The Signalling of Managerial Tone: Evidence from the Earnings Conference Calls

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By

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Declaration

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

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Abstract

This thesis attempts to investigate the signalling role of managerial tone in the context of corporate disclosure. It first starts with a literature review in-depth to review how managers use their tone (roles) and why they use them(determinants). A detailed analysis of 81 published studies between 2010 and 2021 informs scholars about the current state of research on managerial tone. Based on a signalling framework, this thesis examines the following questions: Does managerial tone have a signalling role? Does the signal (tone) match the latent information it intends to convey? Can the receiver(analysts) correctly interpret the signal and send feedback to confirm(disconfirm) the signal? Does the signalling environment impact signalling effectiveness? How does tone signalling effectiveness varies across signaller's characteristics? Using a sample of earnings conference call transcripts from FTSE350 firms, empirical tests in this thesis provide evidence that managerial tone can produce effective signals matching the private information from managers. Analysts accurately understand tone signals and send confirmation feedback to managers. The information environment can moderate signalling effectiveness. Beyond this, top managers with a stronger ability and signalling willingness can strengthen tone signalling effectiveness, while top managers with less signalling willingness weaken tone signalling effectiveness. The findings suggest that managerial tone represents a reliable signalling device for transmitting latent information about a firm's quality and future performance and that receivers can correctly understand this signal and develop a consistent interpretation. It implies that managerial tone can be used for two-way communication. Further, prestigious top managers with more ability and signalling willingness are more valuable for firms to improve their signalling process.

Contents

1.Introduction

1.1 Background of the study

The narrative disclosure of companies receives great academic attention. Understanding the narrative information of corporate disclosure is important. On the one hand, narrative can be informative by itself. For example, various emotional words in the text can affect the stock return(Bochkay et al., 2020;Azimi et al., 2021). This implies the text may contain or convey some information and this information has been absorbed into markets which can influence the stock price. Similarly, narrative disclosure can bring more news and information about the firm's existing and planned investment(Durnev and Mangen, 2020;Berns et al., 2021), predict the firm's future policy(Avramov et al., 2021), risk (Rjiba et al., 2021) and cooperation relationship with other stakeholders(Hossain et al., 2020;Greiner et al., 2020). Hence, narrative can play a role to provide incremental information. On the other hand, narrative can give a context to facilitate the reader's encoding and process of the accounting numbers. All quantitative information can only supply an incomplete picture and the narrative can affect how the information has been perceived and understood. For example, Baginski et al. (2016) find that when the quantitative signal has the same sign as the textual information, the market's pricing becomes stronger. This suggests that quantitative and textual information complement each other to affect investors' judgment. Another example is that Boudt and Thewissen (2019) find that managers use more positive words at the beginning and end of the CEO letter to present a more positive audience perception because audiences normally focus more on the beginning/conclusion and pay less attention to the middle part. Therefore, narratives can also play a role for managers to influence the audience. Furthermore, companies utilize narratives to communicate with their stakeholders. For example, managers interact with analysts and manage firms' communication with financial stakeholder in the public earnings conference calls(Brown et al., 2019). Firms also communicate with investors on a social media platform and manage investors' evaluation through various Twitter messages(Cade, 2018). Hence, narratives can be used in the two-way communication channel to build conversation and connectivity(Brennan and Merkl-Davies, 2018).

In the past decade, text analysis techniques have been significantly developed (Lewis and Young, 2019), and different textual attributes of narrative information have been investigated. One strand focuses on the remarkably investigated research of readability, which is how difficult the managers make their narrative to read(Lo et al., 2017;Bonsall and Miller, 2017;Bonsall et al., 2017). Moreover, one strand focuses on tone: the sentiment of the text(Chen and Loftus, 2019;De Amicis et al., 2021;Allee et al., 2021), which still attracts many scholars. Besides, a significantly less explored research strand focuses on topic modelling, which is the contents or what type of information the managers choose to disclose(Mauritz et al., 2021;Ryans, 2020). This thesis focuses on managerial tone. Basically, it is the various emotions managers express in the accounting narrative. More specifically, this thesis attempts to investigate the signalling role of managerial tone in the setting of earnings conference call. I select conference call to examine the research questions in this thesis for two reasons. First, the firm's top management team is directly involved in the conference call. In contrast, other disclosure media are mostly written and edited by different individuals who are unlikely to be firm executives (Larcker and Zakolyukina, 2012).Second, conference call capture real-time, two-way communication (Matsumoto et al., 2011;Gow et al., 2021). The audience mainly includes professional financial experts who can ask questions and provide comments during the conference call. This enables managers to receive the audience's feedback immediately and thereby increases the visibility and speed of the entire signalling process—from the signaller to the receiver and to the signaller again as feedback. Thus, the use of conference calls gives this thesis a unique advantage in that I can observe the end-to-end, real-time signalling process involving the manager's tone and the receiver's feedback. Moreover, research on two-way communication is important because firms can benefit from the connectivity to obtain stronger relationship with stakeholders, develop reputation and generate knowledge to avoid risk(Brennan and Merkl-Davies, 2018).

1.2 Motivation of the thesis

Corporate narrative disclosure is one form of voluntary disclosure. Information asymmetry is an underlying assumption of the research on voluntary disclosure (Beattie, 2014;Bergh et al., 2019). Managers have more information than outsiders about a firm's economics, prospects, or risks (Healy and Palepu, 2001). This

information difference leads to the imperfect functioning of the capital market (Akerlof, 1970). This incentivizes managers to disclose private information to communicate their valuable knowledge of the firm's situation to outsiders.

Healy and Palepu (2001) and Beyer et al. (2010) examine the voluntary disclosure literature to discuss six motives that will affect managers' voluntary disclosure decisions: capital market transaction, corporate control contests, stock-based compensation, litigation costs, proprietary costs, and management talent signalling hypotheses. Extant tone research primarily focuses on capital market transactions in which managers use tone to provide information to the capital market to reduce information asymmetry(Azimi et al., 2021;Feldman et al., 2021;Bassyouny and Abdelfattah, 2021). A few studies start to explore firm control contest motivation (Chen et al., 2020), stock compensation motivation (Arslan-Ayaydin et al., 2016), litigation motivation (Cazier et al., 2019), and proprietary cost motivation (Allee et al., 2021). However, there is very little focus on the signalling hypothesis that managers have superior information than the outside and use tone to signal the firm's prospects.

Signalling theory offers a powerful explanation model for voluntary disclosure research(Bergh et al., 2014). It helps explain how signalling actors, such as signallers and receivers, navigate information asymmetry, informational uncertainties and the decision making associated with them(Bergh and Gibbons, 2011). According to Connelly et al. (2011), there are two primary actors in the signalling process. Specifically, the signaller (e.g., the firm, managers) needs to choose whether or how to signal their private information and the receiver (e.g., stakeholders) needs to choose how to interpret the signal and respond accordingly(Connelly et al., 2011). Beyond this, the signalling environment can influence the signalling effectiveness (the extent to which the signalling process reduce the information asymmetry) and the behaviours of each actor during the signalling(Connelly et al., 2011). Extant signalling research has more consideration on the choice of signal and the effect of signalling, such as whether the signaller chooses a specific signal to communicate the private information(Lys et al., 2015;Aggarwal et al., 2012) or whether there is stock price reaction after the signal has been released(Liu et al., 2020;Arslan-Ayaydin et al., 2020). However, there is scarce focus on the other half of the signalling process – how the receiver interprets the signal and gives a response, and how the contextual factors

(e.g., information asymmetry degree, signaller characteristics) play a part in affecting the signalling.

In conference calls which are one of the most important voluntary disclosure settings, managers are very likely to signal future performance. Conference calls involve sophisticated investors who are more interested in the future than current firm performance because the current performance has been disclosed in other channels before the conference call(i.e. earnings press releases). Chapman and Green (2017) provide evidence that analysts requested forward-looking information in nearly one-third of discussion sessions. Langberg and Sivaramakrishnan (2010) show that managers disclose information to seek feedback from analysts on some proposed project initiatives, before making long-term commitments. The information demand from the sophisticated audience drives managers to change their disclosure choices and adopt tools to facilitate further disclosure. Based on the above, managers are very likely to signal some private information in conference calls to influence the audience's understanding of the firm's prospects and reinforce the audience's confidence in the firm. As an evident and observable signal, managerial tone has been less examined in terms of the signalling hypothesis(Trueman, 1986).This thesis intends to fill in the above gap to investigate the signalling role of managerial tone in the context of corporate disclosure. It draws on the signalling theory and intends to implement a complete empirical test of the tone's signalling process in the conference call setting, such as whether managers use their tone as a signal, whether the managerial tone has a fit with the private information it wants to convey, how the receivers interpret managerial tone and present with a response, and whether the contextual factors (information asymmetry, managers' characteristics) affect the tone signalling process.

1.3 Research aim/objectives and questions

In chapter 2, I aim to offer a comprehensive literature review on the use of managerial tone in the context of corporate disclosure. The prior literature review mainly focuses on detailed textual analysis methods. There is an insufficient literature review to synthesize the multiple roles that managerial tone plays and investigate various determinants affecting managers' tone choices. Particularly, the current review largely focuses on what and how to apply textual analysis techniques in accounting research,

there is a limited understanding of the intention and motives of managerial tone in the context of corporate disclosure. Given the wide variety of corporate disclosure media, from traditional annual reports, earnings press releases to two-way interactive conference calls, social media and the current literature on managerial tone, there is a need for an integrative review to organize these findings. I hence have conducted a systematic search of journals ranking at 3, 4, and 4* in the accounting and finance sections of the Association of Business Schools (ABS) list. It employs both manual and electronic keyword searches. A more detailed narrative review analysis of the cited papers has built on 81 studies published between 2010 and 2021 across 33 journals. First, the current state of research on managerial tone informs scholars about publication year, publication journals, used narrative disclosure media, the country, and tone analysis methods. Second, the narrative review classifies and assesses the tone's informative and influencing roles by discussing different strands of selected papers. Third, the narrative review investigates different motivations and determinants in the subfields of institutional context and managers' characteristics. Finally, this chapter maps a future direction with theoretical and practical implications. In a word, this chapter reviews how managers use their tone (roles) and why they use them (determinants). It describes the current research state of this topic, integrates the important roles and determinants, and discusses how this research can shape future research.

In chapter 3, from a managerial (i.e., insider) perspective, I examine the signalling role of managerial tone in the context of corporate disclosure. Based on a signalling framework, I examine the following research questions: Does managerial tone have a signalling role? Does the signal (tone) match the latent information it intends to convey? Can the receiver (analyst) correctly interpret the signal and send feedback to confirm (disconfirm) the signal? Does the signalling environment impact signalling effectiveness? Extant tone studies largely investigate whether there is a positive association between tone and different aspects of capital market performance (i.e. stock return, market volatility, market trade, etc). The underlying assumption in these studies is that a positive association suggests that tone provides useful information to impact the capital market. However, to date, we have only limited knowledge about how the signal receiver perceive signals (e.g., managerial tone). Many extant tone studies have more consideration on a one-way/signaller focused communication

process, such as whether what kind of tone generates desired outcomes of the capital market (Wisniewski and Yekini, 2019;Durnev and Mangen, 2020), but have neglected the signal receivers. This constitutes and important research gap: whether signal receiver notice, interpret and send feedback to the signaller. This is very less studies to test this important aspect of the signalling process that signal receivers or stakeholders can interpret and act upon signals from firms. I present the signalling theoretical framework from Connelly et al. (2011) and develop the hypothesis drawn on this to test the above research questions. Using a sample of 3,680 transcripts of earnings conference calls from 241 UK firms in the Financial Times Stock Exchange 350 Index, I found that managerial tone can produce effective signals matching the private information from managers. Analysts accurately understand tone signals and send confirmation feedback to managers. Further, the information environment can moderate signalling effectiveness. This suggests that managerial tone represents a reliable signalling device for transmitting latent information about a firm's quality and future performance and that receivers can correctly understand this signal and develop a consistent interpretation. These findings have implications in demonstrating that managerial tone can be used for two-way communication.

Chapter 4 investigates whether CEOs intend to use their tone to "signal" the firm's prospects and how tone signalling varies across the four different CEO's characteristics (whether CEO has the MBA, whether CEO has the financial experience, the gender of CEO and the tenure of CEO). This chapter is an extension of Chapter 3. Beyond tone signalling, contextual factors influencing the signalling process are relatively understudied, and little research has focused on how signalling processes vary depending on the signaller, especially in tone study. This chapter intends to fill in this gap by empirically testing a sample of 1,861 UK earnings conference calls with the CEO directly involved. Specifically, I look at the moderation effect of the four CEO's characteristics on the tone signalling (the relationship between CEO tone and future performance). The prior literature on signalling theory focuses more on the signal's influence, such as whether stock prices are affected after managers send out a signal, but scarcely examines the area of the signalling environment. This chapter aims to extend this research line and provide richer evidence of signalling contextual factors (signallers' characteristic) that moderate signalling effectiveness in the context of voluntary disclosure. The results from a series of regression analyses reveal the signal

provided through CEO tone matches the private information it aims to convey. Firms expecting good performance in the next quarter (private information) used a more optimistic tone in conference calls. While those expecting poor performance spoke less optimistically. More importantly, the association between CEO tone and future performance is strengthened when CEOs have the stronger ability (e.g., CEOs with MBAs hold more business knowledge or CEOs have prior financial experience). What's more, female CEOs are more willing to enhance tone's signalling; however, CEO with longer tenure are less willing to do it. This suggests that CEO's characteristics can be the moderator to strengthen or weaken the association between CEO's tone and the firm's future performance. This finding implies that top managers with the stronger ability and more signalling willingness convey the firm's value and prospects more effectively to outsiders; thus, it is more successful in signalling and reducing the information symmetry.

1.4 Research methods

Extant tone studies mainly employ quantitative research methods based on collection of secondary data. Accounting researchers collect corporate narrative transcripts, for example, annual reports (texts apart from financial statement), earnings press release, conference call, management forecast, etc. They use textual analysis technique to extract various tone from these texts and make tone as a quantitative variable for statistical analysis. There are two studies, Tan et al. (2014) and Emett (2019), which employ qualitative research methods (e.g., experiment) to manipulate people's language attributes (tone) to see the impact of tone on investors' behavior.

There are two methods to measure tone in mainstream narrative disclosure research. First, the widely used method is a wordlist to count emotional words' appearance frequency. In texts, more optimistic(pessimistic) words from a predefined wordlist mean a higher optimistic(pessimistic) tone. Nowadays, various wordlists are developed based on different background domains, like Harvard and General Inquire wordlist created from social psychology domain(Doran et al., 2012), Diction list created from politics and mass media domain(Davis et al., 2012). The most popular in Accounting and Finance is Henry wordlist(Henry, 2008) and Loughran and McDonald (2011) wordlist since they are developed from specific financial text like earnings

announcements, annual reports and conference calls. Second, another method is employing a machine learning algorithm (e.g., Naïve Bayes classifier, support vector classifier) to measure tone. Based on a manually trained sample, the algorithm can return with various emotional categories with indicated emotional scores or levels. This method needs massive advanced textual analysis technique but proves challenging to replicate in different studies, which makes it less used in the current tone analysis of accounting and finance area.

In this thesis, the Loughran and McDonald (2011) wordlists have been used as the tone measurement method because it is the only wordlist developed from annual reports and conference calls, making it highly related to the data sample (conference call) collected for this thesis. Moreover, Henry and Leone (2016) conclude that the wordlists approach works as effectively as the machine learning advanced approach, especially for the tone analysis in the financial context. In a word, this thesis employs quantitative research methods with managerial tone extracted with specific wordlist for statistical analysis, based on earnings conference call transcripts of FTSE350 firms.

1.5 Intended contribution of the thesis

This thesis intends to contribute the literature in three ways. First, from the theoretical perspective, this thesis contributes to the signalling theory by developing an understanding of how the signalling process is expressed through the tone. Through the empirical test in the conference call setting of whether the managerial tone has a signalling fit with the private information it wants to convey, whether the receiver can correctly interpret and confirm with feedback and whether the contextual factors (e.g., information asymmetry or signallers' characteristics) play a significate part to influence the signalling process, this thesis intends to enhance the understanding of the signalling role that the tone plays in the context of corporate disclosure. It helps test the foundational signalling relationship and explain the organizational phenomena. Moreover, this thesis provides evidence that managerial tone can be used in the two-way communication model that the audience can respond and give feedback through the tone. Prior tone studies have more consideration about one-way information transmission (e.g., whether tone provides incremental information) but lack the observations that tone has been used to engage in the conversation, build a better

relationship and strengthen mutual understanding(Merkl-Davies and Brennan, 2017). This thesis intends to give more insight into tone's two-way communication role by testing the relationship between the signaller's tone and receiver's tone and how the receiver interprets the tone signal.

Second, from the practical perspective, this thesis extends the signalling literature by demonstrating managerial tone can be a good signal to convey managers' private information or expectation of the firm's prospects. It complements the extant literature, which has shown that managers use various signalling devices to reduce information asymmetry, including bank loan loss provision (Kiridaran et al., 2004), discretionary accruals (Louis and Robinson, 2005), special items (Riedl and Srinivasan, 2010), dividend increase (Aggarwal et al., 2012), and corporate social responsibility (Lys et al., 2015). Moreover, this thesis contributes to the literature on signalling, with its predominant focus on signal receivers, and empirically test the theoretical framework in Connelly et al. (2011). The receiver and signalling environment in the signalling process are relatively insufficiently researched areas in signalling theory (Connelly et al., 2011). We add to the literature with new empirical evidence on how a receiver interprets and acts upon a signal via receivers' tone and how the environment affects signalling. Beyond this, this thesis intends to contribute to the signalling theory by extending its predictions to the top managers' characteristics and demonstrating the important moderation role that top managers' characteristics play in influencing signalling effectiveness. It also complements the literature of managers' characteristics that human factors can shape voluntary disclosure behaviour.

Third, from the management implication perspective, the firm needs to pay attention to the tone's role during the signalling process. The tone is the most observable and direct textual attribute of two-way narrative disclosure (e.g., conference calls, social media). It can convey the signaller's private information or expectation of the prospects. Moreover, it can engage in a feedback confirmation from the audience. This thesis intends to enhance the understanding of the tone's communication role which can effectively help firms reduce information asymmetry and build better connectivity with their stakeholders. This also helps managers to learn the importance of the channel to signal in the conference calls. Small and medium companies can learn from FTSE350 firms. Furthermore, the firms need to consider the influencing role of top

managers' characteristics. Prestigious directors with more business knowledge and prior experience are more valuable for firms to improve their signalling process. The female leader is more willing to enhance their signalling, whereas a leader with longer tenure is less willing to do it. This thesis intends to give insight into human factors affecting the organization's disclosure behaviour and the firms need to consider the leaders' characteristics during their recruitment.

1.6 Structure of the thesis

The remainder of the thesis is structured as follows. In Chapter 2, I conduct an in-depth presentation of related literature. I begin by describing the literature survey approach and continue by outlining the current tone research status including publication year, publication journals, used narrative disclosure media, the country, and tone analysis methods. I continue with the main part of this chapter which focuses on detailed narrative literature review to investigate and assess the roles that managerial tone plays and the determinants of it in various subfield. The chapter concludes with a discussion of future research direction. Chapter 3 empirically tests the signalling theoretical framework from Connelly et al. (2011). After a discussion concerning the motivation for the study and a glance at the existing evidence, I present the signalling theory and develop the hypotheses that are tested. Since this comprises the first empirical work in the thesis, I provide all the necessary details relating to the conference call transcripts, tone measurement methods and the construction of the respective empirical models, highlighting the usefulness and appropriateness of each. After specifying the details of the extensive set of control variables that is used, the sample characteristics and the descriptive statistics, I present and discuss the empirical results. In Chapter 4, I extend the investigation between CEO tone and future performance with the focus on the moderation effect of CEO's four characteristics. The research process including the research methods is similar to Chapter 3. After introducing the main subject and the motivation for researching it, I provide a description of the conceptual framework and the hypotheses arising from it. I continue by analytically explaining each of the four CEO's characteristics and provide justification as to the moderation effect estimate. In chapter 5, the results and conclusions are brought together, even though a discussion and conclusion section of

all the relevant findings is provided in each above chapter. Following this, brief suggestions about possible future research directions are also provided.

2.The use of managerial tone in corporate disclosure: a review in accounting and finance

2.1 Introduction

Managerial tone, as a kind of textual attribute, refers to the emotions managers express in accounting narratives, such as optimistic, pessimistic, uncertain, or risky(Chen and Loftus, 2019;De Amicis et al., 2021;Allee et al., 2021). The concept emerged in the last decade with the development of textual analysis techniques, and has been empirically discussed in subfields such as market-based accounting research (Henry, 2008;Loughran and McDonald, 2011), impression management (Cho et al., 2010;Huang et al., 2014b), corporate governance (Rogers et al., 2011), and upper echelons theory (Davis et al., 2015). Managerial tone not only contains incremental information to reduce information asymmetry (Feldman et al., 2010;Wang, 2020) but also contributes to managers' strategic reporting to influence their audience (Moreno et al., 2019;Yang and Liu, 2017). Accordingly, studies on this topic are largely driven by the question, "what is the role and purpose of managerial tone?"

Although many studies have assessed managerial tone over the past decade, there is insufficient literature review of these studies. Particularly, there is a limited understanding of the intention and motives of managerial tone in the context of corporate disclosure. The current review largely focuses on what and how to apply textual analysis techniques in accounting research. For example, Li (2010b) studies textual analysis of corporate disclosure, including tone(the sentiment of the text(Chen and Loftus, 2019;De Amicis et al., 2021;Allee et al., 2021)), readability (how difficult the managers make their narrative to read(Lo et al., 2017;Bonsall and Miller, 2017;Bonsall et al., 2017)), similarity, and voice, but with less focus on managerial tone since there is very little published work at that time. Textual analysis in accounting is still in its initial stages. Further, Kearney and Liu (2014), Loughran and McDonald (2016) and Lewis and Young (2019) focus on the detailed methods of textual analysis (e.g., wordlist-based methods and machine learning), various empirical models and how they should cope with the relevant accounting research hypotheses. They do not provide an integrative and concise syntheses of the use of tone in corporate disclosure.

Given the wide variety of corporate disclosure media, from traditional annual reports, earnings press releases to two-way interactive conference calls, social media, and the current literature on managerial tone, there is a need for an integrative review to organize these findings.

To fill the above gap, our comprehensive review contributes to managerial tone literature in several ways. First, I organize and synthesize the tone-related literature to advise on the current research on managerial tone (see Table 1). Second, I assess and clarify the role and purpose of managerial tone in corporate disclosure (see Tables 2 and 3). Third, I investigate and synthesize the literature to assess the motives and determinants of managerial tone (see Tables 4 and 5). Finally, with a critical review of managerial tone in the context of disclosure, I suggest directions for future research. This literature review also has implications for the broader research on communication between capital market participants and firms.

2.2 Scope and Methods of the Review

Our literature review contains two steps to provide an overview of the relevant studies, including a categorical statement of their research purpose, used narrative sample, and methods. First, to identify the scope of the review, I systematically searched the following academic journals: journals in the Accounting and Finance sections of Academic Journal Guide 2021, issued by the Association of Business Schools (ABS list 2021). To ensure the homogeneous quality of the searched papers, I limit our search to journals with ratings of 4*, 4, and 3. The search methods combined both manual search and search tools provided by each e-journal to achieve search completeness. The search keywords were tone, sentiment, optimism, pessimism, qualitative, narrative, text analysis, and word frequency. Second, I employ content-related inclusion and exclusion criteria(Colombo, 2021) to decide whether to retain the papers for further analysis. The inclusion criterion according to our research objectives is managerial tone, a clearly identified and empirically studied construct in the matter of corporate disclosure, even if the tone is not the main focus of the study. Studies on the tone of investors or the public, news media, business press, and financial analysts are omitted. Consequently, I identified 81 original research papers that fit these criteria,

listed by published journals, published year, disclosure media, country, and tone analysis methods in Table 1.

Table 1 - Count of published papers cited

Panel A: by Journal	Total
ABACUS	1
Accounting and Business Research	3
Accounting Forum	2
Accounting, Auditing & Accountability Journal	2
Accounting, Organizations and Society	2
Auditing: A Journal of Practice & Theory	1
Contemporary Accounting Research	5
European Accounting Review	2
Financial Analyst Journal	2
Financial Management	2
International journal of financial economics	1
International Review of Financial Analysis	6
Journal of Financial Economics	2
Journal of Accounting and Economics	2
Journal of Accounting Public Policy	4
Journal of Accounting Research	4
Journal of Banking & Finance	2
Journal of Business Finance and Accounting	2
Journal of Corporate Finance	4
Journal of Empirical Finance	1
Journal of Financial and Quantitative Analysis	1
Journal of Financial Markets	1
Journal of International Financial Markets, Institutions& Money	1
Journal Real Estate Finance and Economics	1
Review of Accounting Studies	4
Review of Quantitative Finance and Accounting	4
The Accounting Review	13
The British Accounting Review	1
The European Journal of Finance	1
The Financial Review	1
The international Journal of Accounting	1
The Journal of Financial Research	1
The review of Asset Pricing Studies	1
Total	81

(continued)

Table 1 (continued)

Panel B: by Year	
2010	4
2011	1
2012	5
2013	1
2014	3
2015	7
2016	6
2017	4
2018	10
2019	9
2020	20
2021	11
Total	81
Panel C: by Disclosure Media	
10-K filing	8
10-K MD&A	11
10-K environment disclosure	1
8-K filing	2
IPO filing	1
Proxy statement	1
Annual Report	7
CEO letter	3
Chairperson's statement	4
Conference call	18
Earning press release	13
Management earnings forecasts	2
Interim Management Statement	1
CEO statements of corporate sustainability reports	1
Social media	1
Integrated reports	1
Combination of above 2 or 3 media	6
Total	81
Panel D: by Country	
Germany	1
Ireland	1
Singapore	1
UK	11
US	64
Cross-countries	3
Total	81

(continued)

Table 1 (continued)

Panel E: Tone analysis methods	
Diction list	7
Henry list	6
LIWC list	1
Loughran and McDonald list	42
Self-built list	4
Combination of above 2, 3, or 4 lists	14
Machine learning	2
Manual coding	3
Experiment on tone manipulation	2
Total	81

The selected studies were published from 2010 to 2021, mainly because of the development of the automated computer-based tone analysis approaches. Three-quarters of these studies chose 10-K filing (e.g., forward-looking statements, MD&A sections), annual reports (e.g., CEO letters, chairperson's statements), earnings press releases, and conference calls as qualitative research data. The main capital market context is in the United States, with 64 out of 81 studies focusing on the United States' narrative disclosure media. The main tone analysis method is the wordlist-based approach, with Loughran and McDonald's(2011) wordlist as the most popular.

