased or inconsistent in the reporting, thus allowing them to evaluate risks related to the financial health of a company and its decision-making processes better. Third, the discussion of the financial performance measures in Managers Discussion can enable regulators to discover areas in which the reporting practices can be improved to result in a more transparent and standardized reporting among companies. Fourth, the findings of this study can be used to improve investor communication strategies of the companies. The financial performance measures would be in line with the content of the Managers Discussion, thus enabling the companies to communicate their strategic focus, risk mitigation efforts and growth opportunities more effectively to investors and provoke understanding and trust. Finally, implications of the study can be used to promote the overall market transparency and efficiency. The discovery of the relationship between financial performance and the story of the managers will help the stakeholders obtain more confidence in the information presented in 10-K reports. This, on its part, may result in more rational pricing of securities and less information asymmetry in the financial markets.

The rest of the study is structures as follows. Section 2 provides literature review consist of theoretical framework and relevant studies. Section 3 presents methodology, section 4 discussed the empirical results, and finally section 5 concludes the study with limitations and future directions.

2. Literature Review

2.1 Theoretical Framework

According to Efficient Market Theory (EMT), financial markets are efficient in processing and what is available in prices of securities. The Managers Discussion in 10-K reports is a source of good information that gives insight into the financial performance of a company, strategic perspective and risk aspects. When the indicators of financial performance are a high priority among the Managers in the Discussion of

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the content, it implies that such information is a dynamic part of the complete information that is offered to the participants in the market. Under the market prices, EMT suggests that the markets are quick and responsive to new information. Provided that the Managers Discussion integrates the financial performance indicators in any significant manner, this fact presupposes that the information should be quickly integrated in the evaluations of the perspective and the risk profile of a company by the market participants. Therefore, the variations in the financial performance of a company, which are communicated in the Managers Discussion can be swiftly priced in the market, which will impact on the value of company securities.

Besides, EMT implies that investors cannot always outperform the market using the information that is publicly available to them. When the Discussion on financial performance by the Managers uses already known information on financial performance, investors who solely rely on this information might not be able to win an advantage in the sense of generating abnormal returns. The implication of the theory was that the investors should take other factors or private information that does not necessarily conform to the Managers Discussion to potentially outperform the market on a regular basis. EMT is based on the assumption of market efficiency; however, it acknowledges that market efficiency may be distorted because of other factors including behavioral bias, information asymmetry or market inefficiency (Shleifer, 2000; Akerlof & Shiller, 2010). The substance of the Managers Discussion may have an effect on the investor sentiment and perception, and may produce market responses which are not necessarily accurately described by a strict interpretation of market efficiency. These deviations give chances to market players to find and trade in mispriced securities.

Agency Theory offers a theory to explain the principal-agent relationship and the impact of such on the contents of the Managers' Discussion in 10-K reports. Agency Theory is concerned with the association between agents (managers) and principals (shareholders/owners) and the conflicts of interest in the associations that exist. The 10-K reports include the Managers Discussion as a channel through which managers can interact with the shareholders and other stakeholders. It is a chance that managers offer information about financial performance, strategies, and risk management of the company thus resolving the information asymmetry agency problem between the principal and agent. In addition, the Agency Theory acknowledges that the managers can exercise discretion during their decision-making that can result in the agency costs. The Managers Discussion gives them (managers) a chance to form the narrative about financial performance indicators and other applicable information.

The Managers Discussion content is indicative of how much of the discretion is used by the managers to frame the financial performance and strategic perspective of the

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company to suit their own interests or to avoid the agency costs (Aly, El-Halaby, & Hussainey, 2018). Based on the theory, the importance of the Managers Discussion in solving agency problems as well as aligning the interests in minimizing information asymmetry and improving transparency and accountability is illuminated. Analyzing the Discussion of Managers in the frames of the Agency Theory, the stakeholders will be able to obtain the information about the relation between the principal and the agent and check the quality and the correspondence of the information provided by the managers.

Signaling Theory is also used to interpret the Discussion of the Managers in 10-K reports which is a signaling mechanism. Managers are strategic in reporting and placing emphasis on the performance or financial indicators and other pertinent data in order to minimize information asymmetry as well as communicating positive attributes of the company to the external stakeholders. The stakeholders assess the validity of such signals and respond to them and this may affect their judgment on how they invest and how they see the company. The managers are motivated to send signals to communicate positive attributes or characters of the company to the market (Schleicher, 2012). In the same manner, the content of the Managers Discussion can be strategically designed to bring out positive financial performance indicators, growth opportunities or good risk management practices.

Such signals are meant to form a good image to the outside stakeholders which may affect their decision to invest or value the company. Notably, the market responds to the messages delivered by managers in Managers Discussion (Clatworthy & Jones, 2006). As an example, news of positive things about financial performance measures, growth plans or good risk management can create more investor confidence and this may result in a positive reaction in the market like high share prices or easier access to finance. When the Managers Discussion is analyzed through the prism of Signaling Theory, the stakeholders may get more insights about strategic communication decisions makers of the managers make and interpret the signals sent regarding the company nature and future.

Financial ratios in the context of the stakeholder theory offer a platform on which the financial performance of a company can be examined and also how it can fulfill the responsibilities of the various stakeholders of the company. Through a financial ratio analysis, managers are able to highlight the strengths and weaknesses of the financial position of the company and therefore in the 10-K report, they can discuss the issue that various stakeholders have. As an illustration, in the event that the financial ratios of the company depict that it is not profitable, managers can deliberate on how the company can enhance its profitability and lower its costs. On the same note, when the financial ratios of the company show that the company has a high amount of debt, the

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managers can talk about the ways of handling the debt and how to improve the financial position of the company. Comprehensively, these underlying theories indicate that financial performance indicators are significantly useful in informing certain topics by managers in a company 10-K report.

2.2 Manager Discussion and its effects

All the companies in which securities are traded publicly are required to report by the regulations of the Securities and Exchange Commission (SEC). Such reports should be submitted electronically and can be made publicly available on the SEC site called Electronic Data Gathering, Analysis, and Retrieval (EDGAR) website[1]. The annual Form 10-K is the most vital of these reports and is covered by 15 SEC-specific Items, such as "Risk Factors," "Management Discussion and Analysis," and "Financial Statements." Although Form 10-K is occasionally called the annual report, it is different than the annual report to shareholders, which is generally available to shareholders on the investor relations section of a company.