2.3 Results of the Review

In this section, I discuss the selected reviewed papers from four different perspectives. First, the main role and purpose of the managerial tone in corporate disclosure are to provide incremental information and reduce information asymmetry. Second, the managerial tone also plays the role of influencing the audiences and their decision-making behaviour in favour of managers and firms (Brennan and Merkl-Davies, 2018). Third, the literature finds that the institutional context, such as corporate governance, litigation, stock compensation, corporate control contests, proprietary costs, institutional distance, and labour concerns, could be the determinant of managerial tone. Fourth, other studies find that managers' characteristics, such as gender, prior experience, cultural background, career concern, and overconfident attitude, could be determinants of managerial tone. To help categorize the literature, I tabulate all cited

reviewed papers in Tables 2, 3, 4 and 5(appendix I), following the reviewing order and the perspectives discussed above.

2.3.1 Role in providing information

Information asymmetry is the central assumption in this strand of research. Over the past decades, accounting scholars have shifted their focus from traditional quantitative information to the latest qualitative information and consistently asked, “will accounting attributes provide incremental information?” If so, “what kind of information do they provide?” Driven by this question, it is not surprising to find that the most important perspective of the studies of managerial tone is what information it can provide.

Stock return. The most direct and observable is whether managerial tone can provide incremental information that affects stock returns. Yekini et al. (2016) reports that the positive tone of the UK annual report has a significant positive association with contemporary stock returns. Doran et al. (2012) use conference call transcripts for publicly traded real estate investment trusts to give similar results that net positive tone has significant explanatory power for the contemporary stock price reaction. Bochkay et al. (2020) find that when managers use more extreme words (e.g., extremely positive or extremely negative), stock prices react more strongly. The latest study by Azimi and Agrawal (2021) also finds that a positive tone in the 10-K filing is positively associated with contemporaneous abnormal returns, while a negative tone is negatively associated with abnormal returns. Loughran and McDonald (2013) report that the uncertainty tone in IPO filings produces higher first-day returns. Wang (2020) finds that the net pessimistic tone of MD&A risk disclosure is positively associated with credit default swap spreads around the filing date. The above evidence suggests that various managerial tones (e.g., positive, negative, uncertainty) contain incremental information, and this information has been fully incorporated into the share price to have an impact on the capital market, based on the underlying assumption of the efficient market hypothesis (EMH).

Since managerial tone provides incremental information, other studies are concerned whether such information is true. In other words, does the market price it correctly? Feldman et al. (2010) and Price et al. (2012) provide evidence that net positive tone

in MD&A and conference calls is positively associated with initial stock returns and post-earnings announcement stock returns. This suggests that the tone's information effect can last for a long time, and the market price it correctly. Wisniewski and Yekini (2019) find that activity tone and realism tone in the UK annual reports are positively associated with future stock returns, suggesting that managerial tone provides information to predict stock returns over a longer horizon. Moreover, Feldman et al. (2021) find that the positive tone of order backlog disclosure in 8-K filings is associated with immediate and drift returns, suggesting the usefulness of certain qualitative disclosures.

Alternatively, Jiang et al. (2019) provide opposite evidence that net positive tone in 10-K, 10-Q, and conference calls is negatively associated with future stock returns. The initial stock market might be overvalued for a positive tone and will be corrected by the subsequent lower stock returns when more fundamental information is revealed. Similarly, Gordon et al. (2012) also report that a more positive tone in earnings press releases before restatement is associated with more negative market returns around restatement. This suggests that a more positive tone raises a more positive expectation for investors, whereas the restatement in the later stage disconfirms the previous disclosure, which leads to a much larger negative surprise. Overall, the empirical evidence on the correct or incorrect pricing of managerial tone is ambiguous.

Interestingly, some studies find new evidence that there are some moderating factors that can affect the association between managerial tone and stock returns. For example, Cheng et al. (2021) claim that market reactions to managerial tone in 8-K fillings are more positive if the positive tone is presented earlier in the document. The ordering of positive information strengthens the association between tone and market returns. Managers tend to use tone placement to convey more useful information, and investors respond more strongly to the prioritized tone. Tan et al. (2014) use an experiment to provide evidence that readability and investor sophistication affect investors' judgment of managerial tone. The tone has a remarkable effect on investors' judgment when readability is low, but a weak and less relevant effect when readability is high. Tone can easily affect the judgment of less sophisticated investors, but not for more sophisticated investors. Baginski et al. (2016) report that the accompanying quantitative information can confirm the information included in managerial tone.

When the quantitative signal has the same sign as the managerial tone, the market's pricing will be stronger. The quantitative signal seems to strengthen the credibility of the managerial tone, and the market correctly responds to it. Apart from the above features related to the disclosure information itself (e.g., ordering, readability, and accompanying quantitative signal), two other studies find that the information environment will also affect the association between managerial and stock returns. Boudt et al. (2018) reported that the level of information asymmetry affects the tone's informativeness. When firms have higher information asymmetry (e.g., smaller size, younger, in a higher growth stage), the managerial tone has a more informative signal to the capital market. Tsileponis et al. (2020) also provide consistent evidence that the impact of tone in corporate press releases on market returns is negatively moderated by the tone of media articles. It is quite possible that media tone already reflects part of news or information that reduces information asymmetry; thus, the market reaction will be less strong for the managerial tone in corporate disclosure. Furthermore, two other studies, Brockman. et al. (2015) and Chen et al. (2018) find that markets react much more strongly to analysts' tone than the managerial tone in the conference call. Analysts' tone seems to be more reliable and credible to impact the capital market than the managerial tone when managers and analysts interact in the conference call.

Overall, this section reviews the most important role of managerial tone in providing incremental information to affect market returns. Some disclosure features, such as the ordering of information, readability, and accompanying quantitative information, together with information asymmetry or media tone, can moderate tone's impact on stock returns. However, it is still unclear whether the information conveyed by the tone is true or false.

Market volatility. A few studies extend the above research on managerial tone and stock returns to investigate whether tone can provide information about investors' perceived risk. They quantify investors' perceived risk using the standard deviation (SD) of stock returns or implied options volatility to examine whether tone discloses some information about the firm's uncertainty and whether the market can recognize it. Elshandidy and Shrives (2016) report that the managerial tone of risk disclosure in German firms' annual reports has an impact on market liquidity and investors' perceived risk. The good news with a positive tone will improve market liquidity and

reduce investors' perceived risk. Conversely, the bad news with a negative tone has the opposite effect. Borochin et al. (2018) report similar results that higher(lower) net positive tone in conference calls leads to less(more) perceived market uncertainty. With some difference, Campbell et al. (2020) provide evidence that disclosure tone volatility (SD of tone) is positively associated with market-based risk. Investors view higher tone volatility as a signal of a firm's operating uncertainty and response with a larger stock return volatility. Overall, managerial tone can provide specific information about a firm's uncertainty or risk, which impacts the market's perceived risk.

Trading volume. The research on the association between managerial tone and trading volume mirrors the above research on stock returns and market volatility to conclude that the market views managerial tone as informative and responds with larger investors' trading disagreement. Bochkay et al. (2020) find that when managers use more extreme tone words in a conference call, the abnormal trading volume increases. Azimi and Agrawal (2021) report that positive(negative) tone in 10-K is associated with a lower(higher) abnormal trading volume. Baginski et al. (2018) also reported that residual tone in management earnings forecasts can explain disagreement in investors' trading behaviour measured by abnormal trading volumes around the announcement date. A higher optimistic residual tone is associated with an increased abnormal trading volume. Overall, managerial tone can provide information, and the market will respond with abnormal trading volume.

In summary, the above review mainly discusses whether managerial tone can provide incremental information to the capital market and whether the market can absorb this information in response to stock returns, perceived risks, and abnormal trading volume. The following sections focus on a different angle of whether tone can contain information to predict or explain the future firm's performance, policy, investment, and the behaviour of related auditors and analysts. It focuses more on the explanatory power and predictive power of managerial tone because tone can provide a context for quantitative information and can be useful in predicting firm outcomes.

Future performance. A few studies report that managerial tone can predict and explain future earnings. Li (2010a) finds that the average tone of forward-looking disclosures in MD&A is positively associated with future earnings and liquidity. Tone

contains incremental information regarding a firm's future performance. Davis et al. (2012) also find that net positive tone in earnings press releases is positively associated with future return on assets. Tone contains value-relevant information about managers' expectations of future performance. Rahman (2019) reports that the net positive tone of the third-quarter interim management statement (IMS), but not the first quarter IMS, is positively associated with future earnings. Bassyouny and Abdelfattah (2021) report that the net positive tone of the executive's section in the UK annual report, but not the tone of the governance section, has predictive power for future return on assets. Alternatively, Mayew et al. (2015) show that a negative (positive) tone is positively(negatively) associated with future bankruptcy, and this prediction could be as early as three years before bankruptcy. This suggests that managerial tone could also provide incremental information to predict if the firm will cease as a going concern. Similarly, Elsayed and Elshandidy (2020) create comprehensive wordlist of corporate failures in annual reports to capture a failure-based tone and find that this tone can predict corporate failure up to two years ahead of the actual failure. Overall, the above evidence suggests that managerial tone can contain useful and value-relevant information to help explain and predict both future good and poor performance.

Investment. Durnev and Mangen (2020) report that a company's investment amount and investment efficiency are positively associated with the net positive tone of its rivals' MD&A, indicating that managerial tone can bring more news and information about the firm's existing and planned investment and affect other firms in the industry. Berns et al. (2021) find that the change in net positive tone in MD&A is positively associated with subsequent internal and external investment activities. The tone has rich content that can foreshadow a firm's future investment. Ahmed and Elshandidy (2016) also find that firms with a negative tone in their 10-K filings are less likely to be involved in subsequent M&A activities. Firms with a relatively conservative tone can indicate their conservative behaviour. In a word, managerial tone conveys useful information for predicting a firm's future investments and M&A.

Policy. Law and Mills (2015) report that financially constrained firms that express a more negative tone in 10-K filings will pursue a more aggressive tax policy. The managerial tone reflects the firm's current financial situation and predicts its

subsequent tax policy. Avramov et al. (2021) also find that the risky tone in 10-K filings is associated with diminishing leverage, R&D, capital expenditure, dividend payouts, employment, increasing cash holdings and stock repurchases. Tone-based risk measures can predict corporate policies in the longer run. Conversely, Ertugrul et al. (2017) report that firms with more uncertain tone and weak modal words in 10-K filings can have more stringent contractual terms in bank loans. The ambiguous tone will impact a firm's borrowing cost because the ambiguous tone intensifies the firm's perceived risk and directly weakens its creditworthiness. Rjiba et al. (2021) find that the positive association between annual report complexity and the cost of capital increases when the tone is more negative or ambiguous. Uncertainty tones work together with the readability to reduce the cost of capital. Based on the above empirical evidence, tone can convey information to predict the firm's policy.

Behaviour of analysts and auditors. A few studies provide evidence that managerial tone impacts analysts' and auditors' subsequent behaviours. Bochkay and Joos (2021) report that a net positive tone in conference calls is negatively associated with analysts' risk forecasts. A more positive disclosure tone is associated with lower analysts' forecasts of firm risk. Druz et al. (2020) also report that analysts lower (raise) their earnings estimates when there is a more (less) negative managerial tone. This suggests that managerial tone is an important information source for analysts' forecasts, and analysts rely on qualitative disclosure information in addition to quantitative information.

Greiner et al. (2020) report that a more certain and more optimistic tone in CEO letters is associated with higher audit fees. A more common tone is associated with lower audit fees. Auditors view certainty and optimism as unwillingness to compromise and low credibility, inconsistent with their scrutiny and conservatism preference, requiring higher audit fees. Hossain et al. (2020) also report that a higher abnormal positive tone in 10-K filings is associated with a higher likelihood of a going concern modified audit opinion. Auditors view abnormal positive tone as an indicator of greater risk and are more inclined to issue going concern opinions. Overall, the managerial tone impacts auditors' judgment, and auditors prefer a more conservative and neutral tone.

In conclusion, this section of literature review has examined the informational role of managerial tone. Tone contains incremental information that affects the capital market,

and it is useful for predicting the future firm's outcomes. The purpose is to provide information to seek the capital market reaction or to obtain a signal about the firm's prospects and risks for decision-making purposes.

2.3.2 Role in influencing audience

The empirical findings show that managerial tone could also play a role in influencing its audience to potentially change their perception and decision-making behaviour to obtain their approval and support that can benefit the firms (Brennan and Merkl-Davies, 2018). This is different from the tone's information role in that tone can transmit useful information to reduce information asymmetry. For influencing role, tone is used as an impression management tool or strategic reporting tool, which could deteriorate information asymmetry.

Obfuscation. A few studies show that managerial tone is inconsistent with the firm's actual performance. When a firm has weak performance, the managerial tone tends to cover the weaknesses, mislead the audience, and present a good firm image. For example, Cho et al. (2010) find that firms with worse environmental performance are trying to express more optimistic and less certain tones than firms with better environmental performance. Managers bias the tone in 10-K environment disclosure to mask and blur the firm's poor environmental performance to manipulate the stakeholder's impression. Similarly, Schleicher and Walker (2010) find that loss-making firms tend to express a more positive tone in the UK annual report. Melloni et al. (2017) report that for firms with weak financial performance, the integrated report tends to be more optimistic, much longer, and less readable. Huang et al. (2014b) find a negative association between abnormal positive tone in earnings press releases and firm's future earnings. Firms that are not expected to perform well in the next period will use a current positive tone to mislead the audience. Overall, firms tend to use more positive tones to cover the current or future poor performance, which is an obfuscation strategy that misinforms the audience.

Strategic reporting. A few other studies report that firms tend to increase a positive tone and decrease a negative tone to emphasize good information and diminish poor information. The managerial tone has been strategically used to maintain or repair a firm's image. Davis and Tama-Sweet (2012) find that managers report less negative tone and more positive tone in earnings press releases than MD&A because press releases have a larger stock price effect. Firms use less negative tone when they meet or beat their benchmark. Yang and Liu (2017) also report that firms specifically tend to emphasize positive information on Twitter but choose to omit negative information accordingly. Moreover, Moreno et al. (2019) longitudinally analysed the chairman's statement over a

long period and reported that a positive tone is overwhelmingly used than a negative tone, irrespective of financial performance. Barkemeyer et al. (2014) report that the sustainability report has a higher optimism than the respective financial report, although the sustainability report is expected to go down over time to reflect a realistic sustainability performance.

Moreover, Boudt and Thewissen (2019) find that managers use more positive words at the beginning and end of the CEO letter to present a more positive audience perception because audiences normally focus more on the beginning/conclusion and pay less attention on the middle part. Allee and Deangelis (2015) also report that managers tend to spread positive (negative) words more (less) evenly to have a higher (lower) tone dispersion when firms have improving (declining) information or good (bad) news. Higher positive tone dispersion and negative tone condensation strengthen the audience's positive perception. Differently, D'Augusta and DeAngelis (2020b) report a complex relationship between managerial tone and a firm's current earnings: when earnings are below expectations, tone positively reflects earnings, while when earnings are beyond expectations, tone negatively reflects earnings. Managers may intentionally lower the positive tone to reduce the audience's expectations when firms are prosperous.

Influence of trade behaviour. Brockman et al. (2017) report that firm insiders sell (buy) shares following a positive (buy) tone in a conference call. The managerial tone is inverse and inconsistent with insider trading behaviour. This suggests that managers can manipulate tone to guide stock price away from the fundamental values and take advantage of this mispricing for self-serving trading. Choi (2020) also finds a negative association between tone in MD&A and insider trading, and a negative association is more likely for executives who have inside information.

In contrast, Emett (2019) reports that there are some conditions on which the influence of managerial tone on investors' trading behaviour will rely on. When a firm performs poorly, investors will have more confidence to invest if managers are more likely to discuss the prospect and challenge aggressively. When the firm is performing well, investors will have more trust in investing if managers are more modest, conservative, or negative to discuss the prospect realistically. Blau et al. (2015) report that sophisticated investors (e.g., short sellers) will sensibly interpret the tone's information to do more short

selling, even if there is an unusually positive tone in the conference call. Manipulation of tone does not work properly for sophisticated investors.

In conclusion, this strand of literature examines the role that managerial tone plays in influencing audiences. Managers can use tone to obfuscate poor performance, strategically emphasize positive information, maintain positive perceptions, implement internal trading, and influence investors' trading behaviour. Tone performs like a manipulation tool rather than a transmission signal.

2.3.3 Determinants in the institutional context

This section of the literature examines various institutional context determinants that can affect managerial tone.

Corporate governance. Huang et al. (2020) find that managers with more real earnings management will also use a more positive tone in MD&A and earnings press releases. Goergen et al. (2020) report that firms with CEO duality will have a more positive tone in proxy statements. DeBoskey et al. (2019) also report that CEOs with more power (e.g., longer tenure and CEO duality) express a more positive tone in their earnings announcement. Powerful CEOs with duality or longer tenure can exert greater control over internal and external stakeholders. They obtain more experience, knowledge, and social capital to take the challenge and tolerate the risk of presenting the tone aggressively. However, an overly optimistic tone increases litigation Rogers et al. (2011). Specifically, a positive tone in non-forward-looking statements is more related to subsequent litigation than forward-looking statements (Cazier et al., 2019). Hence, firms with strong corporate governance have incentives to constrain the overly optimistic tone to secure their reputation and reduce litigation risk. For example, DeBoskey et al. (2019) provide evidence that stronger board oversight (e.g., better board independence, higher meeting frequency, and attendance) weakens the effect of CEO power. Lee and Park (2018) find that when a firm has a larger number of finance experts in the audit commission, the abnormal positive tone in MD&A will be reduced.

Moreover, Amoozegar et al. (2020) report that long-term institutional ownership is associated with a diminished and more neutral tone in the conference call because long-term institutional investors encourage managers to focus more on the firm's long-term value. Similarly, D'Augusta and DeAngelis (2020a) find that accounting conservatism in corporate governance can effectively reduce overly positive tone because conservatism in the accounting system imposes a stronger verification requirement, making it harder for managers to manipulate tone opportunistically.

Overall, firms with earnings management and powerful CEOs may use more positive tones, which increase the risk of ligation. Corporate governance mechanisms such as board oversight, financial experts, institutional ownership, and accounting conservatism can restrict this manipulation to some extent.

Stock-based compensation. When managers have more equity-based incentives, the tone of earnings press releases is more positive (Arslan-Ayaydin et al., 2016). Stock-based compensation aligns managers and shareholders' interests, and managers are incentivized to inflate tone to pursue a beneficial stock price.

Corporate control contest. Managers in peer firms with hostile takeover targets tend to disclose more bad news, use more negative tone, or spread negative words more evenly to increase investors' negative perceptions because they want to mitigate the takeover threat from the industry and maintain their current career position (Chen et al., 2020).

Proprietary cost. When a firm has an intense competition product market, managers tend to use a more negative tone and uncertainty tone in conference calls to frame an increased perceived risk and discourage entry or competition (Allee et al., 2021). Managers use tone to understate their prospects or performance to reduce proprietary costs.

Cultural and institutional distance. The tone of cross-listed firms in the United States is more negative than that of domestic firms in the same country (Henry et al., 2021). Cross-listed firms face home bias concerns that local investors lack familiarity and trust in cross-listed firms compared to domestic firms, especially for those with greater cultural and institutional distance. Managers in cross-listed firms use less positive tone to increase perceived credibility and communicate more cautiously.

Labour concern. Firms with higher labour union power choose to use a less positive tone in earnings press releases(Arslan‐Ayaydin et al., 2018). Managers facing stronger labour unions use more negative tones to affect the perception of labour unions about the financial performance of the firm to weaken their bargaining power. Moreover, labour unemployment concerns also affect corporate disclosure tone (Ji and Tan, 2016). For firms with higher labour unemployment concerns, managers will use a less negative tone to affect the perception of employees about the firm's prospects and risks to lower labour costs.

In summary, various institutional context factors incentivize managers to choose different tones. Stock compensation will lead managers to pursue a more positive tone, while corporate governance, takeover threat, proprietary cost, home bias, and labour concern will make them downplay the tone.

2.3.4 Determinants in manager characteristics

This section examines various manager-specific characteristics that affect managerial tone.

Gender. Bassyouny et al. (2020);Arslan-Ayaydin et al. (2020) report that firms with female CEOs tend to use a less positive tone in their annual reports because female managers are more likely to be risk avoiders. Conversely, De Amicis et al. (2021) report that female executives use a more positive and less ambiguous tone than male executives in the conference call because they wish to assert and convince their authority and ability to the audience, especially in a male-dominated business environment.

Experience. Bassyouny et al. (2020) also report that CEOs with previous financial experience tend to use a less positive tone because they know the financial rules very well and prefer a conservative strategy. Davis et al. (2015) find a similar result that managers with an investment bank experience tend to express a less positive tone because they might be more sensitive to the legal cost incurred by an overly positive tone. Moreover, Davis et al. (2015) report that managers with charity experience speak more positively in conference calls than those who do not.

Cultural background. Managers with a more individualistic ethnic culture tend to exhibit a more positive tone in the conference call because individualism is related to independence and self-esteem, which will lead to more optimism (Brochet *et al*.,2019).

Career concern. Arslan-Ayaydin et al. (2020) find that managers with stronger career concerns tend to use a more positive tone in earnings press releases because they want to use the tone to signal their ability and performance to avoid career termination. Moreover, Bochkay et al. (2019a) also report a consistent result that there is a positive association between career concern and CEO's positive tone. At the beginning of CEO tenure, CEOs tend to use more positive tones to convince the outside about their managerial ability and leadership. Along with their tenure, career concern gradually attenuates due to accumulated performance and strategy information disclosed, which diminishes their incentive to prove themselves to affect the outsider's judgment. Lower

career concerns make managers less positive.

Overconfidence. Buchholz et al. (2018) prove that CEO narcissism is positively related to abnormal positive tone in 10-K filings. Bassyouny et al. (2020) also report that narcissistic CEOs tend to play a more positive tone in the annual report. Narcissistic CEOs are more likely to use overly positive tones to present financial performance. Consistent with this, a few studies use the positive tone of corporate disclosure as a proxy for overconfidence to examine the effect of managers' overconfidence. For example, overconfident managers decrease leverage by increasing cash holdings and decreasing dividend payouts to reduce reliance on external financing (Ataullah et al., 2018a). Moreover, they will increase debt maturity (Ataullah et al., 2018b) and use more equity than debt (Vivian and Xu, 2017). Conversely, a few studies criticize managers' overconfidence by proving that overconfident managers might experience worse long-run performance (Yan, 2015) and bring higher systematic risk (Liu et al., 2020).

In summary, the literature finds that gender, experience, cultural background, career concerns, and overconfidence can affect managerial tone. It is still a relatively new area in the literature, and there is no clear and consistent result

2.4 Implications and Directions for Future Research

This final section discusses and summarizes the above reviewed literature and develops a research agenda to stimulate further studies. I present theoretical and practical implications for managerial tone in the context of corporate disclosure.

2.4.1 Theoretical implications

Through a systematic assessment of the above literature on the role of managerial tone, I can draw several conclusions and recommend future research directions. First, the most important and emerging role of managerial tone is to provide information. The literature summarizes that tone can contain incremental information that affects the capital market, raises stock reactions, and affects market volatility and trading volume. It can also provide information to explain future performance, predict further

policy, investment activity, and stakeholders' behaviour. Tone plays a communication role in transmitting and conveying contained information to the audience. However, little is known about the effectiveness of this communication mechanism. Specifically, managers use tone to provide information because of information asymmetry in the capital market. However, does tone solve the problem of information asymmetry? Healy and Palepu (2001) suggest that the extent to which voluntary disclosure mitigates information asymmetry depends on whether the disclosed information is credible. Hence, it is still unclear whether managerial tone holds credibility to effectively reduce information asymmetry or upon what conditions it will hold credibility. One particularly important aspect of tone communication, which is used to explain the effectiveness of tone communication, is cost (Connelly et al., 2011). On the one hand, tone can provide information to reduce information asymmetry based on the assumption that it is credible, reliable, and honest. On the other hand, managers must pay a high price if they use tone to provide false information, and they may develop a reputation for dishonesty. If the tone is costless, which means managers can use tone to communicate or cheat, the effectiveness of the tone's communication is difficult to verify. Accordingly, this would represent a valuable direction for future research to advance the understanding of tone's cost and the effectiveness of tone's communication in different contexts.

Second, to expand on the above discussion, tone can also influence audience behaviour. Managers largely use tone not to transmit information but to affect the audience's perception to obtain their approval or support for the firm itself. The literature summarizes that tone can be used for performance obfuscation to present a good image, strategically reporting to maintain and repair the reputation, and affecting the stakeholders' trading behaviour for self-serving. However, I know very little about whether the audience will be successfully affected and change their judgment. Tone research will benefit from future examinations of the role of audiences in this influence process. As noted earlier, Blau et al. (2015) provide evidence that managers' tone manipulation is not effective for sophisticated investors (e.g., short sellers) who will sensibly interpret the tone's information for their own benefit. Future research could study the impact of tones on additional stakeholders. For example, do sophisticated investors and unsophisticated investors (e.g., analysts, institutional investors,

creditors, and small investors) explain the tone differently? Do the internal audience (e.g., employees), and external audiences (e.g., customers, media, and government) adjust their behaviour differently in response to managerial tone? The studies may need careful design of narrative samples and industries to cope with the appropriate audience type.

Third, Brennan and Merkl-Davies (2018) developed an accounting communication conceptual framework and argued that the purpose of accounting communication is to provide information, influence audiences, or engage in dialog. Similarly, tone research lacks the observations that tone has been used to engage in the conversation, build a better relationship, and strengthen mutual understanding (Merkl-Davies and Brennan, 2017). This is different from one-way information transmission and two-way asymmetric communication with the audience being passively influenced. This focuses more on whether the communicator and audience can effectively interact to obtain better connectivity. Tone is the most observable and direct textual attribute of two-way narrative disclosure (e.g., conference calls, annual meetings, and social media). Thus, the role of tone in accounting for two-way symmetrical communication may be a fruitful direction for future studies.

Fourth, the extant theory largely focuses on two aspects: economic theory (e.g., efficiency market hypothesis for tone providing information to capital market, agency theory for corporate governance to affect tone) and psychology or behavioural theory (tone used for impression management, tone affected by upper echelon characteristics). From the literature in 2.3.1, tone can provide information to affect stock return(Yekini et al., 2016), market volatility(Borochin et al., 2018), trading volume(Bochkay et al., 2020) and can be useful to predict future performance(Elsayed and Elshandidy, 2020) or policy(Avramov et al., 2021). Information asymmetry is the central assumption in this strand of research. The literature follows the efficiency market hypothesis that tone contains incremental information and the capital market can absorb it to respond. The literature in 2.3.3 follows the agency theory that the pursuit of stock compensation(Arslan-Ayaydin et al., 2016) and earnings management(Huang et al., 2020) will lead managers to upward their tone, while corporate governance mechanisms (e.g., board oversight, financial experts, institutional ownership, etc), takeover threat(Chen et al., 2020), proprietary cost(Allee

et al., 2021) will make them downplay the tone. In another side, the literature in 2.3.2 supports the impression management theory that tone can be used as obfuscation or strategic reporting. Tone here is not aiming to provide information but to influence its audience to change their perception and decision-making behaviour. Interestingly, the literature in 2.3.4 follows the upper echelon theory that managers' individual characteristics (e.g., gender, experience, cultural background, career or overconfidence) can affect their tone.

Except the above, It would be beneficial to explore other potential theories, such as legitimacy theory, stakeholder theory, or institutional theory. For example, how do firms use tone to affect societal perceptions of the adequacy of corporate behaviour, especially when the company has a scandal? What is the role of tone in gaining, maintaining, or repairing legitimacy? Is it to reduce the legitimacy gap? How do firms use tone differently to cope with more important stakeholders and less important stakeholders? When engaging in dialog with stakeholders, what is the role of tone to directly ascertain their expectations, needs, and views regarding current organizational practices and policy? The audience's expectations are not static but change over time. It is necessary for firms to respond to current and future changes to the environment in which they operate. Tone, as one of the attributes of language with the largest observability, plays an important role. Scholars may begin to explore how tone not only affects investors and firms but also affects the stakeholders/society.

Fifth, Healy and Palepu (2001) and Beyer et al. (2010) examine the voluntary disclosure literature to discuss six motives that will affect managers' voluntary disclosure decisions: capital market transaction, corporate control contests, stock-based compensation, litigation costs, proprietary costs, and management talent signalling hypotheses. Extant research largely focuses on capital market transactions in which managers use tone to provide information to the capital market to reduce information asymmetry. A few studies start to explore firm control contest motivation (Chen et al., 2020), stock compensation motivation (Arslan-Ayaydin et al., 2016), litigation motivation (Cazier et al., 2019), and proprietary cost motivation (Allee et al., 2021). However, I do not find a study to support or reject the signalling hypothesis that managers have superior information than the outside and would like to use tone to signal their performance or their management ability. It would also be beneficial to

explore whether managers will choose tone to signal (e.g., tone honesty), whether tone will fit with the managers' insider information, and whether the environment will affect the signalling effectiveness.

2.4.2 Practical implications

Throughout the review in the previous sections, I discussed possible opportunities for future research from a practical perspective.

Disclosure media. Most studies largely focus on the United States 10-K or the United Kingdom annual reports, conference calls, or earnings press releases. However, these disclosure channels are possibly affected by the same economic and environmental factors and jointly influence the tone (Li, 2010b). I know very little about whether there is a difference or interaction between tones in different textual disclosure media.

Managers/Audience. The extant literature almost does not distinguish the management roles such as the CEO, CFO, chairman, and operation managers. More studies are needed to investigate the tone of different management roles and the interactions between them. Moreover, little is known about the different categories of audiences, such as sophisticated investors, unsophisticated investors, employees, auditors, customers, and governments. The role of various audiences will be beneficial for tone research in two-way communication as well.

Country/Industry. There has been an almost complete focus on tone in the United States only. I know very little about cross-country differences in the features of tone in the context of corporate disclosure. The managerial tone could be a function of national differences (Henry et al., 2021) and cultural background differences (Brochet et al., 2019). Exploring the differences between countries and linking them to voluntary disclosure could provide more evidence for the tone's motivation and audiences' various responses. The same situation exists in different industries, and it is expected that the finance industry will have a tremendous difference compared to the retail industry, especially in terms of how to use tone to communicate with the audience.

Various textual attributes. Empirical evidence exists on various textual attributes in the context of corporate disclosure, such as abstract and concrete language (Elliott et

al., 2015), deceptive language (Larcker and Zakolyukina, 2012), non-plain English, and erroneous language (Brochet et al., 2016), self-inclusive language (Chen and Loftus, 2019), and vivid and pallid language (Hales et al., 2011). To date, very little is known about the influence and interactions between them. Moreover, exploring the categories of tone can be extended to a broader group: hope, confidence, or resilience, which may need more support from textual analysis techniques.

Longitudinal studies. Another fruitful area for future research is the longitudinal studies on tone. Longitudinal studies such as Barkemeyer et al. (2014), who examine gaps between sustainability reports and financial reports, will be beneficial to investigate the credibility of the tone. Longitudinal studies such as Bochkay et al. (2019a), who examine trends over tenure, focus on the cause-effect of tone and other factors.

2.5 Implication for empirical tests in this thesis

Through the narrative literature review in 2.3, extant tone studies have largely investigated whether tone plays an informational role to convey incremental information. For example, a positive association between tone and stock return suggests that tone provides useful information to impact the capital market (Feldman et al., 2010;Yekini et al., 2016;Bochkay et al., 2020). A positive association between tone and future performance suggests that tone contains valuable signals to predict a firm's prospects (Mayew et al., 2015;Li, 2010a;Davis et al., 2012). Tone can convey information to predict a firm's policy (Law and Mills, 2015) and future investment activity (Berns et al., 2021). We now have increasing academic knowledge on the informational role of tone in that it can signal insightful information on a firm's economics, prospects, and/or risks to help outsiders better assess the firm. However, to date, we only have limited knowledge of how the receiver perceives or interprets signals (e.g. managerial tone). Many extant tone studies have focused more on a one-way/signaller-centred communication process, such as whether performance determines tone (Davis et al., 2012;Davis et al., 2015) or whether tone generates general market reactions (Wisniewski and Yekini, 2019;Durnev and Mangen, 2020), but have neglected the signal receivers. This constitutes an important research gap: how signal receivers notice, interpret, and send feedback to the signaller. There are

very few studies to test this important aspect of the signalling process wherein signal receivers (e.g. stakeholders) can interpret and act upon signals from firms. A few recent tone studies began to divert attention away from the capital market to focus on stakeholders. Greiner et al. (2020) reported that a more certain and optimistic tone in CEO letters is associated with higher audit fees. A more common tone is associated with lower audit fees. Auditors see certainty and optimism as unwillingness to compromise and low credibility, which is inconsistent with their scrutiny and conservatism preferences, and may involve higher audit fees. Hossain et al. (2020) reported that a higher abnormal positive tone in 10-K filings is associated with a higher likelihood of a going concern modified audit opinion. Auditors view abnormal positive tone as an indicator of greater risk and are more inclined to issue going concern opinions. The managerial tone impacts auditors' judgement and auditors prefer a more conservative and neutral tone. This shows that managerial tone is an important source of information for stakeholders, and that they rely on qualitative disclosure information in addition to quantitative information. To fill in the above gap, the following two chapters utilises the signalling framework built by Connelly et al. (2011) to examine interactions between signallers and receivers through managerial tone and empirically test the key signalling process (Connelly et al., 2011) using a conference call as a setting. I have built our hypothesis based on key concepts from Connelly et al. (2011) and their signalling framework, which is a useful theoretical lens to understand how managerial tone engages in two-way communication. According to this framework, managers employ their tone (observable) to signal private information (unobservable) to the audience. Chapter 3 and 4 will aim to examine whether the signal (e.g. managerial tone) fits well with the unobservable information (private information) that it wants to convey; whether the receiver can interpret the signal correctly and send feedback to the signaller; and whether the signalling environment can affect the entire signalling process.

2.6 Conclusion

In this study, I conduct a comprehensive review to identify, interpret, and gain deeper insights into the role that managerial tone plays and factors affecting the tone. I review different literature streams of tone studies in the context of corporate disclosure. In

doing so, I provided a systematic overview of the most important information role and the influence role of managerial tone. I also summarized the extant investigation on the determinants of tone and the factors that can affect the choice of specific tone words. I offer several theoretical and practical suggestions for future research and hope that our review will lead accounting scholars to extend and broaden their understanding and application of managerial tone. Further, I know the potential limitations, such as the search criteria that I apply to select the relevant papers. I acknowledge that alternative search criteria may increase or decrease the sample size. Moreover, I am aware that alternative approaches are available (e.g., focusing on disclosure theory or media). Despite these limitations, our review provides a new perspective to contribute to our understanding of managerial tone in corporate disclosure.

3.Signalling through managerial tone and analysts' response

3.1 Introduction

In the last decade, accounting narrative and textual analysis have gained unprecedented academic attention. Accounting narratives are used to convey and disseminate information to reduce information asymmetry, persuade stakeholders to obtain their approval and support, and initiate a dialogue with stakeholders to strengthen mutual understanding and relationships (Brennan and Merkl-Davies, 2018). Unlike a quantitative financial statement, it is difficult to regulate and standardise the language in accounting narratives owing to the language's complexity and flexibility in terms of grammar, literacy, readability, and tone. These features determine the multiple functions of the language in accounting narratives. Among these features, managerial tone (e.g. optimistic, pessimistic, and neutral) reflects all characteristics of the language and plays various roles (i.e. information providing, influencing audience), making it the focus of most extant studies.

Information asymmetry is an underlying assumption in research on corporate narrative disclosure (Beattie, 2014;Bergh et al., 2019). Managers have more information than do outsiders on a firm's economics, prospects, and/or risks (Healy and Palepu, 2001). This difference incentivises managers to disclose private information to communicate their valuable knowledge of a firm's situation to outsiders. Signalling theory (Spence, 1973) has contributed significantly towards accounting for the scholarly understanding of how managers reduce information asymmetry with corporate narrative disclosure. The signaller needs to choose if and how to signal information and the receiver needs to process and interpret the signal (Connelly et al., 2011). Signalling theory offers a powerful explanatory model (Connelly et al., 2011;Bergh et al., 2014) to help describe how key signalling actors navigate information asymmetry, informational uncertainties, and decision-making (Bergh and Gibbons, 2011).

Managerial tone has gained unprecedented academic attention in the literature on corporate narrative disclosure. Extant tone studies have investigated whether tone

plays a signalling role to convey incremental information. For example, a positive association between tone and stock return suggests that tone provides useful information to impact the capital market (Feldman et al., 2010;Yekini et al., 2016;Bochkay et al., 2020;Brockman. et al., 2015). A positive association between tone and future performance suggests that tone contains valuable signals to predict a firm's prospects (Mayew et al., 2015;Li, 2010a;Davis et al., 2012). Tone can convey information to predict a firm's policy (Law and Mills, 2015) and future investment activity (Berns et al., 2021). We have increasing knowledge on the informational role of managerial tone in that it can signal insightful information on a firm's economics, prospects, and/or risks to help outsiders better assess the firm. However, to date, we only have limited knowledge of how the receiver perceives or interprets signals (e.g. managerial tone). Many extant tone studies have focused more on a one-way/signaller-centred communication process, such as whether performance determines tone (Davis et al., 2012;Davis et al., 2015) or whether tone generates general market reactions (Wisniewski and Yekini, 2019;Durnev and Mangen, 2020), but have neglected the signal receivers. This constitutes an important research gap: how signal receivers notice, interpret, and send feedback to the signaller. There are very few studies to test this important aspect of the signalling process wherein signal receivers (e.g. stakeholders) can interpret and act upon signals from firms.

Based on this motivation, this study utilises the signalling framework built by Connelly et al. (2011) to examine interactions between signallers and receivers through managerial tone and empirically test the key signalling process (Connelly et al., 2011) using a conference call as a setting. It examines whether the signal (e.g. managerial tone) fits well with the unobservable information (private information) that it wants to convey; whether the receiver can interpret the signal correctly and send feedback to the signaller; and whether the signalling environment can affect the entire signalling process.

The first research question is whether the signal (i.e. managerial tone) is correlated with the unobservable quality (private information) it intends to convey. That is, whether managerial tone plays a signalling role to indicate managers' expectations of the firm's prospects. Managerial tone can play a signalling role effectively if the signal is observable and highly correlated with the unobservable quality. Conversely, poor

signalling can occur if a discrepancy exists between the signal and private information (Bergh et al., 2019). Managers' superior private information about the firm's prospects (Lys et al., 2015) or their expectations of the firm's future performance leads them to choose a specific tone for the signal. Managers confident of their firm's superior future performance will be more likely to choose an optimistic tone, given that they want to signal their firm's future success and convince the investors of its ability/prospects. Managers expecting poor performance from their firms will potentially choose a less optimistic tone to signal the risk in advance to reduce investors' expectations. Prior studies have shown that managers use accruals (Louis and Robinson, 2005), dividend increase (Aggarwal et al., 2012), or corporate social responsibility (CSR) initiatives (Lys et al., 2015) to signal their private information to investors. However, very few studies have examined whether managers use managerial tone as a signalling device and whether this tone serves as an effective signal that matches the private information.

The second research question concerns whether the receiver (audience in the conference call) can correctly interpret the signal (managerial tone) and send feedback to the signaller (managers). According to signalling theory, the signalling process is successful when the audience receives and confirms the signal (Connelly et al., 2011). Prior research on tone has mostly focused on the one-way communication model and thus examined tone producers or tones providing incremental information to passive recipients (Brennan and Merkl-Davies, 2018). For example, managers' experience (Davis et al., 2015) and cultural background (Brochet et al., 2019) can influence managerial tone, and managerial tone can impact stock returns (Wisniewski and Yekini, 2019), market volatility (Campbell et al., 2020), and trading volume (Baginski et al., 2018). However, very few studies have focused on the two-way communication model in which the audience correctly understands the information conveyed by the tone and confirms the signal with feedback. Thus, this study aims to fill this gap by testing a more complete signalling process from the signaller to the receiver, particularly considering the receiver's interpretation and feedback.

The third research question examines whether the signalling environment moderates the tone's signalling effectiveness. The drive to reduce information symmetry and

obtain investor support incentivises managers to signal information. When firms are in a good (poor) information environment and have less (more) information asymmetry, managers will have less (more) incentive to signal. The information environment is expected to correlate with the signalling motivation and moderate the tone's signalling function.

I selected corporate earnings conference calls to examine the aforementioned questions, as they capture real-time, two-way communication (Matsumoto et al., 2011;Gow et al., 2021). The earnings conference call is often conducted immediately after the release of financial results (e.g. earnings announcement), typically the end of each financial quarter. The firm's top management team (e.g. CEO, CFO, president of investor relationship, and so on) will first summarise the current performance with a commentary and look for predictions on the future of the business in the presentation segment. After this, the conference calls normally end with a discussion that involves a group of sophisticated audience members (i.e. analysts) asking formal questions. Analysts can process vast narrative disclosure information more easily than unsophisticated audience members. They pay close attention to how a firm's management responds and ask more questions or offer comments. This can help managers receive the audience's feedback immediately and increase the visibility and speed of the entire signalling process, starting from the signaller to the receiver and to the signaller again as feedback. Thus, the use of conference calls gives this study a unique advantage as it is easy to observe an end-to-end, real-time signalling process that involves the manager's tone and receiver's feedback.

I collected 3,680 earnings conference call transcripts from 241 firms in the Financial Times Stock Exchange 350 Index (FTSE350) and conducted a series of regression analyses and robust analyses to examine the hypotheses (see Section 2.4). The empirical results are summarised as follow. First, the regression results support that the signal provided through managerial tone matches the private information it aims to convey. Firms expecting good performance in the next quarter (private information) used a more optimistic tone in conference calls, while those expecting poor performance spoke less optimistically. I conjecture that insider information or managers' expectation of future performance determines the tone that FTSE350 managers employ to signal about firm prospects. In particular, the signalling results

provide evidence that tone can be considered a signalling device to communicate about a firm's future condition. Second, as the most direct conference call audience, analysts can effectively receive the managerial tone signal, confirm with feedback, and correctly interpret the conveyed information. Accordingly, they express more optimism about a firm's promising prospects or less optimism about a firm's uncertain risk. Analysts' tone complies with a firm's future performance, revealing their accurate understanding of the private information that the signal intends to convey and development of the same expectation as managers. Further, their tone mirrors the managerial tone, suggesting that analysts confirm the signal by sending feedback to the managers. Specifically, analysts send a more (less) optimistic response to more (less) optimistic managers. Analysts confirm the managers' signal by using their own tone. Finally, I found that the signalling environment moderates the tone signalling. Firms with better information environments are less likely to signal using tone. The robustness estimations conducted using different tone and performance measurements are consistent with the above main empirical results and support the hypothesis that tone serves as a signal.

Our study contributes to the literature in three ways. First, it investigates signalling-feedback interaction to show that managerial tone can be used in the two-way communication model. Tone studies focus on one-way, signaller-focus communication investigation and we extend this line of research to provide insights on how a receiver (i.e. analyst) interprets and responds to the managerial tone to change their decision-making behaviour. Second, we contribute to the literature on signalling, with its predominant focus on signal receivers, and empirically test the theoretical framework in Connelly et al. (2011). The receiver and signalling environment in the signalling process are relatively insufficiently researched areas in signalling theory (Connelly et al., 2011). We add to the literature with new empirical evidence on how a receiver interprets and acts upon a signal and how the environment affects signalling. Third, corporate narrative disclosure research on signalling focuses on investors and shareholders as receivers. We offer insights on the impact of signalling on additional stakeholders (e.g. analysts). We show that an analyst in earnings calls may pay attention to the managerial tone and use it as an important channel of information.

The remainder of this paper is organised as follows. Section 3.2 reviews the related literature and formulates the research hypotheses. Section 3.3 describes the sample selection process and research methods. Sections 3.4 and 3.5 discuss the main empirical results and the robustness tests. Finally, Section 3.6 concludes the paper.

3.2 Literature review and hypothesis development

3.2.1 Information asymmetry and voluntary disclosure

Information asymmetry is an underlying assumption of the research on voluntary disclosure (Beattie, 2014;Bergh et al., 2019). Managers have more information than outsiders about a firm's economics, prospects, or risks (Healy and Palepu, 2001). This information difference or "lemons problem" leads to the imperfect functioning of the capital market (Akerlof, 1970). This incentivises managers to disclose private information to communicate their valuable knowledge of the firm's situation to outsiders.

A series of theoretical and empirical studies have shown that voluntary disclosure reduces information asymmetry by providing investors with more access to information (Diamond, 1985;Bushman, 1991;Lundholm, 1991). This is based on the assumption that managers have more inside information compared to outsiders. Leuz and Verrecchia (2000) show that German firms' voluntary transition to a high-quality reporting regime has enabled them to increase disclosure and thus reduce information asymmetry. Baginski and Rakow (2011) and Fu et al. (2012) also document that high-quality voluntary disclosure and higher financial reporting frequency reduce information asymmetry and capital cost. Thus, voluntary disclosure generates different capital market effects for firms, such as improved stock liquidity, reduced cost of capital, and increased number of financial analysts (Beyer et al., 2010). A higher level of disclosure increases investors' confidence in firms and reduces their compensation demand for bearing information risk, which, in turn, increases stock liquidity and reduces the cost of capital. Additionally, increased disclosure equips analysts with new information as they prepare forecasts.

Information asymmetry can also influence voluntary disclosure behaviour by acting as a boundary condition in research on voluntary disclosure (Bergh et al., 2019). For

example, information asymmetry can act as a moderator and influence the frequency of voluntary disclosure. Both managers and investors change their behaviour with a change in the level of information asymmetry (Connelly et al., 2011). Aggarwal et al. (2012) find that firms with worse information environments are more likely to signal information via dividends. Higher information asymmetry incentivises firms to increase the information content of these dividends. Boudt et al. (2018) also find that tone in earnings press releases serves as a more informative signal of future performance when firms operate in a higher information asymmetry environment; the degree of information asymmetry influences a firm's incentive to disclose and the degree of disclosure.

In summary, the problem of information asymmetry incentivises various voluntary disclosure behaviours that can improve imperfect capital market function (i.e. the cost of capital and stock liquidity).

3.2.2 Signalling theory

I draw on signalling theory to form our study's theoretical basis. Spence (1973) developed and applied signalling theory to the labour market. This theory addresses information asymmetry in the market and asserts that managers can reduce information asymmetry by signalling more information from one party to another (Morris, 1987). Signalling theory supports the idea that managers implement voluntary disclosure to communicate regarding their firms' economic state, reduce information asymmetry, and attain a higher market valuation (Healy and Palepu, 2001).

Signalling theory has been frequently invoked in disclosure research, particularly to explain how managers overcome information asymmetry to convey private information about the firm's prospects. For example, Kiridaran et al. (2004) show that undervalued banks convey their insider information through loan loss provisions to raise their banks' market value. Louis and Robinson (2005) also find that managers employ accruals in conjunction with a stock split signal to communicate favourable private managerial information. A dividend increase is also considered a meaningful signal, especially when firms have poorer information environments (Aggarwal et al., 2012). Firms operating in low information environments are more likely to increase their dividends to reduce information asymmetry. Similarly, Lys et al. (2015) provide evidence that

firms with a promising outlook will undertake more CSR activities, which play a role in signalling a firm's future performance.

Overall, by communicating favourable information through different signalling devices, managers reduce information asymmetries between stakeholders and management and thereby improve the cost of capital and enhance the value of share prices.

3.2.3 Signalling framework

This study applies the signalling framework developed by Connelly et al. (2011). I reviewed the primary elements described by Connelly et al. (2011), as illustrated in Figure 1.

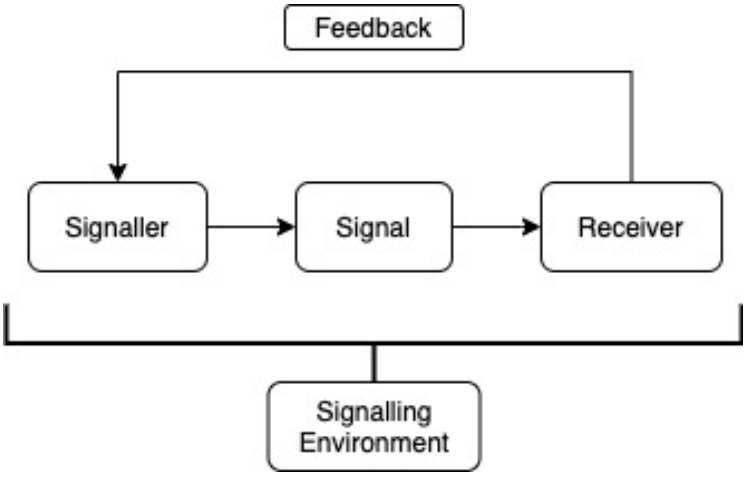

Figure 1: Signalling framework

***Signaller*:** Connelly et al. (2011) consider signallers as insiders who obtain private, superior information not available to signal receivers. In corporate disclosure, signallers represent firms or managers. Accordingly, managers communicate about the firm's unobservable quality to the audience to reduce information asymmetry.

Signal: Signals contain information that signallers communicate and convey. They should also be observable as failing to do so will lead to this signal not being noticed by the receivers, resulting in the failure of the signalling process. In this study, the signal refers to the managerial tone of the conference call.

***Receiver*:** According to Connelly et al. (2011), receivers are outsiders who lack information about the firm and hence seek this information. After receiving the signals,

receivers are likely to send countersignals (feedback) to the signallers; this feedback indicates how the receivers interpret the signals (i.e. confirm or disconfirm).

***Signalling environment*:** In corporate disclosure, the signalling environment refers to the degree of information asymmetry between the firm and its outsiders. The signalling environment can influence the signallers, signals, and receivers (the three predominant actors in the signalling process) individually and their interactions.

3.2.4 Hypothesis development

I follow the above signalling framework to build the hypothesis on elements of the signalling process. As per this framework, managers employ their tone (observable) to signal private information (unobservable) to the audience. In this study, managers who hold the conference call are referred to as “signallers”, and analysts who attend the conference call are called “receivers”. Managerial tone is the signal conveyed from managers to the analysts about the firm’s private information.

First, I discuss the signal fit by examining whether the managerial tone matches the unobservable private information (i.e. future performance) or whether managerial tone plays the signalling role to convey the private information. Second, I focus on the receiver’s interpretation and feedback by examining how analysts respond to managerial tone and whether analysts correctly interpret the information. Finally, I investigate whether the signalling environment influences the tone signalling.

3.2.4.1 Signal fit

Connelly et al. (2011, p53) discuss the signal fit as “the extent to which the signal is correlated with unobservable quality”. This representation focuses on the characteristics of the signal itself, such as whether there is a relationship between the observable signal and the unobservable private information. Based on this, I investigate the signal fit—the relationship between managerial tone and private information, focusing on whether tone can send signals matching the private information and alter audiences’ understanding of a firm’s future state (Ciuchta et al., 2017), that is, whether tones can perform a reliable signalling role.

Prior studies also provide some competing evidence on the relationship between tone and performance. For example, Cho et al. (2010) find that firms with worse environmental performance are trying to express more optimistic and less certain tones than firms with better environmental performance. Managers bias the tone in 10-K environment disclosure to mask and blur the firm's poor environmental performance to manipulate the stakeholder's impression. Similarly, Schleicher and Walker (2010) find that loss-making firms tend to express a more positive tone in the UK annual report. Melloni et al. (2017) report that for firms with weak financial performance, the integrated report tends to be more optimistic, much longer, and less readable. Huang et al. (2014b) find a negative association between abnormal positive tone in earnings press releases and firm's future earnings. Firms that are not expected to perform well in the next period will use a current positive tone to mislead the audience. Another strand of studies often consider tone as an independent variable containing information that can be used to predict future firm performance (Davis et al., 2012;Mayew et al., 2015), which emphasizes the investor perspective that tone can provide useful information to help outsiders better assess the firm.