The 10-K report should include item 1A, which gives the investors information regarding the possible level of risk likely to occur when the company is operational, legally, environmentally, and health-wise. This section is essential to enable the investors to make a wise decision as to whether to invest in that company or not. Discussion and Analysis of Financial Statements (MD&A) of 10-K reports is relevant in financial literature, as it reports a lot of information regarding the performance of the financial activities and future of a company (Tavcar, 1998). Managers possess a different understanding of how the company works and are able to give input on the drivers of financial performance. Additionally, the discussion will allow managers to share their vision of the company in terms of strategy, which can be informative to investors and other stakeholders (Batra & Daudpota, 2018; Sohangir et al., 2018). In theory, the disclosure of Management Discussion and Analysis (MD&A) is important as it is used to accomplish two main functions. To begin with, they facilitate the task of accounting by confirming the already available information that has been made available to the users via the public channels. Secondly, they contribute to minimizing the information asymmetry as they provide the information that brings the expectations of investors and creditors into agreement with the expectations of the management. This is done by inclusion of forward-looking information (Kothari et al., 2009; Dutta, Fuksa, & Macaulay, 2019).

According to Li (2010), the way managers spread their expectations on future in forward-looking statements may offer important information on the profitability of a

[1] https://www.sec.gov/edgar.shtml

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company. The author compared the MD&A portions of 10-K and 10-Q reports in the US and discovered that the overall aspect of the statements can predict future earnings. Koelbl (2020) examines the question of whether the language in the MD&A section of the U.S Real Estate Investment Trusts (REITs) can give evidence of future firm performance and, consequently, cause a market reaction. The authors postulate that the higher the pessimistic (optimistic) language in the MD&A, the lower (higher) the future performance of a firm. As noted by Berns et al. (2022), the information presented through the tone of financial statements is extended. The relationships between modifications in tone in the section of the 10-K (MD&A) and successive capital investments, or mergers and acquisitions (M&A) activity, are positive. Fedorova et al. (2022) found that the feeling conveyed in MD&A is more consistent and has a greater explanatory and predictive value on the choices made by the company in terms of M&A and internal investments than in annual reports. Moreover, Wang, Wu, and Yan (2021) differentiate two forms of positive tones: sincere and excessive. The authors concluded that it is only the true positive tone that has a considerable effect on the rate of adjustment to the optimal capital structure.

It is crucial to mention that the information that is provided by managers might not necessarily be accurate, and it is logical to believe that the debate of managers may mislead the stakeholders and cause mispricing of assets. As an illustration, Loughran, McDonald, and Yun (2009) demonstrated that businesses that reported on ethics-related matters in their 10-K reports are more prone to being linked to “sin” stocks, encountering class-action litigation, and scoring lowly on corporate governance. These results indicate that managers who depict their companies as being ethical are likely to be deceiving the populace, which is in line with the integrity-performance paradox. Moreover, as Loughran and McDonald (2023) posit, in even the most adversely affected industries due to COVID-19, managers failed to point out how they were exposed to pandemic threats to investors. This is shown by the findings that less than 21 percent of the 10-K filings in 2018 included any mention of the terms related to the pandemic despite the general awareness of pandemic risks at least since 2010. This demonstrates that managers failed to recognize the risk of the pandemic in the context of examining the risk factors of firms. In addition, it is still important to remember the agency issues that may prevail in the tone or context of the manager in the managerial obfuscation hypothesis. Observably, managers will voluntarily increase the complexity of the narrative disclosures with the aim of concealing information about poor financial performance (Souza et al., 2019). Thus, it is obvious to anticipate that indicators of financial performance in firms will influence/discourage managers on how and what to disclose.

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Besides the content of the information, a positive or negative tone can also be used to mislead the information by the managers. In particular, companies disclose in a more positive tone in the disclosure when financial performance is positive and in a less positive way when they are the victims of losses (Schleicher, 2012). Cohen, Malloy, and Nguyen (2020) analyzed the whole history of quarterly and annual filings of U.S companies, and proved that any changes introduced into the language and structure of financial reports have significant impacts on the future returns and operations of the companies. In addition, Rjiba, Saadi, Boubaker, and Ding (2021) investigate whether the relationship between the understanding of financial reports and financial reports ease of understanding is dependent on the tone of 10-K filings. The authors discovered that the influence of the annual report complexity on the cost of equity is stronger in case the tone of disclosure is negative or unclear.

One should take care when decoding the positive phrases employed by business managers as it is likely that such information contains subjective views and perspectives that represent the views of the company. As Hasan (2020) observed, the manipulation by managers is an important aspect that should be considered. According to Kang et al. (2018), one of the crucial factors that may lead to the flexibility of tone between reports is financial performance of the firms. On the same note, Aly, El-Halaby, and Hussainey (2018) specifically analyzes the return on assets, to analyze the two-way relationship between tone and financial performance. The authors demonstrated that the tone of disclosure can also be more positive in the better-performing companies in terms of financial performance, which can indicate that these companies are more confident in the future and are able to provide a much more positive impression of their operations among stakeholders.

Although, Mushtaq et al. (2022) revealed divergent findings in investigating how financial performance indicators, including ROA, the Tobins Q, ROE, and ROIC influenced the positivity and negativity of 10-K filings, they concluded that financial performance indicators influence the quality of 10-K filing. Although these indicators did not seem to have a significant impact on positivity, they also acted to decrease the negativity in the textual/descriptive section of the 10-K and thus it was not easy to conclude that it was related to 10-K sentiments. The authors also determined that the other characteristics of the firm including corporate governance, cash holding and R&D expenditure had mixed effects on positivity and negativity and therefore, it was not easy to establish the relationship with 10-K sentiments. The confounded effect of other firm attributes emphasizes the complexity in the interpretation of the drivers that affect 10-K sentiment and more studies might be necessary to understand such relationships in a better manner. Accordingly, our hypothesis is that the subject of the

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discussion of the managers in 10-K reports is driven by the financial performance of the company.

3. Methodology

3.1 Data

This section provides an overview of the methodology (see Figure 1) used to investigate the relationship between financial performance and the content of Managers' Discussion sections in 10-K filings. The study aims to understand whether financial performance drives the topics discussed by managers in these filings. The dataset for this study comprises a collection of 10-K filings from U.S companies. The filings are sourced from the SEC's EDGAR database, covering a specific time period 2004-2022 years to capture a substantial sample of financial disclosures. The financial performance of the companies is measured by performing required calculation for financial ratios of each company using their financial statements and market data taken from DataStream.

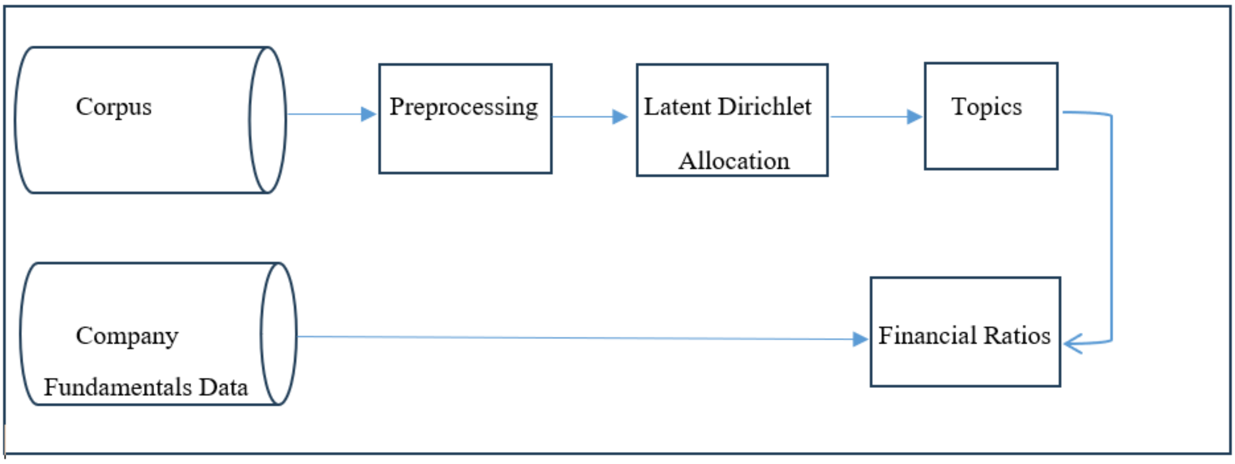

Figure 1: Extraction of topics discussed in the 10-K reports.

3.2 Text Mining

Before conducting topic modelling, the 10-K filings undergo various preprocessing steps to convert the text into a structured format suitable for analysis. These operations are standard in text mining and are performed to enhance the accuracy and efficiency of the subsequent analysis (Manning & Schutze, 1999). Such as removal of stop words, stemming, document-term matrix creation, and elimination of uncommon words. A list of common stop words in the English language is compiled. These stop words, such as "the," "is," or "of," do not add significant meaning to the content and are thus removed from the text (Feinerer, Hornik, & Meyer, 2008). We then map related words to their common root form using the Porter stemming algorithm. This step helps to consolidate similar words, reducing the vocabulary's complexity and

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improving topic modelling results. Next, a document-term matrix is constructed, capturing the frequencies of each stemmed word in the collection of 10-K filings. This matrix represents the transformed textual data in a mathematical form, allowing for further computational analysis. Finally, we eliminate the uncommon words. This step is necessary to manage the size and sparsity of the document-term matrix; words that appear in less than 5% of all filings are dropped from the analysis.

3.3 Topic Modelling using Latent Dirichlet Allocation (LDA)

In this study, the LDA algorithm is employed as a state-of-the-art method for topic modelling in text mining. LDA is a generative probabilistic model that extracts underlying topics from a corpus of documents (Blei, 2012). The LDA assumes that each 10-K filing contains a mixture of hidden (latent) topics, represented as probability distributions over the vocabulary. Based on a predefined number of topics, the model infers the most probable topic for a specific set of words. To perform the LDA, the study sets Dirichlet priors (α and η) that control the document-topic and topic-word distributions, respectively. The initial values for these parameters follow default settings used in relevant literature (Blei, Ng, & Jordan, 2003; Blei, 2012). Specifically, the authors propose a two-stage process for generating documents, which involves topics and words mapping onto those topics. The process is as follows:

First, for each document (d) in the corpus (denoted by D), a random distribution θ_d of topics is drawn. $\theta_{d,k}$ represents the proportion of each topic (k) within the document (d). This random variable θ_d follows a Dirichlet distribution with a prior parameter α, which is a vector:

$$\theta_d \sim Dir(\alpha), \qquad \alpha = (\alpha_1, \alpha_2, \quad \alpha_K) \qquad (1)$$

Next, we specify how words are associated with topics. For each word n in document d, a topic $Z_{d,n}$ is chosen based on the distribution θ_d. Then, a word $W_{d,n}$ is selected from a fixed vocabulary, conditioned on the chosen topic $Z_{d,n}$. The distribution for choosing words for each topic is given by $\beta_k \sim Dir(\eta)$ with a prior parameter η.

The joint likelihood of this process is represented by equation (2), which considers the probabilities of the topic distribution θ, the word distribution β, the observed words w, and the assigned topics z.

$$P(\theta, \beta, \omega, Z) = \prod_{d=1}^{D} P(\theta_d \mid \alpha) \prod_{k=1}^{K} P(\beta_k \mid \eta) \prod_{n=1}^{N} P(Z_{d,n} \mid \theta_d) P(\omega_{d,n} | Z_{d,n}) \qquad (2)$$

Since the topics are not directly observable, the previous studies propose a solution using the Latent Dirichlet Allocation (LDA) model to find the highest posterior distribution. The posterior distribution in the equation:

$$P = (\theta, \beta, Z | \omega, \alpha, \eta) = \frac{P(\theta,\beta,\omega,z|\alpha,\eta)}{P(\omega|\alpha,\eta)} \qquad (3)$$

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is obtained by dividing the joint likelihood by the marginal probability $P(\omega|\alpha,\eta)$. However, the computation of the denominator is challenging due to the dependence between topic (β) and word (θ), making it computationally intractable. As a solution, approximate inference techniques like variational expectation-maximization are commonly used (Steyvers & Griffiths, 2013). In the LDA model, the choice of Dirichlet priors α and η plays a crucial role in controlling the document-topic and topic-word distributions, respectively. The study follows the default values used in the original paper by Blei et al. (2003) for initializing LDA parameters. To interpret the topics, a unique identifier (topic name) is assigned to each extracted topic. Traditionally, researchers examine a ranked list of the most probable terms in each topic. However, this approach has limitations, as frequent and non-decisive terms often dominate the list, making it challenging to distinguish the true meanings of the topics (Chang, Boyd-Graber, Wang, Gerrish, & Blei, 2009). To enhance topic interpretation, the study incorporates the term-topic relationship scheme proposed by Sievert and Shirley (2014). This approach measures the "relevance" of terms to each topic, resulting in more coherent and interpretable topics.

The relevance score for each word in a topic is computed as a weighted average of the logarithms of the term's probability within the topic. ($\emptyset_{k,n}$) and its "lift" (ratio of the term's probability within the topic ($\emptyset_{k,n}$) to its marginal probability across the corpus (P_n)). Mathematically, the relevance score for topic (k) and word (n) is as follows:

$$r(n,k|\lambda) = \lambda \log(\phi_{kn}) + (1-\lambda)\log\left(\frac{\phi_{kn}}{P_n}\right), \qquad (4)$$

A weighting parameter (λ) is introduced to balance the relevance measure. In this study, λ is set to 0.6, following recommendations by Sievert and Shirley (2014). Finally, each financial disclosure (d) in the dataset is assigned to the topic with the highest probability of occurrence as determined by the LDA. This simplifies topic categorization. θ_d for further analysis and aligns with established practices.