Trueman (1986) asserts that managers have incentives to signal the firm's future performance because the signal can help investors make an apt evaluation of the firm's future performance and motivate their investment decision. With earlier or more signals, their assessment of the firm's prospects will be more favourable, and the firm's market value will thus be higher. Essentially, signals concerning a firm's future performance influence investors' judgement and the firm's market value (Healy and Palepu, 2001). However, little evidence has been provided to support this hypothesis.

In conference calls—one of the most important voluntary disclosure settings—managers are very likely to signal future performance. These conference calls involve sophisticated investors who are more interested in the future than current firm performance; this preference can be attributed to the disclosure of current performance in other channels before the conference call (i.e. earnings press releases) and the inclusion of this disclosed information in the stock price. Chapman and Green (2017) provide evidence that analysts requested forward-looking information in nearly one-third of discussion sessions. The information demand from the sophisticated audience drives managers to change their disclosure choices and adopt tools to

facilitate further disclosure. Based on the above, managers are very likely to signal some private information in conference calls to influence the audience's understanding of the firm's prospects and reinforce the audience's confidence in the firm. In another study, Langberg and Sivaramakrishnan (2010) show that managers disclose information to seek feedback from analysts on some proposed project initiatives, before making long-term commitments. Market participants predominantly follow the analysts because the latter's recommendations and earnings forecast determines the movement of stock prices (Soltes, 2014;Brown et al., 2015). Therefore, managers are quite likely to signal some information to seek a response from the financial market, driven by analysts' expertise and experience (Langberg and Sivaramakrishnan, 2010). Overall, this two-way information flow between managers and analysts shapes a firm's signalling motivation and behaviour.

As an evident and observable signal, tone has been less examined in terms of the signalling hypothesis (Trueman, 1986), which applies a manager perspective and proposes that expectation of future performance (i.e. private information) leads to the currently observed tone. Managers are willing to use tone to signal their future success. To bridge the aforementioned gap, I posit that the signal provided through managerial tone matches the private information. Firms expecting a good (poor) performance in the subsequent period are more likely to choose an optimistic (less optimistic) tone for signalling. Managerial tone, as the dependent variable, can be used as a signalling device, which is consistent with the following signal fit hypothesis:

Hypothesis 1: Managerial tone is positively related to future firm performance. (signal fit hypothesis).

3.2.4.2 Receiver interpretation and feedback

Connelly et al. (2011, p54) define receiver interpretation as "the process of translating signals into perceived meaning". After receiving the signal, receivers interpret the indication of this signal and use it to make an informed decision. Different receivers may interpret the signal differently and include their own perspectives. After interpreting, receivers can send feedback to confirm or disconfirm the signal. This helps signallers determine whether the receivers have accurately interpreted and confirmed the signal.

In their literature review, Bergh et al. (2014) discuss a similar concept regarding receivers' expectations of signals. They assert that receivers confirm a signal's effectiveness, which determines their valuation of the signal. One common confirmation is stock market reaction (e.g. cumulative abnormal returns) to the signal. However, given this reaction is broad, it is difficult to determine the confirmation of a specific audience.

Empirically, some studies have found that analysts can receive management information through conference calls, which they confirm through their subsequent forecast behaviour (i.e. stock recommendations and earnings forecast revisions). For example, Mayew et al. (2012) show that analysts can obtain superior private information by participating in conference calls and asking questions. Similarly, Chen and Matsumoto (2006) and Green et al. (2014) also reveal that conference calls provide important informational advantages to analysts. After a conference call, the analysts provide more accurate and timelier earnings forecasts, suggesting that they receive information from management during the conference call.

A few studies have also provided evidence that managerial tone in conference calls can provide precise information to analysts, who can confirm it through their subsequent forecasts or what type of language the analysts use. For example, Bochkay et al. (2020) show that managers' tone in conference calls is strongly and positively related to analysts' subsequent forecast revisions. This suggests that analysts pay attention to managers' tone in conference calls and can infer information from managerial tone. In this context, Milian and Smith (2017) show that analysts use favourable language to praise managers' performance during the conference call (i.e. "good year" and "nice quarter"). Analysts' compliments are positively related to the firm's current performance, which demonstrates analysts' unbiased attitude and objective confirmation or approval of the firm's performance. Brockman. et al. (2015) compare managerial tone and analysts' tone and find that analysts' tone seems to be more reliable and credible to impact the capital market than the managerial tone when managers and analysts interact in the conference call. However, this study only focuses on how managerial tone and analysts' tone affect the stock price but neglect the interaction between managers and analysts through their tone.

Based on the above analysis and Hypothesis 1, I examine whether analysts can correctly interpret and confirm the managerial tone. If analysts can accurately interpret the signal, then they may also have the same expectation of firm performance and, accordingly, express more (less) optimism about the firm's prospects (uncertainties). If analysts are willing to confirm the managerial tone, then there will be an observed correlation between the analysts' tone and the managerial tone. Analysts' tone will be consistent with the managerial tone during the conference call, which serves as feedback or a response to the managerial tone. In this regard, it must be noted that more (less) optimistic analysts respond to more (less) optimistic managers. Therefore, I posit the following hypothesis:

Hypothesis 2a: Analysts' tone is positively related to future firm performance (receiver interpretation hypothesis).

Hypothesis 2b: Analysts' tone is positively related to managerial tone during the presentation (receiver feedback hypothesis).

3.2.4.3 Signalling environment

The signalling information environment can be set as a boundary condition as it can influence the behaviour of both the signaller and receiver (Bergh et al., 2019). It can also influence the extent to which signalling reduces information asymmetry (Connelly et al., 2011). I use firm size as the proxy for signalling environment (Bochkay et al., 2020) to test the moderating effect of the signalling environment on tone's signalling.

Concerning firm size, an increase in the size of the firm increases the amount of information available to investors about the firm (Bochkay et al., 2020). Larger firms will have more disclosure regulation requirements and appear more often on other disclosure media (i.e. newspapers, financial press, social media, and analyst reports). Therefore, it is likely that large firms have less incentive to signal via conference calls than small firms.

Concerning information environment, prior studies have shown that firms with a worse information environment have greater incentives for voluntary disclosure. Chen et al. (2002) reveal that firms are more likely to voluntarily disclose balance sheets when

current earnings are less informative and future earnings are more uncertain. Similarly, Aggarwal et al. (2012) show that firms with worse information environments are more likely to use dividends to signal information. This suggests a positive relationship between managers' disclosure incentives and voluntary disclosure. If firms with poor information environments have stronger incentives to signal insider information, then these firms will also be more likely to use tone to communicate with outsiders.

Based on the above, I propose that the signalling environment has a moderating effect on tone's signalling role with the following hypothesis:

Hypothesis 3: The signalling environment can moderate the relationship between tone and future firm performance (signalling environment moderation hypothesis).

3.3 Sample and research design

3.3.1 Sample selection

I obtained an initial sample of 6,165 quarterly earnings conference call transcripts from 241 FTSE350 firms, for the period 2002–2020; these transcripts were extracted from the Thomson Reuters database. I deleted 427 transcripts with distinct titles but repetitive content; I also excluded transcripts containing the earnings announcement but without the discussion section. This procedure yielded approximately 5,399 transcripts for tone measurement. I obtained financial data from the DataStream database and matched the financial variables with the tone variables. After excluding 1,719 transcripts with missing financial data and control variables, the final sample contained 3,680 observations. However, each regression's final sample differed depending on the availability of the various control variables included in the model. Table 6 summarises the sample selection procedures.

3.3.2 Variable measurements

3.3.2.1 Tone measurement

Following Brockman. et al. (2015), I measured manager tone in the entire call and the presentation and discussion sections of the earnings conference call transcripts. I measured analyst tone only in the discussion section. I used Loughran and McDonald

(2011) positive and negative word dictionaries to calculate tone.The quarterly earnings conference call transcripts—including the header of firm identifiers and the date and starting time of the call—are XML-friendly. Additional tags can identify different sections of the call (e.g. presentation and discussion) and the role of attendants (e.g. managers or analysts). I employed Python programming to conduct textual analysis to segment the transcripts and measure the various tone variables accordingly. First, Python segmented the transcripts into presentation and discussion sections. Second, Python separated managers' and analysts' speech in

Table 6. Data collection.

Sample selection	
Earnings call transcripts by FTSE350 extracted from Thomson Reuters from 2002 to 2020	6,165
Same transcript content with a different title	-427
Call transcripts without discussion sessions	-339
Call transcripts for tone measurement	5,399
Call transcripts with missing financial data and control variables from DataStream	-1,719
Sample available to all models	**3,680**

the discussion section. Finally, Python counted the total number of positive and negative words in managers' speech in the entire call, presentation, and discussion sections and in analysts' speech in the discussion only.

I calculated the tone measure as the difference between the percentage of positive and negative words, which is the net tone and expressed as:

$$\frac{Pos-Neg}{Pos+Neg}.$$

Pos and Neg represent the positive and negative words from Loughran and McDonald (2011), respectively. Specifically, I measured the tone variable *Tone* for the managers' speech in the presentation and discussion sections together. I also measured the presentation tone (*Tone_pres*) for the managers' speech in the presentation. Other tone variables—managers' net tone (*Tone_Mdis*) and analysts' net tone (*Tone_A*)—were only measured in the discussion.

3.3.2.2 Financial variables

To measure firm performance, I use the quarterly earnings before interest and taxes (*EBIT*)(Li, 2010a), where *EBIT* is calculated by the quarterly earnings before interest and taxes scaled by total assets at the end of the quarter. I use the statistics and data time-series command to obtain the *EBIT* in the subsequent quarter (*EBITnxtQ*) for the primary test.

I define two separate dummy variables, *EBITloss* and *EBITupdown*, to control the relationship between tone and poor performance(Li, 2010a) and the relationship between tone and performance change(Schleicher and Walker, 2010). *EBITloss* is a dummy variable that equals 1 if *EBIT* is less than 0, and 0 otherwise. *EBITupdown* is a dummy variable that equals 1 if *EBIT* improves from the prior period, and 0 otherwise.

For other control variables in our regressions, I collect the current quarter stock returns (*Return*) because stock return is highly likely to be associated with tone from the prior studies(Yekini et al., 2016;Azimi et al., 2021). I measure accruals (*ACC*) as the current quarter *EBIT* minus the operating cash flow scaled by the total assets and expect accruals is negatively associated with tone(Li, 2010a). Following the previous voluntary disclosure(Huang et al., 2014b;Davis et al., 2015;Li, 2010a), I include the below variables as the control variables: firm size (*Size*) is the logarithm of the market value of equity. *BTM* is book-to-market ratio calculated as total assets scaled by the market value of equity plus total liabilities. *Busiseg* is a logarithm of one plus the number of business segments, and *Geoseg* is a logarithm of one plus the number of geographic segments. *Firmage* is the number of years since a firm appeared in the DataStream database. I also calculate return volatility (*Returnvol*) as the standard

deviation of the stock return data for the past 12 months. Similarly, I calculate earnings volatility (*EBITvol*) as the standard deviation of *EBIT*. I also collect the total number of earnings per share and make its logarithm value the analyst-following number (*AF*). The variables used in this study are presented in Table 7.

Table 7. Variable definition.

Dependent Variable		
Tone	Managers' net tone in the entire conference transcript, calculated as (pos-neg)/(pos+neg)	Brockman. et al. (2015)
Tone_pres	Managers' net tone in the presentation section, calculated as (pos-neg)/(pos+neg)	Brockman. et al. (2015)
Tone_Mdis	Managers' net tone in the discussion section, calculated as (pos-neg)/(pos+neg)	Brockman. et al. (2015)
Tone_A	Analysts' net tone in discussion section, calculated as (pos-neg)/(pos+neg)	Brockman. et al. (2015)
Tone_R	Managers' net tone in the entire conference transcript, calculated as (pos-neg)/total, used for robustness analysis	Brockman. et al. (2015)
Tone_pres_R	Managers' net tone in the presentation section, calculated as (pos-neg)/total, used for robustness analysis	Brockman. et al. (2015)
Tone_Mdis_R	Managers' net tone in the discussion section, calculated as (pos-neg)/total, used for robustness analysis	Brockman. et al. (2015)
Tone_A_R	Analysts' net tone in discussion section, calculated as (pos-neg)/total, used for robustness analysis	Brockman. et al. (2015)
Independent Variable		
EBIT	Quarterly earnings before interest and taxes (EBIT) scaled by total assets	Li (2010a)
EBITnxtQ	EBIT of next quarter	Li (2010a)
Epretax	Quarterly pre-tax income scaled by total assets used for robustness analysis	Li (2010a)
EpretaxnxtQ	Epretax of next quarter	Li (2010a)
Control variable		

EBITloss	A dummy variable that equals 1 if EBIT is less than 0, and 0 otherwise	Li (2010a)
Epretaxloss	A dummy variable that equals 1 if Epretax is less than 0, and 0 otherwise, used for robustness analysis	Li (2010a)
EBITupdown	A dummy variable that equals 1 if quarterly EBIT increases from the previous quarter, and 0 otherwise	Schleicher and Walker (2010)
Epretaxupdown	A dummy variable that equals 1 if quarterly Epretax increases from the previous quarter, and 0 otherwise, used for robustness analysis	Schleicher and Walker (2010)
Return	Contemporaneous stock return	Li (2010a)
ACC	Accruals calculated as earnings minus cash flow from operations, scaled by total assets	Li (2010a)
Size	The logarithm value of the market value of equity	Li (2010a)
BTM	Book-to-market ratio calculated as total assets scaled by market value of equity plus total liability	Li (2010a)
Busiseg	The logarithm value of 1 plus the number of business segments	Li (2010a)
Geoseg	The logarithm value of 1 plus the number of geographical segments	Li (2010a)
Firmage	The number of years since a firm appeared in the DataStream	Li (2010a)
Returnvol	Stock return volatility calculated using past 12-month stock return data	Li (2010a)
EBITvol	Standard deviation of EBIT calculated using past 5-year data	Li (2010a)
Epretaxvol	Standard deviation of Epretax calculated using past 5-year data, used for robustness	Li (2010a)
AF	The number of analysts following calculated as the logarithm value of total estimates number on the mean of earnings per share	Schleicher and Walker (2010)

3.3.3 Empirical models

For our regression test, I use the below ordinary least squares regression models:

Tone = $\alpha_0 + \alpha_1$ Performance+ Control + ε ,

where Tone is tested with various tone variables, such as *Tone, Tone_pres, Tone_Mdis,* and *Tone_A*, and Performance is tested with the next period EBIT (*EBITnxtQ*). Each regression test controls for the firm and year fixed effects, together with the use of heteroskedasticity robust standard errors. I discuss the details of each regression model in Section 3.4.

3.4. Empirical results

3.4.1 Descriptive statistics and correlation analysis

Descriptive statistics are presented for all tone variables, financial variables, and control variables in Table 8; as shown, the mean value of various managers' net tone is positive, while the analysts' net tone mean value is negative. Specifically, the managers' net tone in the presentation (mean value 0.390) is more optimistic than the managers' net tone in the discussion (mean value 0.058) and the analysts' net tone in the discussion (mean value -0.251), which is relatively pessimistic. Overall, these results show that managers and analysts differ in disclosing firm performance. I examine the economic significance in the subsequent regression analysis.

Table 9 presents the correlations between all our variables in the primary test. Consistent with expectations, the correlation between *Tone* and *EBITnxtQ* is 0.133. Accordingly, *EBITnxtQ* has a correlation of 0.125, 0.070, and 0.058 with *Tone_pres, Tone_Mdis,* and *Tone_A*, respectively.

As expected, most of the correlations between the tone variables are relatively high (e.g. *Tone* has a correlation of 0.871 and 0.726 with *Tone_pres* and *Tone_Mdis*, respectively). However, the correlation between the manager and analyst tones is relatively low, and the lowest correlation is between *Tone_pres* and *Tone_A* (0.206). Almost all correlations between the control variables are less than 0.20, though there are a few exceptions.

Table 8. Descriptive statistics.

	N	Mean	Std. Dev.	min	Median	max
Dependent variable						
Tone	4961	.274	.203	-.556	.292	.762
Tone pres	4960	.390	.217	-1	.415	1
Tone Mdis	4961	.058	.247	-1	.070	.840
Tone A	4957	-.251	.276	-1	-.259	1
Tone R	4961	.013	.011	-.034	.014	.049
Tone pres R	4961	.021	.013	-.028	.020	.071
Tone Mdis R	4961	.003	.011	-.082	.003	.047
Tone A R	4961	-.010	.013	-.225	-.010	.037
Independent variable						
EBIT	4516	.041	.059	-.616	.036	1.116
EBITnxtQ	4094	.040	.054	-.543	.036	1.108
Epretax	4879	.034	.058	-.623	.028	1.113
EpretaxnxtQ	4415	.033	.054	-.556	.028	1.105
Control variable						
EBITloss	4561	.101	.301	0	0	1
Epretaxloss	4879	.125	.331	0	0	1
EBITupdown	4561	.429	.495	0	0	1
Epretaxupdown	4879	.435	.496	0	0	1
Return	4742	-.880	.374	-1.981	-.901	4.698
ACC	4152	-.017	.064	-.825	-.009	1.109
Size	4761	15.375	1.515	10.491	15.171	20.327
BTM	4738	.714	.281	.016	.727	1.779
Busiseg	4915	1.596	.447	.693	1.609	2.398
Geoseg	4926	1.607	.555	.693	1.609	2.398
Firmage	4932	22.623	7.115	1	28	28
Returnvol	4738	.295	.138	.001	.268	2.898
EBITvol	4861	.053	.026	.001	.048	.443
Epretaxvol	4865	.053	.026	0	.05	.452
AF	4761	2.723	.485	.693	2.833	3.784

Table 9. Pearson correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) Tone	1.000																	
(2) Tone_pres	0.871	1.000																
	(0.000)																	
(3) Tone_Mdis	0.726	0.455	1.000															
	(0.000)	(0.000)																
(4) Tone_A	0.260	0.206	0.272	1.000														
	(0.000)	(0.000)	(0.000)															
(5) EBIT	0.151	0.159	0.078	0.072	1.000													
	(0.000)	(0.000)	(0.000)	(0.000)														
(6) EBITnxtQ	0.133	0.125	0.070	0.058	0.550	1.000												
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)													
(7) EBITloss	-0.169	-0.190	-0.089	-0.061	-0.467	-0.234	1.000											
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)												
(8) EBITupdown	0.073	0.081	0.052	0.046	0.173	-0.004	-0.193	1.000										
	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.806)	(0.000)											
(9) Return	0.190	0.211	0.084	0.092	0.181	0.201	-0.155	0.084	1.000									
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)										
(10) ACC	0.020	0.038	0.007	0.038	0.348	0.048	-0.276	0.125	0.040	1.000								
	(0.206)	(0.014)	(0.651)	(0.015)	(0.000)	(0.003)	(0.000)	(0.000)	(0.011)									
(11) Size	-0.102	-0.030	-0.031	-0.070	0.024	0.019	-0.104	0.056	0.034	0.023	1.000							
	(0.000)	(0.040)	(0.034)	(0.000)	(0.110)	(0.232)	(0.000)	(0.000)	(0.020)	(0.151)								
(12) BTM	-0.185	-0.193	-0.132	-0.107	-0.430	-0.458	0.225	-0.019	-0.251	0.071	-0.146	1.000						
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.220)	(0.000)	(0.000)	(0.000)							
(13) Busiseg	-0.066	-0.043	-0.049	-0.009	-0.016	-0.022	-0.002	0.018	-0.015	-0.025	0.128	-0.031	1.000					
	(0.000)	(0.003)	(0.001)	(0.532)	(0.272)	(0.154)	(0.902)	(0.225)	(0.304)	(0.106)	(0.000)	(0.034)						
(14) Geoseg	-0.096	-0.100	-0.018	0.060	0.059	0.068	-0.027	0.026	0.021	-0.070	0.141	-0.167	0.255	1.000				
	(0.000)	(0.000)	(0.218)	(0.000)	(0.000)	(0.000)	(0.070)	(0.088)	(0.147)	(0.000)	(0.000)	(0.000)	(0.000)					
(15) Firmage	0.061	0.039	0.066	0.030	-0.049	-0.051	-0.045	0.013	-0.006	0.068	0.204	0.063	0.045	0.097	1.000			
	(0.000)	(0.006)	(0.000)	(0.038)	(0.001)	(0.001)	(0.002)	(0.389)	(0.666)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)				
(16) Returnvol	-0.041	-0.050	-0.002	-0.013	-0.028	0.008	0.026	0.038	0.299	-0.055	-0.033	-0.015	0.051	0.022	-0.032	1.000		
	(0.005)	(0.001)	(0.886)	(0.386)	(0.063)	(0.598)	(0.087)	(0.012)	(0.000)	(0.001)	(0.026)	(0.305)	(0.000)	(0.130)	(0.027)			
(17) EBITvol	-0.063	-0.052	-0.059	-0.054	0.007	-0.009	0.073	-0.035	-0.077	-0.060	0.009	-0.012	0.082	0.055	-0.069	-0.069	1.000	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.650)	(0.551)	(0.000)	(0.019)	(0.000)	(0.000)	(0.540)	(0.409)	(0.000)	(0.000)	(0.000)	(0.000)		
(18) AF	-0.027	-0.009	0.070	-0.068	0.005	0.002	-0.031	0.076	-0.051	-0.024	0.596	-0.117	0.028	0.139	0.281	-0.023	-0.048	1.000
	(0.067)	(0.529)	(0.000)	(0.000)	(0.721)	(0.911)	(0.041)	(0.000)	(0.001)	(0.126)	(0.000)	(0.000)	(0.059)	(0.000)	(0.000)	(0.127)	(0.001)	

This table presents Pearson correlations among dependent, independent, and control variables used in the main test. All variables are defined in Table 7, and p-value are in parentheses below each coefficient.

3.4.2 Regression analysis results

3.4.2.1 Hypothesis 1 – Signal fit hypothesis

In this section, I examine the signal fit hypothesis, which states that firms with an expectation of better (poor) performance in the next period (private information) use a more (less) optimistic tone. Firms will use tone to signal undisclosed information. In particular, I estimate the following equation using panel data and report the results in columns (1), (2), and (3) of Table 10:

Model (1): *Tone* = $\alpha_0 + \alpha_1$ EBITnxtQ + controls + e (1).

The dependent variables are managers' net tone in the entire call (*Tone*), presentation (*Tone_pres*), and discussion (*Tone_Mdis*), as tabulated in columns (1)–(3) in Table 10. The primary observed independent variable is *EBITnxtQ* and its coefficient α1. I include *EBITloss* and *EBITupdown* to control the relationship between tone and poor performance, and tone and performance change, respectively. I also control for contemporaneous returns (*Return*), accruals (*ACC*), firm size (*Size*), book-to-market ratio (*BTM)*, return volatility (*returnvo*l), EBIT volatility (*EBITvol*), business segment (*Busiseg*), geographic segment (*Geoseg*), firm age (*Firmage*), and analyst following (*AF*), which have been controlled in other financial disclosure studies (Feldman et al., 2010;Davis and Tama-Sweet, 2012;Li, 2010a). If the estimate of α1 is statistically positive, this implies that managers have insider information and will employ a tone to signal future earnings. Managerial tone corresponds well to the private information it intends to convey.

The results in columns (1)–(3) of Table 10 show that all manager' tones—for the entire call or for the presentation and discussion sections—are positively related to *EBITnxtQ*. *Tone_pres* has the strongest signalling effect and is positively related to *EBITnxtQ* at 0.545 ($p<0.01$). *Tone* in the entire conference call has a slightly weaker signalling effect and is associated with *EBITnxtQ* at 0.459 ($p<0.01$). *Tone_Mdis* is relatively much weaker on the signalling effect with a coefficient of 0.290 ($p<0.05$). This might be attributed to the discussion section's spontaneity, which could be more difficult for managers to control (Blau et al., 2015). Overall, the regression evidence supports the signalling fit hypothesis that managerial tone can serve as an effective signal that

corresponds to the information it intends to convey. Managers have insider information and are willing to use tone as a signal. Firms with an expectation of better (poor) performance tend to express a more (less) optimistic tone in the current period.

Table 10. Regression results for H1.

	(1)	(2)	(3)
	Tone	Tone_pres	Tone_Mdis
EBITnxtQ	.459***	.545***	.290**
	(6.353)	(6.634)	(2.456)
EBITloss	-.083***	-.103***	-.047***
	(-7.184)	(-7.831)	(-2.918)
EBITupdown	.014**	.015**	.009
	(2.471)	(2.335)	(1.156)
Return	.045***	.056***	.008
	(4.65)	(5.037)	(.602)
ACC	-.071	-.035	-.028
	(-1.42)	(-.559)	(-.351)
Size	.018*	.037***	-.001
	(1.806)	(3.364)	(-.078)
BTM	.011	.024	.015
	(.372)	(.721)	(.33)
Returnvol	-.259	.287	-.192
	(-.404)	(.388)	(-.485)
EBITvol	1.102	.490	2.131**
	(1.457)	(.524)	(2.448)
Busiseg	-1.17***	-1.657***	.111
	(-4.992)	(-7.096)	(.228)
Geoseg	-.062	.073	-.021
	(-.848)	(.934)	(-.107)
Firmage	-.053***	-.073***	-.013
	(-6.517)	(-7.968)	(-.892)
AF	.050***	.042***	.056***
	(3.618)	(2.701)	(2.926)
_cons	3.222***	4.033***	-.050
	(4.931)	(5.943)	(-.044)
Observations	3203	3203	3203
R-squared	.594	.526	.453
Adj R^2	.512	.431	.343
Year fixed effect	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes

t-values are in parentheses. See variable definitions in Table 7.

**** p<.01, ** p<.05, * p<.1*

The results in column (1) also show that the net tone for managers' entire call is negatively related to *EBITloss* (-0.083, p<0.01) and positively related to *EBITupdown* (0.014, p<0.05). This means that firms with EBIT losses employ a less optimistic tone, while firms with increased EBIT from the previous quarter will tend to express a more optimistic tone. This is consistent with Li (2010a), who found that managers credibly use tone to describe current firm performance. Furthermore, managers' net tone for the entire call is positively related to *Return* (0.045, p<0.01), which is also consistent with Li (2010a) findings that firms with well-performing stock returns will speak more optimistically during earnings conference calls. Additionally, managers' net tone for the entire call is positively related to the number of analysts' following a firm (0.050, p<0.01). This is consistent with Schleicher and Walker (2010), who found that more analysts following a firm provides an additional incentive for managers to show more optimism during conference calls. Conversely, our findings that firm age and business segment numbers are negatively associated with *Tone* are inconsistent with Li (2010a).