3.4 Financial Ratios

The study aims to explore whether key financial performance indicators drive the topics discussed by managers in the annual 10-K narratives in line with prior related studies (Hasan, 2020; Jegadeesh & Wu, 2013; Kang & Han, 2018). After obtaining the topics, we evaluate the distribution of the topics across the different financial ratios. The quantitative financial data for the sample companies are collected from DataStream, providing information on financial performance indicators. Financial ratios are used to assess a company's financial health and performance. There are many different types of financial ratios, including liquidity ratios, profitability ratios, and debt ratios. Liquidity ratios measure a company's ability to meet short-term

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obligations, such as paying bills and payroll. Profitability ratios measure a company's ability to generate profit from its operations. Debt ratios measure a company's ability to manage debt and other financial obligations. Table 1 details key financial performance indicators used in the study, with specifications of measures and sources.

Table 1. Data and Variables

Financial Ratios	**Measuring Formulas**	**Source**
Performance indicator		
Return On Equity	Net Income divided by Equity	DataStream
Current Liquidity		
Current Ratio	Current Assets divided by Current Liabilities	DataStream
Solvency		
TIE ratio	EBIT divided by total Interest Expense	DataStream
Efficiency		
Total Assets Turnover	Net Sales divided by Total Assets	Authors' calculation
Market performance		
Earnings Per Share	The company's Profit divided by the Outstanding shares of Common Stock.	DataStream
Control Variables		
R&D Expenses	Research and Development Expenses scaled by Total Assets.	Authors' calculation
Leverage	Ratio of Total Debt divided by the Total Assets.	Authors' calculation
Cash Holdings	Cash & Cash Equivalent divided by Total Assets	Authors' calculation
Tangibility	Net Property, Plant, and Equipment divided by Total Assets.	Authors' calculation

3.5 Control variables

In this study, we will incorporate firm-specific controls as indicators based on related prior literature (Hasan, 2021; Kang and Han, 2018; Jegadeesh and Wu, 2013). These controls encompass various firm-level variables that have been found to be influential in previous research. The firm-specific control variables include: Tangibility of Firm's Assets (TANG), which refers to the proportion of tangible assets in the firm's total assets, and it could influence the topics of 10-Ks. Financial Leverage (LEV) represents the extent to which the firm uses debt financing, which could impact the topics of 10-Ks. Additionally, Firm's Cash Holdings (CASH) signifies the level of cash reserves held by the firm, which could be a source of managerial anxiety if not utilized efficiently. The impact of excess cash reserves on the topics of 10-Ks has been subject to contradictory arguments in the prior literature. Harford et al. (2008) found a negative association between excess cash reserves, low shareholder rights, and firm profitability and valuation. Dittmar and Mahrt-Smith (2007) examined the role of corporate governance and found that well-governed firms utilize their reserves better than poorly governed firms.

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Furthermore, the study will consider the firm's ability to develop innovative capabilities as an essential determinant of performance. Specifically, Research and Development (R&D) Spending. This variable captures the firm's investment in research and development activities, which can significantly influence the topics of 10-Ks. Artz et al. (2010) observed a positive association between R&D spending and patents, and a negative association with Return on Assets (ROA) and sales growth for a sample of 274 firms from 1996 to 2004. Cardinal and Hatfield (2000) reported that firms with higher R&D spending tend to have more patents compared to firms with lower R&D spending. By incorporating these firm-specific control variables into our study, we aim to better understand their potential impact on the topics discussed by managers in 10-Ks and contribute to the existing body of literature on this topic.

3.5 Estimation Model: System GMM

To test the effects of the financial performance indicators on the topics outlined in the financial reports of the 10-K filings, this study uses the System Generalized Method of Moments (System GMM) estimator. System GMM chosen due to the dynamic aspect of the model, the possible endogeneity of explanatory variables, and the panel form of the data, which has a large number of firms (N) and a time dimension (T) that is relatively short. The presence of the lagged dependent variable brings in the dynamic endogeneity, and thus the OLS or the fixed effects estimators would be biased and inconsistent (Nickell, 1981). System GMM, which was given by Arellano and Bover (1995) and Blundell and Bond (1998), deals with three important econometric issues. First, Endogeneity; Financial performance indicators and narrative disclosures can be agreed upon. System GMM alleviates this problem by applying internal instruments, that is, lagged values of endogenous variables. Second, Unobserved Firm Heterogeneity; the effects of firms that are firm-specific (μi) are dropped via first-differencing. Third, Dynamic Bias; even when a lagged dependent variable is present, the estimator will be consistent. Based on the associated literature, the base dynamic panel model can be stated as:

$$Topic_{i,t} = \alpha Topic_{i,t-1} + \beta FP_{i,t-1} + \gamma X_{i,t-1} + \mu_i + \varepsilon_{i,t} \quad (5)$$

Where $Topic_{i,t}$ denotes the topic intensity (or probability) extracted from the 10-K report of firm i in year t. $Topic_{i,t-1}$ is the lagged dependent variable, capturing persistence in managerial discussion. $FP_{i,t-1}$ represents the vector of lagged financial performance indicators (profitability, liquidity, solvency, efficiency, and market performance). $X_{i,t-1}$ is a vector of firm-specific control variables. μ_i captures unobserved firm-specific effects. $\varepsilon_{i,t}$ is the idiosyncratic error term.

4. Results and Discussion

4.1 Descriptive Statistics and Preliminary Analysis

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Table 2 depicts the descriptive statistics of the topic measures obtained from the Management Discussion and Analysis (MD&A) section of the 10-K reports of the firms and the financial performance measures. The topic variables are the probability strength of any topic produced by the Latent Dirichlet Allocation (LDA) model, which indicates the amount of focus that the managers would have on certain discussion themes during that particular year. The summary statistics reveal that there is significant variation in topic intensity among the firms and with time, indicating that there was heterogeneity in the managerial communication strategies. The Revenue and Growth and Income and Expenses have greater average intensities than the other two, which is the reason why managers mainly focus on performance-related stories. Conversely, the means of Cost of Production and Research and Development are relatively low, but the dispersion is higher, which suggests that these issues are focused on selectively depending on the traits of firms and their financial statuses.