In column (2), I report quite similar results between net tone during presentation (*Tone_pres*) and future performance *EBITnxtQ*. *Tone_pres* is positively related to *EBITnxtQ* (0.545, p<0.01), which shows a stronger relationship than that between the entire call net tone (*Tone*) and *EBIT* (0.459, p<0.05). *Tone_pres* is also negatively related to *EBITloss* (-0.103, p<0.01) and positively related to quarterly EBIT change (*EBITupdown*) (0.015, p<0.05). Furthermore, *Tone_pres* is positively related to *return* (0.056, p<0.01) and to *AF* (0.042, p<0.01).

In column (3), I also find evidence of a statistically significant relationship between managers' net tone during discussion (*Tone_Mdis*) and future performance *EBITnxtQ* (0.290, P<0.05). However, a few control variables lose their significance, which may be because managers have limited control over the discussion section owing to their spontaneity (Blau et al., 2015).

Overall, the positive relationship between managerial tone and future performance is determined mainly by the positive relationship between the presentation net tone and future performance. This supports the signalling fit hypothesis that managerial tone can be used as a signalling device to convey undisclosed information regarding the

firm. Tone can be an effective signal that matches the private information it intends to convey.

3.4.2.2 Hypothesis 2 – Receiver interpretation and feedback

In this section, I examine the receiver interpretation and feedback hypothesis, namely that analysts can correctly interpret managerial tone and analysts will provide feedback on managerial tone, respectively. I estimate the following equations and report the results in Table 11:

Model (2): $\boldsymbol{Tone\_A = \alpha_0 + \alpha_1\ EBITnxtQ + controls + e}$ **(2),**

Model (3): $\boldsymbol{Tone\_A = \alpha_0 + \alpha_1\ Tone\_pres + controls + e}$ **(3).**

Table 11, columns (1) and (2), shows that analysts' net tone is positively related to *EBITnxtQ*, with a coefficient of 0.321 ($p<0.01$), and positively related to the presentation tone (*Tone_pres*), with a coefficient of 0.193 ($p<0.01$). This suggests that analysts receive private information about a firm's future performance and correctly interpret this information. Further, they develop the same expectations about a firms' prospects, and their tone is consistent with the prediction of the firm's future performance. Meanwhile, their tone mirrors the presentation tone, suggesting that analysts confirm the signal from managers and send their feedback with the same tone to indicate their approval. I replace *Tone_pres* with *Tone_Mdis* to estimate equation (3) again and report similar results in column (3) that analysts' tone agrees with managers' tone in the call's discussion section (with a coefficient of 0.287, $p<0.01$), as well.

Overall, the regression results support the receiver interpretation and feedback hypothesis. Analysts can accurately understand the signal of managerial tone and confirm it with their own tone. Tone can be used for two-way communication.

Table 11. Regression results for H2.

	(1) Tone_A	(2) Tone_A	(3) Tone_A
EBITnxtQ	.321***		
	(2.605)		
Tone_pres		.193***	
		(6.999)	
Tone_Mdis			.287***
			(12.22)
EBITloss	-.030*	-.006	-.011
	(-1.699)	(-.38)	(-.702)
EBITupdown	.01	.011	.011
	(1.112)	(1.172)	(1.282)
Return	.025	.009	.018
	(1.61)	(.64)	(1.262)
ACC	.204**	.124	.13*
	(2.349)	(1.486)	(1.685)
Size	.005	-.009	-.005
	(.378)	(-.718)	(-.37)
BTM	.029	-.007	-.006
	(.642)	(-.18)	(-.157)
Returnvol	-.046	-.024	-.024
	(-1.141)	(-.604)	(-.625)
EBITvol	.193	.212	.245
	(.952)	(1.068)	(1.281)
Busiseg	-.168	-.677**	-.284
	(-.534)	(-2.146)	(-.905)
Geoseg	.039	.53*	.171
	(.197)	(1.942)	(.647)
Firmage	-.019	-.009	-.008
	(-1.064)	(-.74)	(-.731)
_cons	.415	.245	.246
	(.591)	(.505)	(.547)
Observations	3282	3674	3675
R-squared	.223	.215	.244
Adj R^2	.163	.156	.188
Year fixed effect	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes

t-values are in parentheses. See variable definitions in Table 7.

**** p<.01, ** p<.05, * p<.1*

3.4.2.3 Hypothesis 3 – Signalling environment moderation

I use firm size as a proxy for a firm's signalling environment (Bochkay et al., 2020). Larger firms are expected to have a good information environment and less information asymmetry. Further, I examine whether the information environment influences the tone's signalling role. I estimate equation (4) and report the results in Table 12:

Model (4): $Tone = \alpha_0 + \alpha_1 EBITnxtQ + \alpha_2 Size \times EBITnxtQ + controls + e.$ **(4)**

Consistent with Model (1), the dependent variables comprise various tone variables, and the independent variables are EBITnxtQ. Moreover, I add a separate interaction term, size × EBITnxtQ, in Model (4). Table 12 shows that there is a strong negative moderating effect of firm size on the signalling of Tone and Tone_pres. Firm size will reduce managers' signalling incentives, especially in the entire call and presentation section. I do not find similar evidence for the managers' discussion tone Tone_Mdis. This shows that the moderation effect of firm size on managerial tone signalling mainly happen in the presentation section. When it goes into the discussion section, tone signalling seems to be weak and difficulty to be affected by the firm related factors. This could perhaps be because CEO tone in the discussion section is much more spontaneous and less controllable by the CEO (Blau et al., 2015).

Table 12. Regression results for H3.

	(1)	(2)	(3)
	Tone	Tone_pres	Tone_Mdis
EBITnxtQ	2.382***	2.651***	1.296
	(3.292)	(3.239)	(1.19)
Size×EBITnxtQ	-.129***	-.141***	-.067
	(-2.701)	(-2.604)	(-.932)
EBITloss	-.082***	-.102***	-.047***
	(-7.127)	(-7.756)	(-2.891)
EBITupdown	.014**	.015**	.009
	(2.449)	(2.313)	(1.146)
Return	.044***	.056***	.007
	(4.572)	(4.954)	(.584)
ACC	-.073	-.037	-.029
	(-1.474)	(-.600)	(-.362)
Size	.023**	.043***	.002
	(2.27)	(3.77)	(.11)
BTM	.008	.021	.013
	(.265)	(.612)	(.292)
Returnvol	-.371	.164	-.251
	(-.573)	(.218)	(-.638)
EBITvol	1.32*	.729	2.245***
	(1.700)	(.745)	(2.603)
Busiseg	-1.179***	-1.667***	.106
	(-5.008)	(-7.06)	(.218)
Geoseg	-.080	.053	-.031
	(-1.078)	(.688)	(-.153)
Firmage	-.053***	-.073***	-.013
	(-6.463)	(-7.914)	(-.889)
AF	.049***	.042***	.056***
	(3.578)	(2.671)	(2.912)
_cons	3.196***	4.004***	-.063
	(4.872)	(5.829)	(-.056)
Observations	3203	3203	3203
R-squared	.595	.528	.453
Adj R^2	.514	.433	.343
Year fixed effect	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes

t-values are in parentheses. See variable definitions in Table 7.

**** p<.01, ** p<.05, * p<.1*

3.5 Robustness

I replicate the primary test with alternative measure for tone and firm performance. I measure each of the above tone variables by using a different formula as follows for the robustness analysis:

$$\frac{Pos-Neg}{Number\ of\ words}.$$

Here, “number of words” is the total word count included in the narrative section. I use *Epretax* as a proxy of a firm’s performance and calculate it as quarterly pre-tax income scaled by total assets. Accordingly, *EpretaxnxtQ* is the pre-tax income in the subsequent quarter, *Epretaxloss* is the dummy variable (equals 1 if *Epretax* is less than zero, or 0 otherwise), and *Epretaxupdown* is another dummy variable (equals 1 if *Epretax* improves from the prior quarter, or 0 otherwise).

The robustness tests are reported in Table 13 for H1, Table 14 for H2, and Table 15 for H3. A similar conclusion can be drawn from the robustness tests, namely that managers’ tone is positively associated with future firm performance. Meanwhile, analysts’ tone complies with a firm’s future performance and agrees with managers’ tone as feedback. The signalling environment negatively moderates tone’s signalling effect.

Table 13. Robustness tests – H1

	(1)	(2)	(3)
	Tone_R	Tone_pres_R	Tone_Mdis_R
EpretaxnxtQ	.021***	.027***	.012**
	(5.696)	(5.802)	(2.467)
Epretaxloss	-.003***	-.005***	-.002***
	(-6.657)	(-6.819)	(-3.283)
Epretaxupdown	.001**	.001*	.000
	(1.982)	(1.959)	(.752)
Return	.003***	.004***	.000
	(4.884)	(5.519)	(.817)
ACC	-.005**	-.005	-.004
	(-2.138)	(-1.529)	(-1.401)
Size	.000	.001	-.000
	(.283)	(1.404)	(-.166)
BTM	.001	.002	.000
	(.591)	(1.253)	(.087)
Returnvol	-.019	-.009	-.005
	(-.568)	(-.206)	(-.283)
Epretaxvol	.055	.026	.109***
	(1.389)	(.506)	(2.813)
B usiseg	-.056***	-.084***	.003
	(-4.206)	(-6.518)	(.135)
Geoseg	-.006	-.003	-.002
	(-1.608)	(-.701)	(-.251)
Firmage	-.002***	-.004***	-.001
	(-5.431)	(-7.631)	(-.795)
AF	.003***	.004***	.002***
	(4.329)	(4.267)	(2.745)
_cons	.168***	.230***	.002
	(4.549)	(5.998)	(.042)
Observations	3255	3255	3255
R-squared	.584	.543	.453
Adj R^2	.501	.451	.343
Year fixed effect	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes

t-values are in parentheses. See variable definitions in Table 7.

**** p<.01, ** p<.05, * p<.1*

Table 14. Robustness tests – H2.

	(1) Tone_A_R	(2) Tone_A_R	(3) Tone_A_R
EpretaxnxtQ	.320**		
	(2.568)		
Tone_pres_R		.144***	
		(7.152)	
Tone_Mdis_R			.252***
			(10.771)
Epretaxloss	-.045***	-.001**	-.002**
	(-2.669)	(-2.074)	(-2.46)
Epretaxupdown	.011	.000	.000
	(1.221)	(.836)	(.855)
Return	.023	.000	.001
	(1.515)	(.615)	(1.203)
ACC	.15*	.004	.005
	(1.704)	(1.355)	(1.449)
Size	.006	-.000	-.000
	(.424)	(-.436)	(-.205)
BTM	.052	-.001	-.000
	(1.16)	(-.349)	(-.194)
Returnvol	-.045	-.000	-.000
	(-1.127)	(-.018)	(-.094)
Epretaxvol	.185	.008	.009
	(.902)	(.8)	(.933)
Busiseg	-.17	-.016	-.001
	(-.542)	(-1.316)	(-.055)
Geoseg	.035	.014	-.003
	(.179)	(1.259)	(-.283)
Firmage	-.02	-.001	-.001
	(-1.099)	(-1.403)	(-1.628)
_cons	.413	.008	.017
	(.589)	(.415)	(.922)
Observations	3338	3680	3680
R-squared	.225	.243	.262
Adj R^2	.165	.187	.207
Year fixed effect	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes

t-values are in parentheses. See variable definitions in Table 7.

**** p<.01, ** p<.05, * p<.1*

Table 15. Robustness tests – H3.

	(1)	(2)	(3)
	Tone_R	Tone_pres_R	Tone_Mdis_R
EpretaxnxtQ	.108***	.139***	.037
	(3.152)	(3.327)	(.823)
size×EpretaxnxtQ	-.006**	-.008***	-.002
	(-2.567)	(-2.72)	(-.548)
Epretaxloss	-.003***	-.004***	-.002***
	(-6.618)	(-6.767)	(-3.27)
Epretaxupdown	.001**	.001**	.000
	(1.991)	(1.967)	(.754)
Return	.002***	.004***	.000
	(4.822)	(5.447)	(.807)
ACC	-.006**	-.005	-.004
	(-2.207)	(-1.604)	(-1.411)
Size	.000	.001*	-.000
	(.661)	(1.786)	(-.072)
BTM	.001	.002	.000
	(.546)	(1.201)	(.077)
Returnvol	-.025	-.016	-.006
	(-.713)	(-.358)	(-.369)
Epretaxvol	.065	.040	.111***
	(1.613)	(.734)	(2.899)
Busiseg	-.056***	-.084***	.003
	(-4.218)	(-6.498)	(.131)
Geoseg	-.007*	-.004	-.002
	(-1.816)	(-1.011)	(-.28)
Firmage	-.002***	-.004***	-.001
	(-5.392)	(-7.58)	(-.791)
AF	.003***	.004***	.002***
	(4.309)	(4.246)	(2.74)
_cons	.167***	.229***	.002
	(4.516)	(5.921)	(.037)
Observations	3255	3255	3255
R-squared	.585	.544	.453
Adj R^2	.502	.452	.343
Year fixed effect	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes

t-values are in parentheses. See variable definitions in Table 7.

**** p<.01, ** p<.05, * p<.1*

3.6 Endogeneity test

To reduce the concern on the endogeneity problem in our regression analysis for the relationship between managerial tone and the firm's future earnings, I make use of a two-stage least-square regression (2SLS). Motivated by Demerjian et al. (2017) and Hasan (2018), I use the industry average value of the firm's current earning (*EBIT*) as the instrument variable to identify the first-stage equation. Specifically, I calculate the industry average value of firm's current earnings (*ind_EBIT*) in each specific industry (according to their SIC code) and map each industry average value to the corresponding firm. I expect the current quarter industry average EBIT (*ind_EBIT*) to be highly and positively correlated with our endogenous variable, the firm's future earning *EBITnxtQ.* It is also highly unlikely that the current quarter industry average EBIT (*ind_EBIT*) influences the firm-level managerial tone. Thus, the essential requirements of the instrument variable are satisfied.

The first column of Table 16 reports that the coefficient for the instrumental variable in the first stage equation is positive and significant (P<0.01), suggesting that *ind_EBIT* is significantly associated with the future earnings *EBITnxtQ.* The results in the second column of Table 16 suggest that the association between managerial tone and future earnings remains robust after accounting for the endogenous relationship between tone and future earnings. Thus, the results from 2SLS corroborate our findings from the main analysis (Table 10).

Table 16. Endogeneity test

	(1) EBITnxtQ	(2) Tone
EBITnxtQ		.705***
		(3.215)
EBITloss	-.032***	-.055***
	(-8.985)	(-3.73)
EBITupdown	-.008***	.017***
	(-4.205)	(2.605)
Return	.022***	.066***
	(7.325)	(4.787)
ACC	.006	-.081
	(.202)	(-1.393)
Size	0	-.028***
	(.105)	(-9.446)
Busiseg	-.007***	.005
	(-3.515)	(.649)
Geoseg	-.002	-.025***
	(-1.121)	(-4.136)
Firmage	0***	.002***
	(-2.822)	(4.219)
EBITvol	.078**	-.408***
	(2.326)	(-2.897)
Returnvol	-.013**	-.118***
	(-2.09)	(-4.133)
AF	.002	.033***
	(.69)	(3.416)
ind_EBIT	.962***	
	(16.172)	
_cons	.058***	.627***
	(3.88)	(7.823)
Observations	3203	3203
R-squared	.197	.165
Adj R^2	.189	.157
Year fixed effect	Yes	Yes
Industry fixed effect	Yes	Yes
	Statistic	P value
Underidentification test: χ^2 statistic	221.519	<0.01
Weak identification test: F-statistic	320.293	<0.01

t-values are in parentheses. See variable definitions in Table 7.

**** p<.01, ** p<.05, * p<.1*

3.7 Conclusion

In this study, I adopt the signalling framework from Connelly et al. (2011) to examine the signalling role of managerial tone in corporate disclosure. First, I extend the signalling literature by demonstrating that tone plays a crucial signalling role in conveying the firm's prospects. Our study considers an insider view (managers' perspective) that managers have insider information unavailable to the audience and they will use tone to signal their own expectations about a firm's prospects. Firms expecting good (poor) performance use a more (less) optimistic tone, and tone matches the insider information it intends to convey.

Second, I examine a more complete signalling process in conference calls by determining whether the audience can interpret the signal correctly and confirm it through feedback. Prior studies have largely focused on the one-way communication model involving only the signaller. I know quite little about receivers' tone, especially when they interact with the signaller. This study bridges this gap and shows that analysts' tone in conference calls is positively related to a firm's future performance, suggesting that analysts accurately interpret the signal and develop the same expectation as managers. I also show that analysts' tone is positively related to managerial tone in the presentation and discussion sections of the call, suggesting that analysts will confirm and respond to managers with a consistent tone.

Third, I also find that the signalling environment moderates the managerial tone's signalling. Larger firms have more disclosure regulation demand and more exposure to other disclosure settings. Naturally, they will also communicate more frequently with their audience. Hence, larger firms have less incentive to signal than smaller firms. Firms with a better (poor) information environment and less (more) information asymmetry will be less (more) likely to signal through tone.

Overall, our findings illustrate how managerial tone in conference calls plays a signalling role and how the audience responds to it. This is consistent with the informational motivation and signalling theory that managerial tone can be used for two-way communication. However, although the endogeneity tests have been

conducted, this set of empirical tests still cannot remove the reverse causality issue completely which is one limitation of this study. The association between managerial tone and the future performance can be explained by using current-period tone to predict future performance or using expectation of future performance to explain current-period tone. Besides, this set of tests can't eliminate the possibility that managers opportunistically upward their tone to boost the analysts' tone as well, which is another limitation of the tests. Empirically, firm size may not be a completely fitting proxy for signalling environment although it is used widely in the current voluntary disclosure studies(Bochkay et al., 2020).

4.How does CEO tone signalling vary across CEO ability and signalling willingness?

4.1 Introduction

The tone of narrative disclosure has begun to receive considerable research attention in the accounting and finance literature. Prior tone studies largely investigate whether there is a positive association between tone and various aspects of economic performance (i.e., stock returns, future performance). The underlying assumption in these studies is that there is a positive association, suggesting tone provides useful information that impacts stock returns (Yekini et al., 2016;Bochkay et al., 2020) or that tone has valuable explanatory power for predicting future performance (Mayew et al., 2015;Li, 2010a). In Chapter 3, I empirically test the signalling of managerial tone based on the theoretical framework by Connelly et al. (2011) to find that managerial tone in the earnings conference call plays a crucial signalling role in conveying the firm's prospects. Firms expecting good(poor) performance use a more (less) optimistic tone, and tone matches the insider information it intends to convey. Furthermore, analysts' tone is positively related to managerial tone in the presentation and discussion sections of the call, suggesting that analysts will confirm and respond to managers with a consistent tone. In this chapter, I take one step further to examine whether top managers' characteristics can moderate the above managerial tone signalling.

Beyond tone signalling, contextual factors play a significant role in strengthening or weakening signalling effectiveness, which is the extent to which signalling reduces information asymmetry (Colombo, 2021). For example, prior tone studies provide evidence that inherent textual features, such as the

ordering of tone words (Cheng et al., 2021) and the degree of information asymmetry (Tsileponis et al., 2020) can affect tone's signalling effectiveness. Moreover, prior new venture financing studies also show that signal frequency (Janney and Folta, 2003), the signal receiver's attention (Drover et al., 2017), and the receiver's age, cognitive style, and personality (Mitteness et al., 2012) can also explain variation in signalling effectiveness. Although signalling theory acknowledges that receivers can perceive and interpret signals differently because of receiver characteristics (Connelly et al., 2011), little research has focused on how the signalling process varies depending on the signaller (Eddleston et al., 2016), especially in the context of tone study. In this study, I fill this gap by investigating whether tone signalling effectiveness (private information affecting CEO tone) varies across different signaller characteristics (CEO business education, CEO financial experience, CEO gender and CEO tenure). I base our study on a signalling theory framework (Connelly et al., 2011) to provide new empirical evidence regarding this insufficiently researched aspect of signalling theory that signaller characteristics can play a critical role in signalling effectiveness (Bergh et al., 2014).

I expect that CEO business knowledge and financial experience can improve the effectiveness of CEO tone signalling. CEOs with stronger business knowledge and financial experience possess the capacity to recognize external demand and take advantage of opportunities to enhance signalling to improve outside evaluations (Lewis et al., 2014). They consider signalling an effective channel for reducing information asymmetry because firm misevaluation not only lowers firm performance but also diminishes their personal reputation and future opportunities in the labour market (Chemmanur et al., 2009;Chemmanur et al., 2019). Because they hold superior information-processing capabilities (Chen, 2014), they can better understand current dynamics, competitive conditions, and stakeholders' information requests and provide more accurate responses. Moreover, more competent CEOs are more knowledgeable about

their client base, their firm's position in the industry, and macroeconomic conditions (Demerjian et al., 2013). They have more sophisticated valuation techniques for predicting a firm's prospects and risk (Chen, 2014), have better access to capital markets for information and resources (Custódio and Metzger, 2014), and can speak in the same financial language as stakeholders (e.g. analysts). All this helps them communicate more effectively to build channels and conduits between the firm and its external audience (Demerjian et al., 2013). From this perspective, I expect CEO business knowledge and financial experience can strengthen tone signalling effectiveness (the association between CEO tone and the firm's future performance).

I also expect CEO gender and tenure can moderate the signalling effectiveness of CEO tone. CEO business knowledge and financial experience can help them enhance their tone's signalling effectiveness; however, they still need incentives to effectively perform signalling tasks (Chen, 2014). I expect female CEOs have strong willingness to signal and are more likely to enhance tone signalling effectiveness. Women are consistently underrepresented among top executives (Huang and Kisgen, 2013). They have not taken entrepreneurial roles as often as men (Murphy et al., 2007) and are even less likely to engage in stakeholder network activities (Becker-Blease and Sohl, 2007). Stakeholders tend to apply a gender filter and highly value male CEOs while doubting female CEOs. The initial legitimacy of female CEOs is lower than that of male CEOs (Alsos and Ljunggren, 2017). Consequently, female CEOs may have a greater need to signal their own and the firms' prospects to compensate for the lower initial legitimacy due to this gender bias (Alsos and Ljunggren, 2017). Because signals of female CEO legitimacy are more difficult to communicate or be perceived by stakeholders (Terjesen et al., 2009), female CEOs are more willing to signal to assert and convince audiences of their authority and ability, especially in male-dominated business environments.

From another perspective, I also expect CEOs may have stronger willingness to signal their firm's prospects in the early years of their tenure because the market is uncertain of their ability and must rely on their recent performance to assess their competency. CEOs are more likely to enhance their signalling during the early days of their tenure to convince those outside the firm of their managerial ability and leadership (Bochkay et al., 2019b). As their tenure increases, career concerns gradually attenuate due to disclosure of their accumulated performance and strategy information, which diminishes their incentive to prove themselves to affect outsiders' judgments. Moreover, CEO knowledge, skills, and abilities may become obsolete (Darouichi et al., 2021) due to complacency and increased cognitive rigidity (Chemmanur et al., 2009). CEOs may become less open-minded and stick to their established paradigms (Lewis et al., 2014), become more entrenched and resist external changes, undertake less innovation (Tan and Liu, 2016), and reduce information- and resource-gathering activities (Henderson et al., 2006). Hence, signalling willingness can decrease as their tenure lengthens. From this perspective, CEO signalling willingness (e.g. gender, tenure) can moderate the association between CEO tone and the firm's future performance.

To test this hypothesis, I collected 1,770 earnings conference call transcripts from 237 FTSE 350 firms. The earnings conference call is often conducted immediately after the release of financial results (e.g. earnings announcement), typically the end of each financial quarter. The firm's top management team (e.g. CEO, CFO, president of investor relationship, and so on) will first summarise the current performance with a commentary and look for predictions on the future of the business in the presentation segment. After this, the conference calls normally end with a discussion that involves a group of sophisticated audience members (i.e. analysts) asking formal questions. I choose corporate conference calls mainly because a conference call is held by the top management team, which means CEOs are directly involved. In

contrast, annual reports are written and edited by different individuals who are unlikely to be firm executives (Larcker and Zakolyukina, 2012).Thus, conference calls give our study a unique advantage, as I can examine how tone signalling effectiveness can be determined by CEO characteristics.

I collect the relevant CEO characteristics data (e.g. business education, financial experience, gender, education) from BroadEx and Bloomberg. I collect the firm financial data from DataStream. The results from a series of regression analyses reveal that the signal provided by CEO tone matches the private information it aims to convey. Firms that expect good performance in the next quarter (private information) used a more optimistic tone in conference calls, while those expecting poor performance spoke less optimistically. Moreover, the association between CEO tone and future performance is strengthened when CEOs have stronger business background and experience (e.g. those with MBAs, indicating more business knowledge, or those with prior financial experience). Moreover, female CEOs are more willing to strengthen the association between tone and future performance; however, CEOs with longer tenure are less willing to do so. This supports our prediction that CEO ability and CEO signalling willingness can act as moderators to strengthen or weaken the association between CEO tone and the firm's future performance. The results of robustness estimations conducted using different tone and performance measurements are consistent with the main empirical results and support the hypotheses that CEO tone signalling varies across different CEO characteristics (e.g., business knowledge, financial experience, gender or tenure).

Our study contributes to the literature in three ways. First, the extant tone literature shows there are a few moderating factors that can influence the association between tone and economic performance (e.g. stock returns, performance), including the ordering of emotional words (Cheng et al., 2021),

readability (Tan et al., 2014), the accompanying quantitative information (Baginski et al., 2016), the degree of information asymmetry (Boudt et al., 2018), and the tone of contemporaneous media articles (Tsileponis et al., 2020). I extend this literature by providing an analysis of the moderating role of the previously less examined factors: CEO business knowledge, financial experience, gender and tenure. Alignment of interests between the signalling hypothesis and managers' specific characteristics suggests that CEO characteristics play an important role in determining managerial tone and its signalling function. Our finding implies that top managers with stronger business background and experience or female CEO and CEO with longer tenure convey the firm's value and prospects to outsiders more effectively; thus, they are more successful in signalling and reducing information asymmetry.