Table 2. Summary statistics

	Mean	Std. Dev.	min	max	Skewness	kurtosis	p25	p75
Topic 1 **Revenue and Growth**	.186	.224	0.000	.992	1.38	4.119	.004	.283
Topic 2 **Income and Expenses**	.5	.286	0.000	.998	-.239	1.758	.25	.741
Topic 3 **Market Risk Factors**	.083	.131	0.000	.953	2.605	11.645	0	.11
Topic 4 **Cost of Production**	.119	.226	0.000	1	2.299	7.309	0	.096
Topic 5 **Research and Development**	.112	.209	0.000	.905	1.961	5.544	0	.07
ROE	.148	.826	-9.007	10.528	.886	16.908	-.052	.27
Tie ratio	2.168	1.814	-6.774	11.779	.55	5.817	1.111	3.026
Current ratio	1.362	.928	-0.273	11.481	.815	5.162	.694	1.928
Leverage	.383	.821	-0.035	12.293	5.341	40.266	.002	.372
Asset turnover	.538	.497	-1.401	10.92	2.713	28.103	.151	.794
Cash holdings	.132	.174	-0.491	1.099	1.665	5.052	.003	.187
Tangibility	.179	.189	-1.156	1.224	1.082	3.158	.027	.28
R&D	.097	.317	-1.747	9.528	9.485	143.13	0	.073
EPS	1.02	1.295	-35.638	19.296	.272	27.043	.262	1.773

The financial ratios are also varied enough, and this justifies their appropriateness in dynamic panel estimation. The analysis of correlation (Table 3) does not indicate any signs of too much multicollinearity between the explanatory variables since the pairwise correlations are below traditional levels. These initial findings are enough to justify that the multivariate System GMM estimation should go ahead.

Table 3. Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

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ROE	1.000								
Tie ratio	0.055	1.000							
	(0.015)								
Current ratio	-0.304	0.373	1.000						
	(0.000)	(0.000)							
Leverage	0.153	-0.372	-0.404	1.000					
	(0.000)	(0.000)	(0.000)						
Asset turnover	0.054	0.216	-0.035	-0.010	1.000				
	(0.000)	(0.000)	(0.000)	(0.002)					
Cash holdings	-0.084	0.146	0.290	-0.064	-0.123	1.000			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
Tangibility	-0.001	-0.132	-0.152	-0.037	0.014	-0.281	1.000		
	(0.867)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
R&D	0.129	-0.135	-0.095	0.179	-0.111	0.160	-0.110	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
EPS	0.169	0.210	0.036	0.056	0.051	-0.179	0.089	-0.240	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

4.2 System GMM Results:

4.2.1 Return on Equity (ROE) and Managerial Discussion Topics

Table 4 presents the System GMM findings that investigate the relationship between the Return on Equity (ROE) and the five LDA-extracted managerial discussion topics. Most specifications have a positive and statistically significant lagged dependent variable, which supports the presence of persistence in disclosure behavior, and the use of a dynamic panel estimator (Arellano & Bond, 1991; Blundell & Bond, 1998). Further, ROE has a positive and significant relationship with Topic 2 (Income and Expenses), which signifies that companies with greater profitability to shareholders are more likely to emphasize more on narratives regarding income generation, profitability, and expenses management. This observation is in line with the signaling theory, which states that managers of high-performing companies prioritise the reporting of positive financial performance to signal power and credibility to the investor (Spence, 1973; Schleicher, 2012). Previously existing empirical studies also indicate that greater profitability correlates with a greater financial-oriented and confident narrative disclosure (Aly et al., 2018; Hasan, 2020).

Conversely, ROE has no significant influence on Revenue and Growth, Market Risk Factors, Cost of production and Research and Development issues. This implies the idea that equity-based levels of profitability have a minor impact on influencing more strategic, risk, and innovation-based debates. Using agency theory, managers may disclose only profitability-related narratives where shareholders have direct interests, whereas they do not disclose other issues because of the requirements of regulations, operational constraints, or long-term strategic benefits instead of short-term equity returns (Jensen & Meckling, 1976; Nadeem, 2022). Comprehensively, the outcomes

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have shown that ROE selectively affects managerial communication. Strong equity performance also seems to be a tool used by managers to reinforce the discussion of income and expense management as opposed to the systematic change of growth and risk, cost, and innovation narratives. This observation is consistent with the existing disclosure research that indicates that the content and emphasis of managerial discussion are influenced by financial performance, but not the whole of it (Li, 2010; Mushtaq et al., 2022).

Table 4. Return on Equity (ROE) and Managerial Discussion Topics

VARIABLES	Topic 1 **Revenue and Growth**	Topic 2 **Income and Expenses**	Topic 3 **Market Risk Factors**	Topic 4 **Cost of Production**	Topic 5 **Research and Development**
L.Topics	0.762***	0.826***	0.356	0.947***	1.002***
	(0.116)	(0.155)	(0.225)	(0.126)	(0.0508)
ROE	-0.00108	0.0243*	-0.00386	-0.00439	0.00896
	(0.00953)	(0.0146)	(0.00662)	(0.00781)	(0.0107)
R&D	-0.0261	-0.0169	0.0235	0.0101	-0.0352
	(0.0350)	(0.0519)	(0.0230)	(0.0223)	(0.0379)
LEVERAGE	-0.00112	-0.0285*	0.0145**	0.00545	0.00913
	(0.00844)	(0.0163)	(0.00703)	(0.00712)	(0.00862)
CASHHOLDINGS	0.000204	-0.0981**	0.0210	0.0118	0.0259
	(0.0304)	(0.0500)	(0.0240)	(0.0177)	(0.0314)
TANGIBILITY	0.0310	-0.0454	0.0333	0.0373	-0.00930
	(0.0351)	(0.0564)	(0.0306)	(0.0434)	(0.0253)
Constant	0.0436*	0.116	0.0405**	-0.00360	-0.00113
	(0.0258)	(0.0792)	(0.0182)	(0.0142)	(0.00988)
Observations	29,186	29,186	29,186	29,186	29,186
Number of CIK	3,381	3,381	3,381	3,381	3,381

Note: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2.2 Current Ratio and Managerial Discussion Topics

Table 5 shows the estimates of System GMM that analyzes the relationship between the Current Ratio and the five LDA-extracted topics of the 10-K report prepared by firms. The coefficients on the lagged dependent variables are significant and positive in all specifications, which proves the persistence of managerial disclosure patterns and justifies the dynamic panel framework (Arellano & Bond, 1991; Blundell & Bond, 1998). The findings show that there is a negative and statistically significant relationship between the Current Ratio and Topic 1 (Revenue and Growth). This observation indicates that companies that emphasize better short-term liquidity place less emphasis on growth-based stories. The Signalling theory suggests that the high liquidity firms might not be under pressure to explain expansion strategies, hence

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making the management of such companies less concerned with the aggressive expansion debate (Spence, 1973; Schleicher, 2012). This finding is in line with earlier findings that companies that are comfortable with their liquidity status have more conservative forward-looking disclosures (Hasan, 2020).