Second, the prior literature on signalling theory focuses more on the signal's influence, such as whether stock prices are affected after managers send out a signal (Wang, 2020;Azimi and Agrawal, 2021;Wisniewski and Yekini, 2019). The signalling environment (i.e., any contextual factors that affect signalling effectiveness) is a relatively insufficiently researched area of signalling theory (Connelly et al., 2011). Contemporaneous study on the signalling environment largely focuses on the context of new-venture financing (Colombo, 2021), but scarcely examines the area of corporate voluntary disclosure. For example, the entrepreneur's race and sexual orientation (Anglin et al., 2018b), the entrepreneur's passion (Davis et al., 2017), and past related crowdfunding experience (Courtney et al., 2017) increase the signaller's perceived credibility and therefore enhance signalling effectiveness. I extend this research line and provide richer evidence of signalling contextual factors (signallers' characteristic) that moderate signalling effectiveness in the context of voluntary disclosure.

Third, research on manager characteristics largely focuses on how such characteristics lead to various organizational outcomes (e.g. firm financial policies, investments, or innovation), while less focus is placed on how top manager characteristics affect a firm's voluntary disclosure. Thus, our study complements the literature on manager characteristics, which suggests that CEO characteristics can play a moderating role and affect tone signalling behaviour.

The remainder of this paper is organized as follows. Section 4.2 reviews the related literature and formulates the research hypotheses. Section 4.3 describes the sample selection process and research methods. Section 4.4 discusses the main empirical results, while sections 4.5 and 4.6 focus on robustness and endogeneity tests. Finally, section 4.7 concludes the study.

4.2 Literature review and hypotheses development

4.2.1 Signalling theory

Spence (1973) develops and applies signalling theory to the labour market. This theory asserts that managers can reduce information asymmetry in the market by signalling more information to others (Morris, 1987). Signalling theory explains that managers use voluntary disclosure to communicate their firms' quality (Trueman, 1986), reduce information asymmetry (Chemmanur et al., 2009), and attain higher market valuation (Healy and Palepu, 2001) and better compensation packages (Anglin et al., 2018a).

Signalling theory has frequently been adopted in disclosure research, particularly to explain how managers overcome information asymmetry to convey private information about a firm's prospects (Kiridaran et al., 2004;Aggarwal et al., 2012;Lys et al., 2015). For example, Kiridaran et al. (2004) show that undervalued banks convey insider information through loan loss

provisions to raise their market value. Louis and Robinson (2005) find that managers employ accruals in conjunction with stock split signals to communicate favourable private managerial information. A dividend increase is also considered a meaningful signal, especially when firms operate in poor information environments (Aggarwal et al., 2012); firms in low-information environments are more likely to increase their dividends to reduce information asymmetry. Similarly, Lys et al. (2015) provide evidence that firms with promising outlooks undertake more corporate social responsibility activities, which help signal their future performance.

Overall, by communicating private information using different signalling devices, managers reduce the information asymmetry between stakeholders and management, thereby lowering the cost of capital and raising share prices.

4.2.2 Contextual factors affecting signalling effectiveness

Connelly et al. (2011) identify several factors that can affect signalling effectiveness, which is the extent to which signalling reduces information asymmetry. For example, signal frequency can enhance signalling effectiveness (Janney and Folta, 2003). When a signaller increases the quantity of signals or sends more observable signals, receivers can more effectively understand the signal(s) to develop a better perception in the signaller's favour. Moreover, a third-party affiliation (e.g. endorsement from a third-party) can validate a firm's signal and make it more reliable, which can help receivers make sense of the signal (Plummer et al., 2016). Receiver attention can also affect signalling effectiveness (Connelly et al., 2011). Signalling will become ineffective if the receiver is not focusing on the signal or the signal is not what the receiver is seeking. Furthermore, the receiver's age, cognitive style, personality (Mitteness et al., 2012), and type (Ebbers and Wijnberg, 2012) can

affect the receiver's interpretation of the signal and thus influence signalling effectiveness.

From the signaller perspective, several signaller characteristics can affect signalling effectiveness. More credible signallers can make signalling more reliable, while more deceptive signallers can decrease information asymmetry (Connelly et al., 2011). Colombo (2021) illustrates some empirical examples in the context of new-venture financing. For example, the entrepreneur's race and sexual orientation have a significant influence on signalling effectiveness (Anglin et al., 2018b).The entrepreneur's passion (Davis et al., 2017) and past related crowdfunding experience (Courtney et al., 2017) increase the signaller's perceived credibility and therefore enhance signalling effectiveness. The signaller's visible actions (e.g. product introduction to the market) increase the probability that investors will develop a higher confidence level in a young firm's capability (Plummer et al., 2016). Overall, this literature demonstrates that several contextual factors (e.g. signal frequency, signaller characteristics and actions, receiver characteristics and attention) can influence signalling effectiveness. However, this has been little researched in the context of voluntary disclosure.

Current tone studies about how contextual factors influence signalling effectiveness focus more on the inherent textual features or the degree of information asymmetry. For example, the ordering of emotional words (Cheng et al., 2021) and text readability (Tan et al., 2014) can affect investors' judgement of tone. The degree of information asymmetry, such as smaller firm size, younger firms, firms in a higher growth stages (Boudt et al., 2018), and contemporaneous media article tone (Tsileponis et al., 2020) can also affect tone market pricing. However, there are fewer studies that focus on how signaller characteristics impact signalling effectiveness. The studies mentioned above tend to examine textual features, which are more related to the signal

(i.e., tone) itself or the information environment, but not the signaller's characteristics, which might impact signalling effectiveness. In this study, I fill this gap and focus on signaller characteristics to investigate whether signaller ability and willingness to signal affect tone signalling effectiveness.

4.2.3 Hypotheses development

4.2.3.1 CEO tone signalling

In this study, I first investigate the relationship between CEO tone and private information, focusing on whether CEO tone can send a signal that matches the firm's private information and alter the audience's understanding of a firm's future state (Ciuchta et al., 2017), that is, whether CEO tone can reliably perform a signalling role.

In conference calls—one of the most important voluntary disclosure settings—CEOs are very likely to signal future performance. These conference calls involve sophisticated investors who are more interested in the future than in current firm performance; this preference can be attributed to current performance being disclosed in other channels before the conference call (i.e. earnings press releases) and the inclusion of this disclosed information in the stock price. Chapman and Green (2017) provide evidence that analysts requested forward-looking information in nearly one-third of discussion sessions. The information demand from this sophisticated audience drives CEOs to change their disclosure choices and adopt tools that facilitate further disclosure. Based on this, CEOs are very likely to signal some private information in conference calls to influence the audience's understanding of the firm's prospects and reinforce its confidence in the firm. Langberg and Sivaramakrishnan (2010) show that managers disclose information to seek feedback from analysts on proposed project initiatives before making long-term commitments. Market participants predominantly follow analysts because the latter's recommendations and earnings forecasts determine stock price

movements (Soltes, 2014;Brown et al., 2015). Therefore, CEOs are quite likely to signal some information to seek a response from the financial market, which is driven by analysts' expertise and experience (Langberg and Sivaramakrishnan, 2010). Overall, this two-way information flow between CEOs and analysts shapes a firm's signalling motivation and behaviour.

Prior studies often consider that tone contains information that can be used to predict future firm performance (Davis et al., 2012;Mayew et al., 2015). This emphasizes the investor perspective that tone can provide useful information to help outsiders better assess a firm. However, as an evident and observable signal, tone has been less examined in terms of the signalling hypothesis (Trueman, 1986), which applies a manager perspective and proposes that future performance expectations (i.e. private information) lead to the currently observed tone. CEOs are willing to use tone to signal their future success. To bridge this gap, I posit that the signal provided by CEO tone matches the firm's private information. CEOs that expect a good (poor) performance in the subsequent period are more likely to choose an optimistic (less optimistic) tone for signalling. CEO tone, as the dependent variable, can be used as a signalling device, which is consistent with the following hypothesis:

Hypothesis 1: CEO tone is positively related to future firm performance.

4.2.3.2 CEO business knowledge and financial experience

I expect CEO business knowledge and financial experience can improve the signalling effectiveness of CEO tone. More able CEOs possess the capacity to recognize external demand and take advantage of opportunities to increase their firm's value. They consider voluntary disclosure as a channel that can enhance signalling to improve a firm's reputation and maintain its legitimacy (Lewis et al., 2014). Moreover, more able CEOs hold superior information-processing capabilities (Chen, 2014) and can better understand current

dynamics, competitive conditions, and stakeholders' needs, allowing them to provide accurate responses. They also have more insider information than lower-level managers and can respond to demands for real-time information and volatile challenges. From another perspective, more able CEOs are more likely to strengthen their signalling through tone to reduce information asymmetry because misevaluation of their firm not only lowers the firm's performance but also diminishes their personal reputation and future opportunities in the labour market. CEOs with higher abilities risk greater losses from mispricing of firm value (Chemmanur et al., 2009).

CEO business background are commonly obtained through their business education and industry experience (Becker, 1964;Anglin et al., 2018a). Perhaps the most common studied proxies are whether CEOs obtain MBAs and whether CEOs hold prior financial experience (Nawaz, 2021;Chemmanur et al., 2019;King et al., 2016;Custódio and Metzger, 2014). An MBA is a sign of the management team's business knowledge, and this affects outsiders' expectations of a firm's prospects (Spence, 1973;Sauer et al., 2010). Holding an MBA is an indicator of a CEO's unobservable talent, operating capability, and ability to survive in a challenging environment because MBA programs have stringent entry requirements. Holding an MBA can also indicate greater depth and quality of a CEO's knowledge, skills, and social networks (Gounopoulos et al., 2020;Nawaz, 2021). CEOs with an MBA are more knowledgeable about their client base, their firm's position in the industry, and macro-economic conditions; they are also better able to understand and apply complex standards to synthesize information into reliable forward-looking estimates to respond to stakeholders with higher quality information (Demerjian et al., 2013). From this perspective, CEO ability (e.g. CEOs with an MBA) can help improve a firm's operational environment and contribute to signalling effectiveness (Chen, 2014).

Furthermore, CEOs with financial experience may more accurately judge a firm's prospects and risks and more fully understand future opportunities (Chen, 2014). For example, financial expert CEOs are more financially sophisticated and have better access to capital markets so they can obtain superior information and resources (Custódio and Metzger, 2014). CEOs with financial knowledge can better provide industry insights to advise regarding where growth opportunities exist and how to exploit them (Kang et al., 2018). Moreover, CEOs with financial experience possess more sophisticated valuation techniques to predict outcomes and reduce risk; they have stronger ability to report more accurate and justifiable depreciation rates, fair values, and other accrual estimates to increase their information advantage (Le et al., 2020). In addition, having a financial background might mean a CEO speaks the same language as financial stakeholders (e.g. analysts) and can communicate more effectively to build channels and conduits between the firm and external organizations (Demerjian et al., 2013). From this perspective, CEO ability (e.g. CEOs with financial experience) can help maintain a transparent and effective environment to reduce information asymmetry (Chemmanur et al., 2009). Hence, I develop the following hypotheses:

Hypothesis 2a: CEO business knowledge improves CEO tone signalling effectiveness.

Hypothesis 2b: CEO financial experience improves CEO tone signalling effectiveness.

4.2.3.3 CEO gender and tenure

In the previous section, I anticipate that a CEO's business knowledge and financial experience can improve their tone signalling effectiveness. Although business background may enhance CEO signalling, they also need incentives

to effectively perform these tasks (Chen, 2014). Hence, this study also examines the moderating influence of CEO willingness to signal. I expect tone signalling effectiveness is stronger (weaker) when CEOs are more (less) willing to signal. CEO willingness to signal moderates the relationship between CEO tone and future performance.

Prior studies provide evidence that the initial legitimacy of female CEOs is lower than that of male CEOs (Alsos and Ljunggren, 2017) because men have more emphasis on leadership while women have more emphasis on family and relationships (Eddleston et al., 2016). Traditional gender norms (i.e. masculine or feminine) can lead to women being perceived as less favourable, especially in top business manager roles where leadership is more heavily emphasized (Ridgeway, 2013). Women are discriminated against in the labour (Koch et al., 2014) and venture capital markets (Alsos and Ljunggren, 2017). They are consistently underrepresented among top executives (Huang and Kisgen, 2013), have not assumed entrepreneurial roles as often as men (Murphy et al., 2007), and less often engage in stakeholder network activities (Becker-Blease and Sohl, 2007). It is easy for stakeholders to apply a gender filter, placing higher value on male CEOs than female CEOs, because different standards and expectations are used to evaluate women's performance (Eddleston et al., 2016). Consequently, female CEOs may have a greater need to signal their own and their firm's prospects to compensate for their lower legitimacy due to gender bias (Alsos and Ljunggren, 2017). For example, De Amicis et al. (2021) report that female executives use a more positive and less ambiguous tone in conference calls than male executives because they wish to assert and convince the audience of their authority and ability, especially in male-dominated business environments. Because a female CEO's signals of legitimacy are more difficult to communicate or be perceived by stakeholders, the standards of ability are higher for them than for men. Thus, to be perceived as being highly committed, a female CEO is more willing to signal to provide

evidence (Terjesen et al., 2009). From this perspective, I expect female CEOs possess more willingness to signal and are more likely to enhance their tone signalling effectiveness.

From another perspective, CEOs may have stronger willingness to report good performance in the early years of their tenure because the market is uncertain about their ability and must rely on their recent performance to assess their competence. For example, Ali and Zhang (2015) find that earnings overstatements are larger during the early years of a CEO's tenure. CEO tone is also more positive at the beginning of their tenure (Bochkay et al., 2019b). As their tenure lengthens and firm performance improves, career concerns gradually diminish, lowering their motivation to prove themselves to outsiders. Thus, CEOs with longer (shorter) tenures are less (more) motivated to signal their performance because they have fewer (more) career concerns.

Along with CEO tenure, CEO knowledge, skills, and abilities may become obsolete (Darouichi et al., 2021) due to complacency and increased cognitive rigidity (Chemmanur et al., 2009). CEOs may become less open-minded (Lewis et al., 2014), prefer to cooperate with like-minded executives, and reduce information- and resource-gathering activities (Henderson et al., 2006). In addition, longer-tenured CEOs have greater power and are more likely to increase their autonomy, resist pressure for change, and stick to their established paradigms (Lewis et al., 2014). For example, Tan and Liu (2016) find that CEOs with longer tenure are more entrenched, resist external changes, and undertake less innovation, diversification, and marketing differentiation. Lin et al. (2014) report that managers with longer tenure are more powerful, which is associated with lower quality internal controls. Thus, CEOs with longer tenure are less likely to signal their firm's prospects due to their complacency and rigidity. Hence, I develop the following hypotheses:

Hypothesis 3a: CEO gender moderates the signalling effectiveness of CEO tone.

Hypothesis 3b: CEO tenure moderates the signalling effectiveness of CEO tone.

4.3 Sample and research design

4.3.1 Sample selection

I obtain an initial sample of 6,165 quarterly earnings conference call transcripts from 241 FTSE 350 firms in the United Kingdom for 2002–2020; these transcripts are extracted from the Thomson Reuters database. I delete 427 transcripts with different titles but repetitive content; I also exclude transcripts with only an earnings announcement and no discussion section. Finally, I delete 665 meeting transcripts where CEOs were not in attendance. This procedure yields approximately 4,734 transcripts used to measure tone. I obtain CEO characteristics from the BoardEx and Bloomberg databases and financial data from the DataStream database. I match the CEO characteristics, financial, and tone variables, yielding a final sample of 1,861 observations. However, the final sample for each regression differs depending on the availability of the control variables included in the model. Table 17 summarizes the sample selection procedure.

Table 17. Sample selection procedure

Sample selection	
Earnings call transcripts by FTSE 350 firms extracted from Thomson Reuters from 2002 to 2020	6,165
Same transcript content with a different title	-427
Call transcripts without discussion sections	-339
Call transcripts without CEOs in attendance	-665
Call transcripts for CEO tone measurement	4,734
Matching with missing financial data from DataStream	-1913
Matching with missing CEO characteristics from BoardEx	-1051
Sample available to all models	**1,770**

4.3.2 Variable measures

4.3.2.1 CEO tone variables

I measure CEO tone in the entire conference call and in the presentation and discussion sections of the earnings conference call transcripts. I use Loughran and McDonald (2011) positive and negative word dictionaries to calculate tone. The quarterly earnings conference call transcripts, including the header of firm identifiers, date, and start time of the call, are XML-friendly. Additional tags can identify the different sections of the call (e.g. presentation and discussion) and role of attendees (e.g. CEO and analysts). I employ Python programming to conduct the textual analysis, to segment the transcripts into presentation sections and discussion sections through the headings and measure the different speaks' tone through the role tags. In chapter 3, the managers tone refers to the tone of all corporate participants that includes CEO, CFO, other

individual managers (e.g., chairman). In this chapter, I focus only on the tone of CEO (through CEO role tag) due to the data availability of managers' characteristics. First, Python segments the transcripts into the presentation and discussion sections. Second, it separates the CEO's speech in the presentation and discussion sections. Finally, it returns the total number of positive and negative words in the CEO's speech throughout the conference call, presentation, and discussion.

I calculate the tone measure as the difference between the percentage of positive and negative words, which is the net tone, and is expressed as follows:

$$\frac{\boldsymbol{Pos - Neg}}{\boldsymbol{Pos + Neg}}$$

where Pos and Neg, respectively, represent the positive and negative words from Loughran and McDonald (2011). Specifically, I measure the tone variable *Tone_CEO* for the CEO's speech in both the presentation and discussion sections. I also measure the presentation tone (*Tone_CEO_pres*) for the CEO's speech in the presentation section and the discussion tone (*Tone_CEO_dis*) for the CEO's speech in the discussion section.

4.3.2.2 CEO characteristics variables

To measure CEO ability, I define two dummy variables, *MBA_CEO* and *Financial_CEO*, to proxy for CEO business knowledge and financial experience. *MBA_CEO* equals 1 if the CEO has an MBA and 0 otherwise. *Financial_CEO* equals 1 if the CEO has prior accounting and finance-related career experience (e.g. CFOs, financial managers, investment bankers, accountants, treasurers) and 0 otherwise. To measure CEO willingness to signal, I also define *CEOtenure*, which is the total number of years of the CEO's tenure and Gender_CEO, which equals 1 if the CEO is female.

4.3.2.3 Independent variable—Financial variables

To measure firm performance, I use quarterly earnings before interest and taxes (*EBIT*), where *EBIT* is calculated as quarterly earnings before interest and taxes scaled by total assets at the end of the quarter. I also use the statistics and data time-series command to obtain *EBIT* in the subsequent quarter (*EBITnxtQ*) for the primary test.

As control variables in our regressions, I define *EBITloss* as a dummy variable that equals 1 if *EBIT* is less than 0, and 0 otherwise. I collect stock returns in the current quarter (*Return*). I measure accruals (*ACC*) as the current quarter *EBIT* minus operating cash flow scaled by total assets. Firm size (*Size*) is the logarithm of the market value of equity. *BTM* is the book-to-market ratio calculated as total assets, scaled by the market value of equity plus total liabilities. *Busiseg* is the logarithm of one plus the number of business segments. *Geoseg* is the logarithm of one plus the number of geographic segments. *Firmage* is the number of years the firm has been included in the DataStream database. I also calculate return volatility (*Returnvol*) as the standard deviation of stock return data for the past 12 months. Similarly, I calculate earnings volatility (*EBITvol*) as the standard deviation of *EBIT*. I also collect earnings per share and make its logarithm value the number of following analysts (*AF*). I consider adding these control variables because they have been used in previous financial disclosure studies (Feldman et al., 2010;Davis and Tama-Sweet, 2012;Li, 2010a). Table 18 presents the variables used in this study.

Table 18. Variable definitions

Dependent Variables	
Tone_CEO	CEO net tone in the conference call transcript, calculated as (pos-neg)/(pos+neg)
Tone_CEO_pres	CEO net tone in the presentation section, calculated as (pos-neg)/(pos+neg)
Tone_CEO_dis	CEO net tone in the discussion section, calculated as (pos-neg)/(pos+neg)
Tone_CEO_R	CEO net tone in the conference call transcript, calculated as (pos-neg)/total, used for the robustness analysis
Tone_CEO_presR	CEO net tone in the presentation section, calculated as (pos-neg)/total, used for the robustness analysis
Tone_CEO_disR	CEO net tone in the discussion section, calculated as (pos-neg)/total, used for the robustness analysis
Independent Variables	
MBA_CEO	A dummy variable that equals one if the CEO has an MBA degree, and 0 otherwise
Financial_CEO	A dummy variable that equals one if the CEO has financial experience (e.g. CFOs, financial managers, investment bankers, accountants, treasurers), and 0 otherwise
CEOtenure	CEO tenure in years
Gender_CEO	A dummy variable that equals one if the CEO is a woman, and 0 otherwise
EBIT	Quarterly earnings before interest and taxes (EBIT) scaled by total assets
EBITnxtQ	EBIT in the next quarter
Epretax	Quarterly pre-tax income scaled by total assets, used for the robustness analysis
EpretaxnxtQ	*Epretax* in the next quarter
Control variables	
EBITloss	A dummy variable that equals one if EBIT is less than 0, and 0 otherwise
Epretaxloss	A dummy variable that equals one if *Epretax* is less than 0, and 0 otherwise, used for the robustness analysis

Return	Contemporaneous quarterly stock returns
ACC	Accruals, calculated as earnings minus cash flow from operations, scaled by total assets
Size	The logarithm value of the market value of equity
BTM	Book-to-market ratio, calculated as total assets scaled by the market value of equity plus total liabilities
Busiseg	The logarithm value of 1 plus the number of business segments
Geoseg	The logarithm value of 1 plus the number of geographic segments
Firmage	The number of years a firm has been included in DataStream
Return volatility	Stock return volatility, calculated using the past 12 months of stock return data
EBITvol	Standard deviation of EBIT, calculated using the past five years of data
Epretaxvol	Standard deviation of *Epretax* calculated using the past five years of data, used for the robustness analysis
AF	The number of analysts following the firm, calculated as the logarithm value of the total estimates of the mean of earnings per share

4.3.3 Empirical models

For our regression tests, I use the following ordinary least squares regression model:

$$\textbf{Tone} = \alpha_0 + \alpha_1 \textbf{ Performance} + \alpha_2 \textbf{ CEO ability} + \textbf{CEO signalling willingness} + \alpha_3 \textbf{ CEO ability} \times \textbf{Performance} + \alpha_3 \textbf{CEO signalling willingness} \times \textbf{Performance} + \varepsilon$$

where *Tone* is measured using various tone variables, such as *Tone_CEO*, *Tone_CEO_pres*, and *Tone_CEO_dis*. CEO ability is measured using whether

the CEO has an MBA (*MBA_CEO*) and whether the CEO has prior financial experience (*Financial_CEO*). CEO signalling willingness is measured using *CEOtenure and Gender_CEO*. Performance is measured using next-period EBIT (*EBITnxtQ*). Each regression controls for firm and year fixed effects and uses heteroskedasticity-robust standard errors. I discuss the details of each regression model in Section 4.4.

4.4. Empirical results

4.4.1 Descriptive statistics and correlation analysis

Table 19 presents the descriptive statistics for the tone, human capital, financial, and control variables. The mean value of net tone is positive and the mean value of presentation tone is highest. The mean of discussion tone is lower, similar to findings in previous studies (Chen et al., 2018).

Table 20 presents the correlations between the variables included in the primary regression. Consistent with our expectations, *EBITnxtQ* has correlation coefficients of 0.118, 0.094, and 0.052 with *Tone_CEO*, *Tone_CEO_pres*, and *Tone_CEO_dis*, respectively.