The coefficients of Current Ratio in Topics 2-5 are not significant, and it is possible to suggest that liquidity is not the systematic factor in the discussion of income and expenses, market risk drivers, cost of production, or research and development. It implies that liquidity impacts mostly the strategic growth accounts, not operational, risk, or innovation-based disclosures. Agency theory, Managers of liquid firms might face less questioning of creditors and short-term stakeholders, and therefore, may not be required to focus on the finer details of operational or risk-related explanations (Jensen & Meckling, 1976). The results suggest that short-term financial stability selectively impacts the discourse by managers. Although liquidity helps to reduce the focus on the growth stories, it does not alter the debate regarding the financial structure, production costs, or innovation materially. This selective effect holds in line with disclosure literature that financial ratios influence the context of and focus of narrative disclosures, but not the volume thereof (Li, 2010; Mushtaq et al., 2022).

Table 5. Current Ratio and Managerial Discussion Topics

VARIABLES	Topic 1 **Revenue and Growth**	Topic 2 **Income and Expenses**	Topic 3 **Market Risk Factors**	Topic 4 **Cost of Production**	Topic 5 **Research and Development**
L.Topics	0.692***	0.988***	0.530*	0.870***	1.001***
	(0.107)	(0.178)	(0.272)	(0.0711)	(0.0409)
Current Ratio	-0.0228***	0.00978	0.00337	-0.00308	0.00132
	(0.00759)	(0.0138)	(0.00517)	(0.00551)	(0.00818)
RD	-0.0375	0.00129	0.00555	-0.000867	-0.0108
	(0.0234)	(0.0343)	(0.0135)	(0.0132)	(0.0249)
LEVERAGE	-0.00878	-0.0213	0.0157**	0.00620	0.0100
	(0.00922)	(0.0177)	(0.00738)	(0.00673)	(0.00997)
CASHHOLDINGS	0.0413*	-0.119**	0.0111	0.00892	0.0297
	(0.0228)	(0.0509)	(0.0184)	(0.00995)	(0.0323)
TANGIBILITY	0.00399	-0.0742	0.0385	0.0489	0.0146
	(0.0353)	(0.0622)	(0.0301)	(0.0322)	(0.0297)
Constant	0.0917***	0.0272	0.0206	0.00929	-0.0104
	(0.0306)	(0.0955)	(0.0250)	(0.0157)	(0.0155)
Observations	31,502	31,502	31,502	31,502	31,502
Number of CIK	3,338	3,338	3,338	3,338	3,338

Note: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2.3 Times Interest Earned (TIE) Ratio and Managerial Discussion Topics

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Table 6 presents the System GMM estimates investigating the relation between the Times Interest Earned (TIE) ratio and the five LDA-extracted topics of the 10-K reports of companies. In all the specifications, the coefficients of the TIE ratio are not significant at the statistical level, meaning that the interest coverage capacity of the firms does not have a significant effect on the focus on any of the five managerial discussion topics. The non-significance is an indication that managers do not change focus on narratives with a change in debt-servicing ability. Intuitive to an agency theory approach, interest coverage is principally the concern of the agency of debtholders and lenders as opposed to equity investors who are the main audience of the narrative disclosures (Jensen & Meckling, 1976). As a result, managers can also deal with risks associated with debts by using quantitative financial statements in place of the thematic format of qualitative disclosures.
Likewise, in signaling theory, the firms with high or low interest coverage would have no incentives to signal the information using narrative topics, because the debt-servicing ability is directly visible in financial ratios (Spence, 1973; Schleicher, 2012). There are previous studies on prior disclosure indicating that managers pointlessly focus on the performance indicators that are less mechanically observable and more open to interpretation, like the growth prospects or innovation strategies (Li, 2010; Hasan, 2020). The non-significance of the TIE ratio in all topics is also consistent with the empirical results indicating that measures of solvency usually offer weaker explanatory power to the content of narrative disclosures than profitability and liquidity statistics (Aly et al., 2018; Mushtaq et al., 2022). In addition, the disclosure requirements required by regulators may standardize discussions of risks and leave the managers with less discretion than they have when changing the focus of the discussion in response to interest coverage changes. The results suggest that the TIE ratio is not significant in determining the thematic content of managerial discourse. This indicates that not every single measure of financial performance has the same impact on storytelling, and it is important to identify various aspects of financial performance when analyzing managerial communication tactics.

Table 6. Times Interest Earned (TIE) Ratio and Managerial Discussion Topics

VARIABLES	Topic 1 **Revenue and Growth**	Topic 2 **Income and Expenses**	Topic 3 **Market Risk Factors**	Topic 4 **Cost of Production**	Topic 5 **Research and Development**
L.Topics	0.249	0.327	-0.274	-0.311	0.120
	(0.277)	(0.437)	(0.311)	(0.679)	(0.418)
TIERATIO	-0.0172	0.0375	-0.0341	-0.0109	0.00240
	(0.0190)	(0.0439)	(0.0271)	(0.0459)	(0.00594)
R&D	1.066	-0.870	-1.452	-0.658	1.064
	(1.367)	(2.868)	(1.250)	(4.250)	(0.946)

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LEVERAGE	0.0233	0.314	-0.0590	-0.758	0.0232
	(0.247)	(0.367)	(0.160)	(0.496)	(0.0512)
CASHHOLDINGS	-0.00459	0.588	-0.203	-0.0903	-0.0919
	(0.341)	(0.560)	(0.240)	(0.457)	(0.119)
TANGIBILITY	-0.100	0.605	-0.167	-0.0450	-0.0889
	(0.272)	(0.458)	(0.254)	(0.350)	(0.0742)
Constant	0.151	-0.0214	0.295**	0.556**	0.0325
	(0.131)	(0.384)	(0.148)	(0.282)	(0.0360)
Observations	539	539	539	539	539
Number of CIK	105	105	105	105	105

Notes: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2.4 Asset Turnover and Managerial Discussion Topics

Table 7 provides the System GMM estimates that investigate the relation between the Asset Turnover, which is a key efficiency measure, and the five managerial discussion topics that were extracted using LDA. The lagged dependent variables reveal the existence of mixed persistence across the topics, which implies that the efficiency-related disclosures manifest higher levels of temporal flexibility than the disclosures that are prompted by profitability or liquidity reasons (Arellano & Bond, 1991; Blundell & Bond, 1998). The findings indicate the positive and highly significant link between Asset Turnover and both Topic 1 (Revenue and Growth) and Topic 2 (Income and Expenses). This implies that companies that make more effective use of their resources in their stories put stronger emphasis on growth opportunities and operational profitability. According to signaling theory, managers of companies that are operating efficiently emphasize better performance of company operations to communicate competitive advantage and managerial capabilities to stakeholders (Spence, 1973; Schleicher, 2012). Similar research in the past records that optimistic and performance-based disclosure content has a strong association with efficiency measures (Li, 2010; Hasan, 2020).