Table 19. Descriptive statistics

	N	Mean	Std. Dev.	min	Median	max
Tone CEO	4418	.325	.211	-1	.343	1
Tone CEO pres	4373	.451	.226	-1	.474	1
Tone CEO dis	4403	.11	.275	-1	.118	1
Tone CEO R	4419	.016	.012	-.03	.016	.064
Tone CEO presR	4374	.026	.016	-.054	.026	.104
Tone CEO disR	4408	.004	.011	-.053	.004	.064
MBA CEO	3078	.267	.442	0	0	1
Financial CEO	3181	.329	.47	0	0	1
CEOtenure	3413	4.536	4.199	0	4	36
Gender CEO	3457	.037	.188	0	0	1
EBITnxtQ	3607	.04	.052	-.543	.035	1.108
EBITloss	4604	.09	.286	0	0	1
Return	4395	-.878	.374	-1.981	-.9	4.698
ACC	3810	-.016	.065	-.825	-.009	1.109
BTM	4382	.718	.279	.016	.732	1.779
Size	4407	15.414	1.526	10.491	15.217	20.327
Firmage	4575	22.851	6.988	1	28	28
Busiseg	4560	1.602	.443	.693	1.609	2.398
Geoseg	4569	1.608	.55	.693	1.609	2.398
Returnvol	4377	.295	.139	.001	.269	2.898
EBITvol	4503	.054	.026	.001	.048	.443
AF	4437	2.669	.706	0	2.773	10.692

Table 20. Correlation analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) Tone_CEO	1.000																		
(2) Tone_CEO_pres	0.838	1.000																	
	(0.000)																		
(3) Tone_CEO_dis	0.706	0.385	1.000																
	(0.000)	(0.000)																	
(4) MBA_CEO	-0.025	0.003	-0.039	1.000															
	(0.168)	(0.874)	(0.034)																
(5) Financial_CEO	-0.065	-0.033	-0.104	-0.138	1.000														
	(0.000)	(0.066)	(0.000)	(0.000)															
(6) CEOtenure	-0.094	-0.078	-0.063	0.026	0.081	1.000													
	(0.000)	(0.000)	(0.000)	(0.147)	(0.000)														
(7) Gender_CEO	0.095	0.077	0.047	-0.062	-0.018	-0.047	1.000												
	(0.000)	(0.000)	(0.006)	(0.001)	(0.323)	(0.006)													
(8) EBITnxtQ	0.112	0.087	0.049	0.045	-0.051	0.035	0.005	1.000											
	(0.000)	(0.000)	(0.004)	(0.025)	(0.011)	(0.068)	(0.790)												
(9) EBITloss	-0.107	-0.112	-0.050	-0.061	-0.003	-0.029	-0.001	-0.224	1.000										
	(0.000)	(0.000)	(0.001)	(0.001)	(0.864)	(0.085)	(0.957)	(0.000)											
(10) Return	0.153	0.178	0.072	-0.011	0.029	0.046	-0.020	0.179	-0.140	1.000									
	(0.000)	(0.000)	(0.000)	(0.568)	(0.107)	(0.008)	(0.242)	(0.000)	(0.000)										
(11) ACC	0.025	0.039	0.015	-0.053	0.048	0.033	-0.045	0.047	-0.271	0.040	1.000								
	(0.129)	(0.017)	(0.354)	(0.007)	(0.012)	(0.073)	(0.014)	(0.008)	(0.000)	(0.014)									
(12) BTM	-0.159	-0.194	-0.113	-0.112	0.085	-0.072	-0.059	-0.439	0.183	-0.239	0.082	1.000							
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)								
(13) Siize	-0.097	0.019	-0.044	0.027	0.066	0.016	0.002	-0.001	-0.099	0.027	0.012	-0.135	1.000						
	(0.000)	(0.220)	(0.004)	(0.137)	(0.000)	(0.369)	(0.897)	(0.938)	(0.000)	(0.074)	(0.464)	(0.000)							
(14) Firmage	0.061	0.062	0.019	-0.063	0.017	0.106	-0.147	-0.050	-0.053	-0.006	0.061	0.054	0.185	1.000					
	(0.000)	(0.000)	(0.201)	(0.000)	(0.332)	(0.000)	(0.000)	(0.003)	(0.000)	(0.697)	(0.000)	(0.000)	(0.000)						
(15) Busiseg	-0.021	-0.004	-0.014	-0.030	0.066	0.020	-0.116	-0.031	-0.004	-0.018	-0.024	-0.037	0.109	0.017	1.000				
	(0.162)	(0.817)	(0.346)	(0.093)	(0.000)	(0.253)	(0.000)	(0.061)	(0.812)	(0.227)	(0.143)	(0.015)	(0.000)	(0.243)					
(16) Geoseg	-0.082	-0.087	-0.018	0.103	0.011	0.059	-0.070	0.081	-0.018	0.017	-0.075	-0.169	0.127	0.078	0.239	1.000			
	(0.000)	(0.000)	(0.234)	(0.000)	(0.547)	(0.001)	(0.000)	(0.000)	(0.229)	(0.259)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
(17) EBITvol	-0.070	-0.058	-0.053	-0.020	0.043	0.019	-0.057	-0.005	0.068	-0.078	-0.065	-0.010	0.006	-0.068	0.083	0.057	1.000		
	(0.000)	(0.000)	(0.000)	(0.274)	(0.017)	(0.273)	(0.001)	(0.757)	(0.000)	(0.000)	(0.000)	(0.503)	(0.716)	(0.000)	(0.000)	(0.000)			
(18) Returnvol	-0.052	-0.043	-0.031	-0.008	0.024	0.028	-0.038	0.005	0.024	0.315	-0.057	-0.020	-0.035	-0.039	0.044	0.021	-0.072	1.000	
	(0.001)	(0.006)	(0.047)	(0.680)	(0.192)	(0.107)	(0.029)	(0.771)	(0.107)	(0.000)	(0.001)	(0.191)	(0.025)	(0.010)	(0.004)	(0.177)	(0.000)		
(19) AF	-0.041	0.018	0.012	0.002	0.012	0.033	0.004	-0.012	0.032	-0.043	-0.011	-0.018	0.405	0.241	0.044	0.152	-0.029	-0.007	1.000
	(0.007)	(0.249)	(0.419)	(0.904)	(0.516)	(0.055)	(0.816)	(0.487)	(0.034)	(0.005)	(0.510)	(0.253)	(0.000)	(0.000)	(0.004)	(0.000)	(0.058)	(0.649)	

This table presents Pearson correlations among dependent, independent, and control variables used in the main test. All variables are defined in Table 18, and p-value are in parentheses below each coefficient.

4.4.2 Regression results

In this section, I examine the association between CEO tone and future performance and whether CEO ability and CEO signalling willingness moderate the association between tone and future performance. I estimate the following equation using panel data and report the results in columns (2), (3), and (4) of Table 21:

$$\begin{aligned}\textbf{Tone} &= \alpha_0 + \alpha_1 \textbf{EBITnxtQ} \\ &+ \alpha_2 \textbf{MBA\_CEO} + \alpha_3 \textbf{Financial\_CEO} + \alpha_4 \textbf{CEOtenure} + \alpha_5 \textbf{Gender\_CEO} \\ &+ \alpha_5 \textbf{MBA\_CEO} \times \textbf{EBITnxtQ} + \alpha_6 \textbf{Financial\_CEO} \times \textbf{EBITnxtQ} \\ &+ \alpha_7 \textbf{CEOtenure} \times \textbf{EBITnxtQ} + \alpha_8 \textbf{Gender\_CEO} \times \textbf{EBITnxtQ} \\ &+ \textbf{Control} + \textbf{Firm\_FE} + \textbf{Year\_FE} + \varepsilon\end{aligned}$$

The dependent variables are CEO tone in the conference call (*Tone_CEO*), presentation (*Tone_CEO_pre*s), and discussion (*Tone_CEO_dis*), as tabulated in columns (1)– (4) in Table 21. The primary independent variable is *EBITnxtQ* and the relevant coefficient is α_1. I also add four separate interaction items (*MBA_CEO×EBITnxtQ*, *Financial_CEO×EBITnxtQ*, *CEOtenure×EBITnxtQ and Gender_CEO×EBITnxtQ*) to examine the moderating role of CEO ability and CEO signalling willingness on the association between CEO tone and future performance. I control for earnings loss (*EBITloss*), contemporaneous returns (*Return*), accruals (*ACC*), firm size (*Size*), book-to-market ratio (*BTM)*, return volatility (*returnvol*), EBIT volatility (*EBITvol*), business segment (*Busiseg*), geographic segment (*Geoseg*), firm age (*Firmage*), and analyst following (*AF*), which have all been used in previous financial disclosure studies (Feldman et al., 2010;Davis and Tama-Sweet, 2012;Li, 2010a).

From columns (1)–(3), α_1 is significantly positive and shows a positive association between CEO tone and future EBIT *(EBITnxtQ)*. CEO tone plays a credible and reliable signalling role in conveying information regarding future performance. This is consistent with the chapter 3 findings that CEO tone can serve as an effective signal that corresponds to the information it intends to convey. This is also consistent with (Li, 2010a) who found managers credibly use tone to describe current firm performance. In column (2), three interaction terms positively moderate the association between CEO tone and future performance, while one interaction term

negatively moderates it. A CEO with an MBA strengthens the tone signalling effect because such CEOs are better able to take advantage of opportunities(Chen, 2014), understand stakeholders' information requests(Chen, 2014), display the firm's prospects better(Demerjian et al., 2013), and strengthen their signalling of future performance. Similarly, CEOs who are financial experts also strengthen the association between tone and future performance, as such CEOs can provide more accurate responses(Kang et al., 2018) and more effectively communicate with tone to enhance signalling and build connections(Le et al., 2020). Female CEOs are more likely to strengthen their signalling, because they utilize these opportunities to assert and convince the audience of their authority and ability to improve their legitimacy(De Amicis et al., 2021). However, this strengthening is weakened by CEO tenure, which suggests that longer-tenure CEOs are less motivated to signal due to declining career concerns(Ali and Zhang, 2015;Bochkay et al., 2019b) and the presence of complacency and rigidity(Lewis et al., 2014;Darouichi et al., 2021). The results in column (3) are consistent with those in columns (1) and (2) that presentation tone can signal future firm performance and that this association is strengthened by CEOs with an MBA, those with financial experience, or CEOs who are female, but it is weakened by CEO tenure. I find no obvious evidence in column (4) for an association between CEO tone and future performance, nor do I find a moderating role of CEO characteristics in the discussion section. This could perhaps be because CEO tone in the discussion section is much more spontaneous and less controllable by the CEO (Blau et al., 2015). Furthermore, CEO tone is positively associated with *Return* (for both whole call and presentation section) but negatively associated with *EBITloss* (for all whole call, presentation section and discussion section). This is consistent with chapter 3 findings and also consistent with Li (2010a) that well-performing firms' CEO will speak more optimistically during earnings conference calls. However, for accrual, firm size and the analysts following, they lose their significance associated with CEO tone which is slightly different with chapter 3. This may be due to the addition of the moderation variables.

The results from the main and interaction effects all support the tone signalling hypothesis that CEO tone can be used as a signalling device to convey information

about a firm's future performance. CEO ability and their willingness to signal can thus moderate the association between tone and future performance.

Table 21. Regression results

	(1)	(2)	(3)	(4)
	Tone_CEO	Tone_CEO	Tone_CEO_pres	Tone_CEO_dis
EBITnxtQ	.7949***	.6937***	.7435***	.5747
	(5.4633)	(3.165)	(2.7946)	(1.6111)
MBA_CEO	.1175***	.0797***	.0759***	.0252
	(7.2924)	(4.1371)	(3.2745)	(.7084)
Financial_CEO	.0752***	.0442***	.0819***	.0272
	(6.257)	(3.0154)	(4.7211)	(1.1001)
CEOtenure	-.0071***	-.0043***	-.0041***	-.0037
	(-6.6573)	(-3.0847)	(-2.6647)	(-1.4415)
Gender_CEO	.2***	.1437***	.1403***	.0452
	(8.3552)	(5.0338)	(5.1016)	(.4911)
MBA_CEO×EBITnxtQ		.8833***	1.2386***	.9026*
		(3.3696)	(3.6943)	(1.7442)
Financial_CEO×EBITnxtQ		.832***	.6809**	.5762
		(3.4664)	(2.2941)	(1.3873)
CEOtenure×EBITnxtQ		-.0616***	-.084***	-.0523
		(-2.5873)	(-3.0607)	(-1.1734)
Gender_CEO×EBITnxtQ		1.0189***	1.1528***	1.4213
		(2.8847)	(2.9112)	(1.4185)
EBITloss	-.0605***	-.0646***	-.0682***	-.0615***
	(-4.3171)	(-4.5924)	(-4.2068)	(-2.8031)
Return	.0392***	.0368***	.045***	.0264
	(4.2196)	(4.0402)	(4.3062)	(1.4956)
ACC	-.0971	-.0962	.007	-.1921*
	(-1.5989)	(-1.5919)	(.0974)	(-1.7369)
Size	.0081	.0068	.037***	.0079
	(.7271)	(.6073)	(2.5855)	(.3853)
BTM	.0097	.0058	.0037	.0812
	(.2512)	(.1516)	(.08)	(1.1807)
Busiseg	-.098	-.0713	-.1322	-.0009
	(-1.2195)	(-.9027)	(-1.3501)	(-.0054)
Geoseg	-.145***	-.1652***	-.128**	-.0736
	(-3.4873)	(-4.0359)	(-2.1219)	(-.8229)
Firmage	-.0168***	-.0143***	-.0245***	-.016
	(-3.1356)	(-2.6729)	(-2.9054)	(-1.3024)
EBITvol	-.1413	-.1544	-.0356	-.3686*
	(-.9633)	(-1.0438)	(-.2008)	(-1.7073)
Returnvol	-.0619**	-.0606**	-.0757**	-.0259
	(-2.2831)	(-2.2444)	(-2.5018)	(-.6246)
AF	.0145	.0147	-.0152	.0302
	(.9405)	(.9572)	(-.6791)	(1.1153)
_cons	.6447**	.6001**	.5941*	.103
	(2.532)	(2.3889)	(1.7901)	(.2286)
Observations	1739	1739	1731	1738
R-squared	.5887	.5948	.544	.3786
Adj R^2	.5383	.5438	.4864	.3005
Year fixed effect	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes

t-values are in parentheses. See variable definitions in Table 18.

**** p<.01, ** p<.05, * p<.1*

4.5 Robustness checks

To check the robustness of the main results, I replicate the primary test with alternative measures of tone and firm performance. Here, I measure each of the above tone variables using a different formula, as follows:

$$\frac{\boldsymbol{Pos - Neg}}{\boldsymbol{Number\ of\ words}}$$

where the number of words is the wordcount included in the narrative section. I use *Epretax* as a proxy for firm performance and calculate it as quarterly pre-tax income scaled by total assets. Accordingly, *EpretaxnxtQ* is pre-tax income in the following quarter, *Epretaxloss* is a dummy variable that equals 1 if *Epretax* is less than zero and 0 otherwise, and *Epretaxvol* is the volatility of *Epretax*. Table 22 presents the robustness test results, which confirm the earlier results that CEO tone is positively associated with future pre-tax earnings. *MBA_CEO*, *Financial_CEO, and Gender_CEO* strengthen this association, while *CEOtenure* weakens it.

Table 22. Robustness analysis

	(1)	(2)	(3)	(4)
	Tone_CEO_R	Tone_CEO_R	Tone_CEO_presR	Tone_CEO_disR
EpretaxnxtQ	.04***	.0379***	.0408**	.0206*
	(4.9861)	(3.2764)	(2.3622)	(1.741)
MBA_CEO	.0067***	.0045***	.0053***	.0006
	(6.2905)	(3.7803)	(3.0638)	(.4229)
Financial_CEO	.0032***	.0019***	.0039***	.0007
	(4.76)	(2.5917)	(3.4209)	(.8607)
CEOtenure	-.0004***	-.0003***	-.0004***	-.0002**
	(-7.3495)	(-3.985)	(-4.2826)	(-2.0792)
Gender_CEO	.0088***	.0056***	.0071***	.0043
	(5.2528)	(2.695)	(2.898)	(1.2606)
MBA_CEO×EpretaxnxtQ		.065***	.1228***	.0526***
		(3.8335)	(4.4309)	(2.7443)
Financial_CEO×EpretaxnxtQ		.0419***	.0422**	.0289**
		(3.3208)	(2.2127)	(1.9673)
CEOtenure×EpretaxnxtQ		-.0042***	-.0053***	-.0022
		(-3.3204)	(-2.9448)	(-1.2789)
Gender_CEO×EpretaxnxtQ		.0677***	.0936***	.0166
		(2.9814)	(3.0736)	(.4552)
Epretaxloss	-.0024***	-.0026***	-.0029***	-.002***
	(-3.4142)	(-3.6391)	(-2.9717)	(-2.7385)
Return	.0023***	.0022***	.0034***	.0008
	(4.5884)	(4.4331)	(5.1105)	(1.0812)
ACC	-.0061*	-.006*	-.0041	-.0052
	(-1.8068)	(-1.7795)	(-.8431)	(-1.2861)
Size	-.0001	-.0003	.0013	-.0002
	(-.2313)	(-.4992)	(1.3239)	(-.2975)
BTM	.0026	.0021	.0031	.002
	(1.2708)	(1.0548)	(.9727)	(.7904)
Busiseg	-.0075*	-.0048	-.0079	-.0005
	(-1.8085)	(-1.1794)	(-1.3793)	(-.0885)
Geoseg	-.0015	-.0031	-.0013	-.0003
	(-.7452)	(-1.5732)	(-.3995)	(-.1093)
Firmage	-.0006**	-.0003	-.001*	-.0001
	(-2.1846)	(-1.1787)	(-1.9498)	(-.2947)
Epretaxvol	-.0101	-.0118	-.0025	-.0175**
	(-1.226)	(-1.4241)	(-.197)	(-2.0999)
Returnvol	-.0023	-.0022	-.0037*	.0005
	(-1.3477)	(-1.3309)	(-1.7041)	(.2959)
AF	.0017*	.0018**	.0023*	.0012
	(1.9157)	(1.9993)	(1.751)	(1.2598)
_cons	.0263*	.0203	.0138	-.0017
	(1.9507)	(1.5262)	(.6476)	(-.1005)
Observations	1770	1770	1761	1769
R-squared	.5996	.6065	.5646	.4233
Adj R^2	.5511	.5578	.5104	.3518
Year fixed effect	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes

t-values are in parentheses. See variable definitions in Table 18.
**** p<.01, ** p<.05, * p<.1*

4.6 Endogeneity test

To reduce concerns about endogeneity problems in our regression analysis for the relationship between CEO tone and the firm's future earnings, I use a two-stage least-squares (2SLS) regression. Motivated by Demerjian et al. (2017) and Hasan (2018), I use the industry average value of the firm's current earnings (*EBIT*) as the instrumental variable to identify the first-stage equation. Specifically, I calculate the industry average value of the firm's current earnings (*ind_EBIT*) in each specific industry (according to their SIC code) and map each industry average value to the corresponding firm. I expect the current quarter industry average EBIT (*ind_EBIT*) to be highly and positively correlated with our endogenous variable, the firm's future earnings *EBITnxtQ.* It is also highly unlikely that the current quarter's industry average EBIT (*ind_EBIT*) influences the firm-level CEO tone. Thus, the essential requirements of an instrumental variable are satisfied.

The first column of Table 23 reports that the coefficient for the instrumental variable in the first stage equation is positive and significant (P<0.01), suggesting that *ind_EBIT* is significantly associated with future earnings *EBITnxtQ.* The results in the second column of Table 23 suggest that the association between CEO tone and future earnings, together with the moderating effect of the human capital variables, remains robust after accounting for the endogenous relationship between CEO tone and future earnings. Thus, the results from the 2SLS regression corroborate our findings from the main analysis (Table 21).

Table 23. Endogeneity test

	(1)	(2)
	EBITnxtQ	Tone_CEO
EBITnxtQ		.9291*
		(1.80)
MBA_CEO×EBITnxtQ		.5441**
		(2.45)
Financial_CEO×EBITnxtQ		.4919**
		(2.33)
CEOtenure×EBITnxtQ		-.1555***
		(-6.35)
Gender_CEO×EBITnxtQ		1.5342***
		(4.84)
EBITloss	-.0304***	-.0564***
	(-6.657)	(-3.01)
Return	.0249***	.0606***
	(8.1676)	(4.54)
ACC	-.0329	.1037
	(-1.0515)	(1.40)
Size	.0004	-.0193***
	(.5541)	(-4.84)
BTM		-.0114
		(-0.22)
Busiseg	-.0085***	.0060
	(-3.9876)	(.064)
Geoseg	-.0025	.0119
	(-1.3069)	(1.57)
Firmage	-.0005***	.0013*
	(-3.0856)	(1.82)
EBITvol	.1088**	-.3710**
	(2.5177)	(-2.15)
Returnvol	-.0166**	-.1387***
	(-2.3008)	(-4.27)
AF	-.0002	.0005
	(-.1506)	(0.10)
ind_EBIT	.8711***	
	(11.7339)	
_cons	.0484**	.2449***
	(2.4533)	(1.53)
Observations	3081	1961
R-squared	.1884	.2016
Adj R^2	.1788	.1845
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
	Statistic	P value
Underidentification test: c^2 statistic	45.176	<0.01
Weak identification test: F-statistic	13.511	

t-values are in parentheses. See variable definitions in Table 18.
**** p<.01, ** p<.05, * p<.1*

4.7 Conclusion

This study applied signalling theory to reveal whether CEOs signal their firm's future performance through their tone and how tone signalling effectiveness varies depending on CEO ability and signalling willingness. I conduct the empirical analysis using a sample of 1,861 earnings conference call transcripts of FTSE 350 firms. The findings indicate that CEO tone can act as a signal to convey a CEO's private information or expectations of the firm's prospects, and this signalling can vary due to various signaller (CEO) characteristics.

The signal provided through CEO tone matches the private information they aim to convey. Firms expecting favourable performance in the following quarter (private information) used a more optimistic tone in conference calls, while those expecting poor performance spoke less optimistically. I conjecture that insider information or CEO expectations regarding future performance determine the tone CEOs employ to signal firm prospects. I extend the extant signalling literature by demonstrating that CEO tone can be considered a signalling device used to communicate a firm's future condition.

More importantly, I consider how signaller characteristics influence the signalling process, which is a relatively understudied area. CEO tone signalling can be improved by CEO business knowledge and financial experience. CEOs with MBAs and those who are financial experts have greater ability to seize potential signalling opportunities and use these opportunities as effectively as possible to enhance signalling to improve the firm's reputation, maintain its legitimacy, and increase its value (Lewis et al., 2014). They are more sophisticated at processing information and can better understand stakeholders' information requests to respond with feedback (Chen, 2014). They are also more knowledgeable about their network, industry, and the macro market conditions to effectively signal the firm's outcomes, growth opportunities, and how to exploit them. Therefore, the findings provide new evidence that CEO ability plays a critical role in improving the signalling process.

Furthermore, CEO tone signalling can be affected by CEO gender and tenure. Female CEOs are more willing to enhance their signalling because they wish to utilize signalling opportunities to convince the audience of their authority and ability to compensate for the possible lower legitimacy caused by gender bias, especially in male-dominated business environments. However, this enhancement can be weakened by longer CEO tenure. CEOs in their early days of tenure are more willing to signal because they have heavier career concern pressures to prove their competence to firm outsiders (Ali and Zhang, 2015). However, this signalling incentive can become obsolete during a CEO's tenure because of attenuating career concerns, the presence of complacency, and increased cognitive rigidity (Chemmanur et al., 2009). Hence, our findings indicate that signalling can be partly determined by signallers' incentives caused by their gender or tenure.

This study focuses on whether signallers' factors affect signalling effectiveness. Contemporaneous signalling research has focused more on the signal's influence (e.g. whether the stock's return is influenced after the signal has been released) but has less considered the contextual factors that affect the signalling process (Connelly et al., 2011). I complement this research line and provide more empirical evidence that contextual signalling factors (CEO ability, signalling willingness) can moderate signalling effectiveness. Moreover, the study's results can advance our understanding of the role that CEO characteristics play in shaping voluntary disclosure behaviour.

The extant tone literature focuses less on the moderating factors that affect the association between tone and economic performance, but more on the determinants and consequences of tone signals (Amoozegar et al., 2020;Arslan-Ayaydin et al., 2016;Chen et al., 2020;Allee et al., 2021;Bassyouny et al., 2020;Brochet et al., 2019). The limited evidence of tone studies on moderating factors features inherent text features such as the order of emotional words (Cheng et al., 2021), readability (Tan et al., 2014), and the information asymmetry in the overall capital market environment (Boudt et al., 2018;Tsileponis et al., 2020). I extend this literature by showing that human factors (ability, signalling willingness) play an important moderating role in influencing tone signalling. Implications for managers are that they need be aware of top managers' abilities, and incentives play a significant part in conference call disclosure and communication. Top managers with stronger abilities and signal willingness more effectively convey a firm's value and prospects. Further, I know the

potential limitations, that I do not include some control variables such as equity offering or M&A due to the data availability issue. Despite these limitations, this chapter provides some new evidence that CEO characteristics can moderate CEO tone signalling.

5. Conclusion

5.1 Summary of the findings of the thesis

This thesis adopts the signalling framework from Connelly et al. (2011) to investigate the signalling role of managerial tone by providing empirical evidence from the UK earnings conference call setting. It extends the signalling literature by demonstrating that managerial tone can play a significant signalling role to convey the firm's prospects. It examines a more complete signalling process in conference calls by determining the analysts can interpret the signal correctly and confirm it through feedback. This bridges the gap that prior tone studies largely focused on the one-way communication model involving only the signaller and we know quite little about receivers' tone, especially when they interact with the signaller. Moreover, this thesis provides evidence for the prior insufficient research aspect of signalling that the signalling environment and the signallers' characteristics can moderate the tone's signalling.

I start with a literature review in-depth presented in chapter 2 to explore the use of managerial tone in corporate disclosure. I searched out 81 papers published between 2010 and 2021 from 33 academic journals. Three-quarters of these studies chose 10-K filing (e.g., forward-looking statements, MD&A sections), annual reports (e.g., CEO letters, chairperson's statements), earnings press releases, and conference calls as qualitative research data. The main capital market context is in the United States, with 64 out of 81 studies focusing on the United States' narrative disclosure media. The main tone analysis method is the wordlist-based approach, with Loughran and McDonald's(2011) wordlist as the most popular. Through the literature review, I found the main role and purpose of the managerial tone in corporate disclosure are to provide incremental information and reduce information asymmetry. Managerial tone can convey new information to affect stock return(Bochkay et al., 2020;Feldman et al., 2021), provide specific information impacting market volatility(Campbell et al., 2020;Borochin et al., 2018), trading volume(Bochkay et al., 2020;Azimi et al., 2021). Moreover, managerial tone can help explain and predict the firm's future performance(Elsayed and Elshandidy, 2020), future investment and M&A(Berns et al., 2021), tax and financial policy(Law and Mills, 2015;Avramov et al., 2021). On top of

this, managerial tone can provide context and bring information to contribute to the analysts' estimate(Druz et al., 2020) and the auditors' judgement(Hossain et al., 2020).

On the other side, the empirical findings from the literature review show that managerial tone could also play a role in influencing its audience to potentially change their perception and decision-making behaviour to obtain their approval and support that can benefit the firms (Brennan and Merkl-Davies, 2018). Firms tend to use a more positive tone to cover the current or future poor performance, which is an obfuscation strategy that misinforms the audience(Huang et al., 2014a). Firms may tend to increase the positive tone and decrease the negative tone(Yang and Liu, 2017) or manipulate the ordering and dispersion of various tone words(Boudt and Thewissen, 2019;Allee and Deangelis, 2015) to emphasize good information and diminish poor information. Furthermore, firms may utilize tone to manipulate the stock pricing and take advantage of the mispricing to implement insider trading(Choi, 2020). In a word, managerial tone primarily plays the informational role to provide incremental information. However, it can also play an influencing role to perform like a manipulation tool rather than a transmission signal.

The literature review found some interesting determinants which can affect managerial tone. For example, firms with earnings management(Huang et al., 2020) and powerful CEOs(Goergen et al., 2020) may use more positive tones, which increase the risk of ligation(Cazier et al., 2019). Corporate governance mechanisms such as board oversight(DeBoskey et al., 2019), financial experts(Lee and Park, 2018), institutional ownership(Amoozegar et al., 2020), and accounting conservatism(D'Augusta and DeAngelis, 2020a) can restrict this manipulation to some extent. Moreover, stock compensation (Arslan-Ayaydin et al., 2016) will lead managers to pursue a more positive tone, while corporate control contest(Chen et al., 2020), proprietary cost(Allee et al., 2021), cultural and institutional distance(Henry et al., 2021) and labour concern(Arslan‐Ayaydin et al., 2018) will make them downplay the tone. Beyond this, a relatively new area of managers' characteristics starts to receive the scholar's attention. For example, managers' gender(De Amicis et al., 2021), cultural background(Brochet et al., 2019), career concern(Arslan-Ayaydin et al., 2020) and overconfidence(Liu et al., 2020) can affect managerial tone.

From all above, Chapter 2 organizes and synthesizes the tone-related literature to advise on the current research state of managerial tone. It assesses and clarifies the role and purpose of managerial tone in corporate disclosure. Moreover, it investigates and synthesizes the literature to assess the motives and determinants of managerial tone. Chapter 2 also suggests future research directions and supplies implications for the broader research on communication between capital market participants and firms.