Conversely, Asset Turnover has a negative and significant association with Topic 4 (Cost of Production) and Topic 5 (Research and Development). This implies that efficient firms that are high performers are less prone to being cost-driven or innovation-driven uncertainty. It can be understood in one way as the operation efficiency eliminates the necessity to substantiate the production costs or long-term R&D investments in narrative disclosures. This action is in line with agency theory that states that the managerial team is strategic in directing the disclosure attention to issues that are most likely to portray positive current operations (Jensen & Meckling, 1976). Asset Turnover has no significant effect on Topic 3 (Market Risk Factors), meaning that risk-related disclosures are more habitually motivated by regulatory

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requirements and industry-specific attributes in contrast to the internal efficiency indicators. On balance, such results indicate that operational efficiency is one of the potent predictors of managerial discourse, which influences the focus and the lack of discussion of issues in 10-K reports. The findings build on existing literature of disclosure by demonstrating that efficiency not only strengthens positive performance statements but also represses the discourse of cost and innovation risk (Aly et al., 2018; Mushtaq et al., 2022).

Table 7. Asset Turnover and Managerial Discussion Topics

VARIABLES	Topic 1 **Revenue and Growth**	Topic 2 **Income and Expenses**	Topic 3 **Market Risk Factors**	Topic 4 **Cost of Production**	Topic 5 **Research and Development**
L.Topics	0.259	0.211	-0.546***	0.0568	0.524***
	(0.217)	(0.200)	(0.188)	(0.251)	(0.160)
ASSET TURNOVER	0.0717***	0.0749***	0.00577	-0.0530***	-0.0662***
	(0.0212)	(0.0192)	(0.00606)	(0.0161)	(0.0216)
R&D	-0.0518***	-0.0359***	-0.0566***	-0.0785***	0.111***
	(0.0177)	(0.0115)	(0.0104)	(0.0227)	(0.0388)
LEVERAGE	-0.0129***	0.0131**	0.0343***	0.00246	-0.0115**
	(0.00463)	(0.00616)	(0.00729)	(0.00418)	(0.00517)
CASHHOLDINGS	-0.0475***	-0.0349**	-0.0502***	-0.0822***	0.109***
	(0.0153)	(0.0169)	(0.0124)	(0.0256)	(0.0371)
TANGIBILITY	-0.139***	-0.167***	-0.0499***	0.556***	-0.0754***
	(0.0428)	(0.0451)	(0.0177)	(0.147)	(0.0260)
Constant	0.143***	0.384***	0.142***	0.0661***	0.0755***
	(0.0422)	(0.0986)	(0.0182)	(0.0201)	(0.0252)
Observations	32,694	32,694	32,694	32,694	32,694
Number of CIK	3,404	3,404	3,404	3,404	3,404

Notes: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2.5 Earnings Per Share (EPS) and Managerial Discussion Topics

Table 8 shows the System GMM estimates that evaluate the association between Earnings Per Share (EPS) and the five LDA-extracted managerial discussion subjects. The relative flexibility of the lagged dependent variables shows that market-performance-based narratives are more adaptive to changing firm conditions and they adjust faster to them, which is in favor of the dynamic modeling framework (Arellano & Bond, 1991; Blundell & Bond, 1998).

The findings indicate that EPS and Topic 2 (Income and Expenses) have a negative and statistically significant relationship. This would indicate that the companies that have greater earnings per share would be willing to decrease the focus on the discussions concerning income and expenses. In terms of signaling theory, high performance on the stock market can reduce the importance of managers explaining

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profitability or cost management because this wave of information is already represented in the indicators based on stock markets (Spence, 1973; Schleicher, 2012). This observation is in line with the fact that managers deemphasize accounting-oriented stories at market opportunities that are positive (Li, 2010).

EPS, on the other hand, demonstrates a positive and strongly significant correlation with Topic 4 (Cost of Production). This shows that the companies that have higher performance in terms of earnings are more inclined to discuss the issues associated with the efficiency of production, cost structures, and operational risks. This action is cognizant of the agency theory that indicates that managers of high-performing firms strategically contextualize the earnings by emphasizing operational hardships and cost management to reduce the possible investor over-optimism and control expectations (Jensen & Meckling, 1976; Nadeem, 2022). EPS has no significant influence on Revenue and Growth, Market Risk Factors, and Research and Development issues. This means that market-based performance is the main cause of operation cost narratives, not the growth orientation or innovation-related disclosures. The previous literature also reveals the selective development of narrative focus by market indicators instead of a consistent effect on disclosure content (Hasan, 2020; Mushtaq et al., 2022). These results indicate that EPS has a contextual role in managerial communication, which supports the line of reasoning that market performance affects the way managers frame operational discourses and not the existence of performance information communication.

Table 8. Earnings Per Share (EPS) and Managerial Discussion Topics

VARIABLES	Topic 1 **Revenue and Growth**	Topic 2 **Income and Expenses**	Topic 3 **Market Risk Factors**	Topic 4 **Cost of Production**	Topic 5 **Research and Development**
L.Topics	-0.0574	0.227	-0.634***	-0.0786	0.240
	(0.237)	(0.203)	(0.177)	(0.257)	(0.387)
EPS	0.00118	-0.00849***	0.00210	0.0111***	-0.00144
	(0.00237)	(0.00313)	(0.00189)	(0.00373)	(0.00123)
R&D	-0.0862**	0.0240	-0.323***	-0.215***	0.336*
	(0.0439)	(0.0378)	(0.0526)	(0.0580)	(0.185)
LEVERAGE	-0.0562**	-0.0488*	0.111***	0.0619**	-0.00478
	(0.0276)	(0.0255)	(0.0231)	(0.0269)	(0.00859)
CASHHOLDINGS	0.0618*	-0.0344	-0.00220	-0.157***	0.0985*
	(0.0328)	(0.0286)	(0.0313)	(0.0465)	(0.0519)
TANGIBILITY	-0.283***	-0.190***	-0.0922***	0.648***	-0.0285*
	(0.0701)	(0.0545)	(0.0294)	(0.158)	(0.0147)
Constant	0.297***	0.446***	0.148***	0.0381**	0.0142*
	(0.0677)	(0.117)	(0.0195)	(0.0155)	(0.00744)
Observations	14,664	14,664	14,664	14,664	14,664
Number of CIK	2,463	2,463	2,463	2,463	2,463

Notes: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

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This study investigates the impact of the financial performance indicators of firms on the managerial discussion context and the thematic structure of annual 10-K reports. This study leans more to the topic-based approach to disclosure, rather than the tone-based approach, and uses the Latent Dirichlet Allocation (LDA) method to identify five economically relevant topics in the Management Discussion and Analysis (MD&A) section and approximate their determinants through a dynamic System GMM model. The research offers new evidence of the strategic allocation of narrative attention by managers on various themes to respond to firm-level financial conditions. The empirical data are good evidence of the selective influence of financial performance indicators about managerial discussion, and not an extensive influence on all the features of narrative disclosure. In all specifications, the lagged dependent variables are very significant, which proves the continuity of disclosure strategies and justifies the dynamism of managerial communication.

The results show that the impact of profitability in terms of Return on Equity ROE on the managerial narratives is limited and focused. The greater the ROE, the greater the focus on income and expense-related discourses, implying that managers of successful companies reinvent narratives that promote financial restraint and shareholder wealth. However, ROE is not of great importance in debates surrounding growth, risk, production expenses, and research and development. This means that equity profitability is a stronger influence on narratives that are of immediate interest to shareholders, and not on more general strategic or operational themes. In terms of its proxies, Liquidity measured by the Current Ratio, has a negative and strong relation with revenue and growth discussions. Companies that have more favourable short-term liquidity status seem less likely to focus on expansion stories, which could be due to the fact that financial stability does not cause the need to explain expansion policies. On the one hand, liquidity does not have a significant impact on the debate concerning income, risk, cost structures, or innovation. This observation raises the selectivity of liquidity impacts on disclosure settings.

Further, the Times Interest Earned (TIE) ratio, which is the value of solvency and ability to service the debt, does not greatly influence any of the topics extracted. It implies that there is no systematic change in the narrative focus by managers based on the fluctuation in interest coverage. The amount of solvency-related information might already be transparent enough in the form of quantitative disclosures, and no further narrative focus might be necessary. Moreover, the Asset Turnover has become one of the strongest factors that determine managerial discussion because it is the metric of operational efficiency. Discussions on revenue and growth, and income and expenses, are positively related to higher asset turnover, whereas cost of production and research and development are negatively related to higher asset turnover. These

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findings indicate that the high-performing companies focus on performance-based accounts and deemphasize cost imperatives and uncertainty of future innovation. Efficiency is thus key in the formation of inclusion and exclusion of certain themes in managerial disclosures. Lastly, the market performance, as reflected by the Earnings Per Share (EPS), reflects a subtle effect. Increased EPS is linked to less focus on the income and expenses discourses, but more focus on the cost of production discourse. This suggests that the high-performing firm's managers can put in context strong earnings by putting a lot of focus on operational cost issues, which may be strategically aimed at controlling investor expectations and reducing the understanding of unsustainable performance.

This research contributes to the existing knowledge regarding narrative disclosure, financial reporting, and corporate communication in a number of ways. First, it contributes to the disclosure research by shifting the focus beyond the traditional sentiment- or tone-based analysis and proposes a contextual, topic-level analysis. Although the previous research is mostly concerned with whether the disclosed information is optimistic or pessimistic, this research shows that what the managers are willing to discuss is also significant. The study is more insightful in addressing managerial communication strategies because it connects financial ratios to disclosures that are concerned with a topic. Second, the results have implications for the agency theory since they indicate that there is a strategic way in which managers can disclose information depending on the financial performance. The profitability and efficiency promote the narratives that support the competence of managers, whereas the less favourable financial landscape shifts the focus to the risk, cost, or justification-focused debates. These trends are aligned with the perception that narrative disclosures form one of the mechanisms to address information asymmetry and bring about a consistent view between the stakeholders' perception and the managers' interests.

Third, the findings provide solid evidence of signalling theory. Managers of strong companies, who have financial resources to leverage, pick and choose positive performance stories, like growth opportunities or efficiency, and repress any stories that can confuse. On the other hand, managers focus on the issues of operational costs to pull down unduly high expectations when market-based performance is high. This signalling behaviour in a strategic sense highlights the communicative value of narrative disclosures as being more than just a compliance mechanism. Fourth, the research forms a complement to the findings of the market efficiency theory through its demonstration that narrative disclosures convey economically significant information that cannot be fully reflected by financial statements only. Despite the fact that financial ratios can be seen publicly, managers nonetheless manipulate the situation of disclosure based on these ratios, which is why narrative disclosures have an interpretive role in creating investor knowledge.

This research has significant implications for investors, analysts, regulators, and managers of corporations. To investors and financial analysts, the findings indicate that narrative disclosures must be viewed together with underlying financial performance. Managers do not talk about everything; instead, they focus on themes that are consistent with existing financial realities. Topics level analysis of MD&A disclosures, therefore, allows analysts to understand more about the intent of managers, the possible biases, and to understand how firms position their performance. To regulators and standard-setters, the results indicate the strategic character of narrative disclosures. Although the existing disclosure policies guarantee a minimum of it, managers still have a lot of freedom in the way they orient the thematic focus of their disclosure. Regulators can gain through promoting more openness and uniformity in the manner in which companies comment on major financial aspects, especially on the aspects of risk exposure and cost frameworks. To the managers of corporations, the research offers information on effective communication practices. Learning about the impact of financial performance on disclosure focus will enable firms to manage their narrative reporting according to the expectations of the stakeholders and remain credible. Managers ought to understand that biased coverage of some subject matter can affect the way the market views and the level of trust in their investment. To auditors and governing bodies, the findings indicate that it is important to observe narrative disclosures rather than just numerical accuracy. Managerial discourse changes, which are topic-based, can also indicate some financial stresses or repositioning that need more attention.

This study has a number of limitations. First, the sample of the U.S. publicly listed companies is analyzed, which might not be generalizable to different institutional or regulatory settings. In overseas markets, disclosure practices and incentives at the managerial level might vary. Second, LDA is a very effective topic extraction tool, yet it is based on probabilistic assumptions and researcher bias when assigning topics. Other text-analysis techniques can result in different topic structures. Third, the paper studies annual 10-K reports, which are disclosure behavior in the long-term. The connection between quarterly disclosures and other communication methods, including earnings calls or press releases, can be investigated in the future in order to obtain more prompt managerial reactions to financial results. Fourth, inasmuch as System GMM takes into consideration the issue of endogeneity, there is no econometric method that can control all sources of bias. Managerial personality traits or firm culture are unobservable factors that might have an impact on disclosure behavior. This research can be expanded in a number of ways by future studies.

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Researchers can test the cross-country variations in topic-based disclosures, analyse the effects of corporate governance and executive traits, or determine the influence of topic emphasis on market outcomes like stock returns, volatility, or analyst forecasts. Also, combining the approach of machine learning with the qualitative analysis may contribute to the further improvement of the interpretability of narrative disclosures.

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