The study presented in Chapter 3 aims to examine the specific signalling features of managerial tone, based on the signalling framework from Connelly et al. (2011). Through a sample of 3,680 earnings conference call transcripts from 241 firms in the FTSE350, I conduct a series of regression analyses and robust analyses to examine three research questions. The first research question is whether the signal (i.e., managerial tone) fits well with the unobservable quality (private information) it intends to convey. This is an empirical test of the signal fit hypothesis discussed in Connelly et al. (2011) framework that whether there is a relationship between the observable signal and the unobservable private information regarding corporate future performance. The empirical finding suggests firms expecting a good(poor) performance in the subsequent period are more likely to choose an optimistic (less optimistic) tone for signalling. Managerial tone is positively associated with future performance, implying that tone can send signals matching private information regarding the firm’s prospects and alter audiences' understanding of a firm's outlook. Therefore, managerial tone can perform a reliable signalling role. These findings also complement the extant signalling literature that managerial tone together with bank loan loss provision (Kiridaran et al., 2004), discretionary accruals (Louis and Robinson, 2005), special items (Riedl and Srinivasan, 2010), dividend increase (Aggarwal et al., 2012), and corporate social responsibility (Lys et al., 2015) can be used as a signalling device to reduce the information asymmetry.

The second research question is whether the receiver (analysts in the conference call) can correctly interpret the tone signal and send feedback to the signaller. If analysts can accurately interpret the signal, they may also have the same expectation of firm performance and, accordingly, express more (less) optimism about the firm's prospects (uncertainties). Furthermore, if analysts are willing to confirm the managerial tone, there will be an observed correlation between the analysts' tone and the

managerial tone. The empirical findings support the above prediction that analysts' tone is positively associated with future firm performance and analysts' tone is consistent with the managerial tone, which serves as feedback or a response to the managerial tone. This finding supports the signalling theory that the signalling process is successful when the audience receives and confirms the signal(Connelly et al., 2011). Furthermore, it tests a complete signalling process from the signaller to the receiver, particularly considering the receiver's interpretation and feedback. More importantly, this finding suggests that managerial tone in the earnings conference calls can be used in the two-way communication model to engage in the signalling-feedback interaction between managers and analysts.

The third research question is whether the signalling environment can affect the entire signalling process. The signalling information environment can be set as a boundary condition as it can influence the behaviour of both the signaller and receiver(Bergh et al., 2019) and also affect the extent to which signalling reduces information asymmetry(Connelly et al., 2011). Firms with poor information environments have more substantial incentives to signal more insider information(Aggarwal et al., 2012). These firms will also be more likely to use tone to communicate with outsiders. The empirical findings support this prediction that the signalling environment can moderate the relationship between tone and future firm performance. The context in which signalling occurs can play a significant part in increasing or diminishing the value of the signalling process.

Chapter 3 implements an empirical test for the Connelly et al. (2011) framework using the earnings conference call setting. It enhances the understanding of the managerial tone's signalling process and particularly investigates the two-way communication model between signaller and receiver. Managerial tone represents a reliable signalling device for transmitting latent information about a firm's quality and future performance and the receiver can correctly understand this signal, develop a consistent interpretation and send confirmation feedback to the signaller. It complements the extant signalling literature that focuses more on the influence of the signals (e.g., what is the impact of the stock return after the signal has been released) by demonstrating empirical tests on the role of receivers and signalling environment. It also fills the gap that tone studies lack observations that tone can be used to engage in two-way

communication to build better connectivity with the stakeholders(Brennan and Merkl-Davies, 2018).

Chapter 4 continues with the empirical tests of the previous chapter. It investigates how the signalling process varies depending on the signaller's characteristics. Beyond tone signalling, contextual factors play a significant role in strengthening or weakening signalling effectiveness, which is the extent to which signalling reduces information asymmetry (Colombo, 2021). This is an insufficiently researched area(Connelly et al., 2011) that human factors can make the signalling process's value increase or decrease. Although signalling theory acknowledges that receivers can perceive and interpret signals differently because of receiver characteristics (Connelly et al., 2011), little research has focused on how the signalling process varies depending on the signaller (Eddleston et al., 2016), especially in the context of tone study.

The first prediction is that CEO business knowledge and financial experience can improve the effectiveness of CEO tone signalling. CEOs who holds MBA and prior financial experience are believed to be more able to enhance signalling to improve outside evaluations (Lewis et al., 2014). They consider signalling an effective channel for reducing information asymmetry because firm misevaluation not only lowers firm performance but also diminishes their personal reputation and future opportunities in the labour market (Chemmanur et al., 2009;Chemmanur et al., 2019). They can better understand current dynamics, competitive conditions, and stakeholders' information requests and provide more accurate responses. They are more knowledgeable about their client base, their firm's position in the industry, and macroeconomic conditions (Demerjian et al., 2013), which help them more accurately predict a firm's prospects and risk (Chen, 2014). More powerful ability brought by business knowledge and financial experience allows them to communicate more effectively to build channels and conduits between the firm and its external audience (Demerjian et al., 2013). The empirical findings support this prediction that CEO business knowledge and financial experience improve CEO tone signalling effectiveness. MBA and Financial experience have positively moderated the association between CEO tone and future performance. This implies that more able CEOs are valuable for the firms and can help more effective signalling to convey the firm's private information and reduce the information asymmetry.

The second prediction is that CEO gender and tenure can moderate the signalling effectiveness of CEO tone. Female CEOs have a strong desire to signal. They are more likely to enhance tone signalling effectiveness because they wish to assert and convince audiences of their authority and ability, especially in male-dominated business environments. Traditional gender norms (i.e. masculine or feminine) can lead to women being perceived as less favourable, especially in top business manager roles where leadership is more heavily emphasized for men(Ridgeway, 2013). Consequently, female CEOs may have a greater need to signal their own and their firm's prospects to compensate for their lower legitimacy due to gender bias (Alsos and Ljunggren, 2017). Empirical findings support this perspective that CEO gender can be a moderator to affect CEO tone signalling effectiveness. From another perspective, CEOs may have a stronger willingness for signalling in the early years of their tenure because the market is uncertain about their ability and must rely on their recent performance to assess their competence. Career concerns gradually diminish as their tenure lengthens and firm performance improves, lowering their motivation to prove themselves to outsiders. Moreover, along with CEO tenure, CEO knowledge, skills, and abilities may become obsolete (Darouichi et al., 2021) due to complacency and increased cognitive rigidity (Chemmanur et al., 2009). Thus, CEOs with longer tenure are less likely to signal their firm's prospects due to less career concern, more complacency and rigidity. Empirical findings also support this perspective that CEO tenure can be a moderator to affect CEO tone signalling effectiveness.

Chapter 4 aligns interests between the signalling hypothesis and managers' specific characteristics and suggests that the CEO's characteristics play an important role in deciding on managerial tone and its signalling function. It provides evidence on two previously less examined moderation factors: CEO's ability and signalling willingness. It complements the extant signalling literature that contextual factors (signallers' characteristics) can moderate signalling effectiveness in the context of voluntary disclosure. It also suggests that CEO characteristics can affect tone signalling behaviour, extending previous manager characteristic literature. Chapter 4 extends Chapter 3's study but focuses more on how human factors affect tone signalling. It implies that managers with the stronger ability and signalling incentives convey the firm's value and prospects more effectively to outsiders.

Overall, this thesis describes the current research state of managerial tone in the context of corporate disclosure, integrates the important roles and determinants, and discusses how this research can shape future research. It tests the signalling framework of Connelly et al. (2011) that managerial tone has a signalling role in conveying the latent information about the firm's prospect. The analysts correctly interpret the signal to send feedback to confirm the signal. It demonstrates tone can be used for two-way communication. Moreover, it provides evidence that contextual factors can affect the signalling process. The information asymmetry can moderate the association between tone and the firm's future performance. CEO's ability and signalling willingness can also moderate the signalling effectiveness. The thesis is consistent with the informational motivation and signalling theory that enhance understanding the communication role of accounting narrative in corporate disclosure.

5.2 Incremental contribution

This thesis mainly contributes to the literature on signalling theory. It empirical tests the theoretical framework in Connelly et al. (2011) with its predominant focus on signal receivers. From extant literature, we have increasing knowledge that managerial tone can signal insightful information of the firm's economics(Feldman et al., 2010;Yekini et al., 2016;Bochkay et al., 2020), prospects(Mayew et al., 2015;Li, 2010a;Davis et al., 2012) or risk, policy(Law and Mills, 2015) and investment (Berns et al., 2021). However, we only have limited knowledge of how the receiver perceives or interprets signals (e.g., managerial tone). This thesis provides new evidence that analysts pay attention to the managerial tone in the earnings conference call. They send a more (less) optimistic response to more (less) optimistic managers. Analysts' tone keeps consistence with managerial tone, which suggests analysts confirm the signal by sending feedback through their own tone to the managers. This thesis fills in the gap that how signal receiver notice, interpret and send feedback to the signaller.

The signalling environment (i.e., any contextual factors that affect signalling effectiveness) is a relatively insufficiently researched area of signalling theory(Connelly et al., 2011). Contemporaneous study on the signalling environment largely focuses on the context of new-venture financing (Colombo, 2021), but scarcely

examines the area of corporate voluntary disclosure. For example, the entrepreneur's race and sexual orientation (Anglin et al., 2018b), the entrepreneur's passion (Davis et al., 2017), and past related crowdfunding experience (Courtney et al., 2017) increase the signaller's perceived credibility and therefore enhance signalling effectiveness. I extend this research line and provide richer evidence of signalling contextual factors (the information asymmetry degree and signallers' characteristic) that moderate signalling effectiveness in the context of voluntary disclosure.

This thesis investigates signalling-feedback interaction to show that managerial tone can be used in the two-way communication model. Extant tone studies largely focus on one-way, signaller-focus communication investigation and we extend this line of research to provide insights on how a receiver (i.e., analyst) interprets and responds to the managerial tone to change their decision-making behaviour. Furthermore, corporate narrative disclosure research on signalling largely focuses on investors and shareholders as receivers. We offer insights on the impact of signalling on additional stakeholders (e.g., analysts). We show that an analyst in earnings calls may pay attention to the managerial tone and use it as an important channel of information.

5.3 Suggestions for future research

From the theoretical perspective, this thesis contributes to the signalling theory by developing an understanding of how the signalling process is expressed through the tone. Tone can play a communication role in transmitting and conveying contained information to the audience. Specifically, managers use tone to provide information because of information asymmetry in the capital market. However, does tone solve the problem of information asymmetry? Healy and Palepu (2001) suggest that the extent to which voluntary disclosure mitigates information asymmetry depends on whether the disclosed information is credible. Hence, it is still unclear whether managerial tone holds credibility to reduce information asymmetry effectively or upon what conditions it will hold credibility. This also complies with Connelly et al. (2011) that the usefulness of a signal to the receiver depends on whether the signal is honest or the extent to which the signaller attempts to deceive. On the one hand, tone can reduce information asymmetry based on the assumption that it is credible, reliable, and honest. On the other hand, if the tone is costless, managers may use tone to

communicate or cheat. The effectiveness of the tone's communication is difficult to verify. Future research may benefit from theoretical work examining the conditions required to hold tone's credibility and the costs of paying for tone's dishonesty.

Moreover, this thesis provides evidence that managerial tone can be used in the two-way communication model that the audience can respond and give feedback through the tone. Accounting research may also benefit from future examining the role of the audience in the signalling process. Brennan and Merkl-Davies (2018) developed an accounting communication conceptual framework and argued that the purpose of accounting communication is to provide information, influence audiences, or engage in dialogue. However, narrative disclosure research lacks the observations that narrative has been used to engage in the conversation, build a better relationship, and strengthen mutual understanding (Merkl-Davies and Brennan, 2017). This focuses on whether the communicator and audience can effectively interact to obtain better connectivity. Future research might also study the impact of signals on the different categories of audiences, such as sophisticated investors, unsophisticated investors, employees, auditors, customers and governments. The study on the audience can also contribute to narrative disclosure research in two-way communication.

From a practical perspective, this thesis complements the extant literature which has shown that managers use various signalling devices to reduce information asymmetry, including bank loan loss provision (Kiridaran et al., 2004), discretionary accruals (Louis and Robinson, 2005), special items (Riedl and Srinivasan, 2010), dividend increase (Aggarwal et al., 2012), and corporate social responsibility (Lys et al., 2015). Future studies may attempt to develop more textual attributes in the context of corporate disclosure, such as the tone of uncertainty, risk, hope, confidence or resilience, by using more support from textual analysis techniques. Moreover, disclosure narrative research can extend into readability and topic modelling and the interaction between them.

This thesis also contributes to the signalling theory by extending its predictions to the top managers' characteristics and demonstrating the important moderation role that the CEO plays in influencing signalling effectiveness. Future research can investigate other top managers, like CFO. Most of the literature on top managers' characteristics

focuses on the CEO(Feng et al., 2011). But little has been known about the incentives and roles of CFO, especially in the narrative disclosure research. The tone study can investigate more roles of CFO during the two-way communication model and explore whether there is any difference between CEO's disclosure behaviour and CFOs.

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Appendix I. Table 2 – Managerial tone: role in providing information

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
Yekini,Wisniewski,and Millo	2016	The British Accounting Review	UK	Annual Report	Henry list	positive tone	Positive tone of annual reports has a statistically significant association with abnormal returns around disclosure dates.
Doran, Peterson,and Price	2012	Journal Real Estate Finance and Economics	US	Conference call	Harvard IV-4 Psychosocial Dictionary and Henry list	net positive tone	Net positive tone in conference call is significantly related to the contemporary stock price reaction.
Bochkay, Hales, and Chava	2020	The Accounting Review	US	Conference call	self-built list	extreme positive tone and extreme negative tone	When managers use more extreme words in earnings conference calls, trading volume around the call increases, and stock prices react more strongly.
Azimi and Agrawal	2021	The review of Asset Pricing Studies	US	10-K filing	Machine learning	positive tone and negative tone	Positive (negative) sentiment predicts higher (lower) abnormal return and lower (higher) abnormal trading volume around the 10-K filing date.
Loughran and McDonald	2013	Journal of Financial Economics	US	IPO filing	Loughran and McDonald list	uncertainty tone	Higher uncertainty tone produces higher first-day returns.
Wang	2020	Contemporary Accounting Research	US	MD&A	Loughran and McDonald list	net negative tone	The change in CDS spreads in the three-day filing window is positively associated with the net pessimistic tone of risk disclosures.
Feldman, Govindaraj, Livnat and Segal	2010	Review of Accounting Studies	US	MD&A	Loughran and McDonald list	net positive tone	Tone changes of MD&A sections are significantly correlated with contemporaneous returns and drift excess returns.
Price, Doran, Peterson,and Bliss	2012	Journal of Banking & Finance	US	Conference call	Harvard IV-4 Psychosocial Dictionary and Henry list	net positive tone	Call tone is significantly related to the initial earnings announcement window abnormal stock returns, the post-earnings-announcement drift and abnormal trading volume.

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Table 2 (continued)

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
Wisniewski and Yekini	2019	Accounting Forum	UK	Annual Report	Diction list	activity tone and realism tone	Activity and realism tone predict subsequent price increases, even after controlling for a wide range of factors.
Feldman, Govindaraj, Livnat and Suslava	2021	Journal of Accounting Public Policy	US	8-K filing	manual coding	positive tone	Order backlog (OB) growth helps forecast future sales and thus assign a positive tone to qualitative OB disclosures that indicate OB growth.
Jiang, Lee, Martin, and Zhou	2019	Journal of Financial Economics	US	10-K,10-Q filing, and conference call	Loughran and McDonald list	net positive tone	Manager sentiment is a strong negative predictor of future aggregate stock market returns.
Gordon, Henry, Peytcheva, and Sun	2012	Review of Quantitative Finance and Accounting	US	earnings press release	Henry list	net positive tone	A more optimistic tone of discretionary disclosure before restatement is associated with a more negative market reaction.
Cheng, Roulstone, and Buskirk	2021	The Accounting Review	US	8-K filing	Henry list	net positive tone	There is a positive relation between investor response to information and the prioritization of that information in the earnings announcement. Market reactions to earnings announcements are more positive when positive information is presented earlier in the document.
Tan, Wang and Zhou	2014	Journal of Accounting Research	Singapore	earning release	experiment on tone manipulation	experiment on tone manipulation	Language sentiment influences investors' judgments when readability is low but not when readability is high. Disclosure couched in positive language leads to higher earnings judgments for less sophisticated investors but lower earnings judgments for more sophisticated investors.
Baginski, Demers,Wang and Yu	2016	Review of Accounting Studies	US	management earnings forecasts	Loughran and McDonald list	net positive tone	When the signs of the quantitative management forecast and linguistic tone agree, tone's incremental pricing is strengthened.
Boudt, Thewissen, and Torsin	2018	International Revie of Financial Analysis	US	earnings press release	Loughran and McDonald list and Henry list	net positive tone	The informativeness of tone increases with the information asymmetry between firms and investors.

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Table 2 (continued)

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
Tsileponis, Stathopoulos, and Walker	2020	Accounting and Business Research	US	earnings press release	Loughran and McDonald list, Henry list, Diction list, and LIWC list	net positive tone	The impact of the linguistic content of corporate disclosures on market returns is moderated by the tone of new information included in media articles.
Brockman, Li, and Price	2015	Financial Analysts Journal	US	Conference call	Loughran and McDonald list	net positive tone	Manager tones convey much more optimism (less pessimism) than their analyst counterparts, and those investors (particularly institutional investors) react more strongly to analyst tones than to manager tones.
Chen, Nagar, and Schoenfeld	2018	Review of Accounting Studies	US	Conference call	Loughran and McDonald list	net positive tone	Intraday prices react significantly to analyst tone but not to management tone for the full duration of the discussion.
Elshandidy and Shrives	2016	The International Journal of Accounting	Germany	annual report	self-built list	net positive tone	German market tends to positively (negatively) price good (bad) news about risk by removing (creating) information asymmetries or reducing (increasing) investor-perceived risk.
Borochin, Cicon, Delisle, and Price	2018	Journal of Financial Markets	US	Conference call	Loughran and McDonald list	net positive tone	Conference call tones are negatively related to measures of firm value uncertainty from the equity options market.
Campbell, Lee, Lu, and Steele	2020	Contemporary Accounting Research	US	10-k, 8-k filing, conference call	Loughran and McDonald list	tone volatility	There is a positive association between disclosure tone volatility and market-based assessment risk.
Baginski, Demers, Kausar, and Yu	2018	Accounting, Organizations and Society	US	Management earnings forecasts	Loughran and McDonald list	abnormal positive tone	The residual tone in management forecast press releases is significantly associated with investor disagreement as captured by abnormal trading volume.
Li	2010	Journal of Accounting Research	US	MD&A	Machine Learning	average tone	The average tone of the forward-looking statement in MD&A is positively associated with future earnings even after other determinants of future performance.

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Table 2 (continued)

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
Davis, Piger and Sefor	2012	Contemporary Accounting Research	US	earnings press release	Diction list	net positive tone	Net optimistic language in earnings press releases is positively associated with future return on assets (ROA) and generates a market response.
Rahman	2019	International Review of Financial Analysis	UK	Interim Management Statement	Manual, Henry list, Loughran and McDonald list	net positive tone	Discretionary tone of third quarter interim management statements(IMS), but not first-quarter IMS, is positively aligned with future annual earnings.
Bassyouny and Abdelfattah	2021	Review of Quantitative Finance and Accounting	UK	annual report	Loughran and McDonald list	net positive tone	Executive's tone has the power to predict a company's future ROA but not governance's tone.
Mayew, Sethuraman and Venkatachalam	2015	The Accounting Review	US	MD&A	Loughran and McDonald list	positive tone, negative tone	Both management's opinion about going concern reported in the MD&A and the linguistic tone of the MD&A together provide significant explanatory power in predicting whether a firm will cease as a going concern.
Elsayed and Elshandidy	2020	International Review of Financial Analysis	UK	annual report	self-built list	fail related tone	Corporate failure-related narrative disclosures significantly predict firms' failure up to two years ahead of actual failure.
Durnev and Mangen	2020	Journal of Accounting and Economics	US	MD&A	Loughran and McDonald list	net positive tone	A company's investments and investment efficiency are significantly positively associated with the tone of its rivals' MD&As.
Berns, Bick, Flugum and Houston	2021	The Financial Review	US	MD&A	Loughran and McDonald list	net positive tone	There is a positive relationship between the tone change in a firm's MD&A section of their annual 10-K and the subsequent internal and external investment activities of the firm.
Ahmed and Elshandidy	2016	International Review of Financial Analysis	US	10-K filing	Loughran and McDonald list	negative tone	Firms with a more negative tone in their prior 10-Ks are less likely to be involved in subsequent acquisitions and have a small portion of M&A investments.

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Table 2 (continued)

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
Law and Mills	2015	Journal of Accounting Research	US	10-K filing	Loughran and McDonald list	negative tone	Firms that use more negative words in their annual reports pursue more aggressive tax planning strategies.
Avramov,Li and Wang	2021	Journal of Empirical Finance	US	10-K filing	self-built list	risky tone	Increases in risk tone are associated with diminishing leverage, capital expenditure, R&D, employment, and dividend payouts, and stock repurchases, along with increasing cash holdings in the following year.
Ertugrul, Lei, Qiu and Wan	2017	Journal of Financial and Quantitative Analysis	US	10-K filing	Loughran and McDonald list	uncertainty tone, weak modal tone	The high percentages of uncertain and weak modal words are linked to more stringent contractual terms in bank loans.
Rjiba, Saadi, Boubaker and Ding	2021	Journal of Corporate Finance	US	10-K filing	Loughran and McDonald list	negative tone, uncertainty tone, weak modal tone	The effect of annual report complexity on the cost of equity is greater when the disclosure tone is more negative or ambiguous.
Bochkay and Joos	2021	The Accounting Review	US	Conference call	Loughran and McDonald list	net positive tone	More optimistic disclosure is associated with lower forecasts of risk.
Druz, Petzev, Wagner and Zeckhauser	2020	Financial Analyst Journal	US	conference call	Loughran and McDonald list	negative tone	When a more negative tone in the conference call is used, analysts lower their earnings estimates. When a less negative tone is used, analysts raise their estimates, but to a lesser extent.
Greiner, Patelli and Pedrini	2020	Auditing: A Journal of Practice & Theory	US	CEO letter	Diction list	Certainty tone, Optimistic tone, Commonality tone	Managerial tone exhibiting low source credibility (as indicated by higher Certainty, higher Optimism, and lower Commonality) is associated with higher audit fees.
Hossain, Raghunandan and Rama	2020	Journal of Accounting Public Policy	US	10-K filing	Loughran and McDonald list	abnormal positive tone	An abnormal positive disclosure tone is associated with a higher likelihood of a going concern modified audit opinions.

Appendix I. Table 3 – Managerial tone: role in influencing audience

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
Cho, Robers and Patten	2010	Accounting, Organizations and Society	US	10-K environment disclosure	Diction list	positive tone, uncertainty tone	Disclosures of worse environmental performers exhibit significantly more ‘‘optimism” and less ‘‘certainty” than their better-performing counterparts.
Schleicher and Walker	2010	Accounting and Business Research	UK	annual report	Manual	positive tone, negative tone	Firms with large impending performance declines bias the tone in the outlook section upwards.
Melloni, Caglio and Perego	2017	Journal of Accounting Public Policy	cross-countries	integrated reports	Diction list	positive tone	In the presence of a firm’s weak financial performance, the integrated reports tend to be significantly longer and less readable (i.e., less concise), and more optimistic (i.e., less balanced).
Huang, Teoh and Zhang	2014	The Accounting Review	US	earnings press release	Loughran and McDonald list	abnormal positive tone	Managers using strategic tone management to mislead investors about firm fundamentals. An abnormal tone predicts negative future earnings and cash flows.
Davis and Tama-Sweet	2012	Contemporary Accounting Research	US	earnings press release, MD&A	Diction list	positive tone, negative tone	Firms disclose higher levels of optimistic language and lower levels of pessimistic language in earnings press releases relative to MD&A disclosures. Managers that exactly meet or just beat earnings benchmarks report a lower proportion of total pessimistic language.
Yang and Liu	2017	Accounting and Business Research	UK	social media	Manual	positive tone, negative tone	Firms minimize the disclosures of negative information but employ various patterns and dissemination techniques to emphasize positive information.
Barkemeyer, Comyns, Figge and Napolitano	2014	Accounting Forum	cross-countries	CEO statements of corporate sustainability reports	Harvard IV list, Diction list	positive tone, uncertainty tone	Sustainability report CEO statements receive higher optimism scores than their financial report counterparts throughout the period under review.

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Table 3 (continued)

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
Moreno, Jones and Quinn	2019	Accounting, Auditing & Accountability Journal	Ireland	chairperson's statement	LIWC list	positive tone, negative tone	Irrespective of the financial performance, there is an overwhelming focus on positive references for Guinness.
Boudt and Thewissen	2019	Financial Management	US	CEO letter	Loughran and McDonald list and Diction list	positive tone, negative tone	Managers use more positive words at the beginning and end of the CEO letter to present a more positive audience perception.
Allee and Deangelis	2015	Journal of Accounting Research	US	conference call	Loughran and McDonald list	positive tone, negative tone	Managers tend to spread positive (negative) words more (less) evenly to have a higher (lower) tone dispersion when firms have improving (declining) information or good (bad) news.
Augusta and DeAngelis	2020	The Accounting Review	US	MD&A	Loughran and McDonald list	net positive tone	The covariance between managerial tone and earnings performance is positive when earnings are below expectations but negative when earnings meet or exceed expectations.
Brockman, Cicon, Li and Price	2017	Financial Management	US	Conference call	adjusted Loughran and McDonald list	negative tone, positive tone	Corporate insiders buy company shares following negative tone conference calls and sell shares following positive tone conference calls.
Choi	2020	Journal of Accounting Public Policy	US	MD&A	Loughran and McDonald list	net positive tone	There is a negative relation between the tone and insider trading only for the pre-spin-off executives who are more likely to have inside information.
Emett	2019	The Accounting Review	US	CEO letter	experiment on tone manipulation	positive tone, negative tone	When a firm is performing poorly, investors invest more when the firm focuses on opportunities rather than challenges in future-oriented disclosures. When a firm is performing well, investors invest more when the firm focuses on challenges rather than opportunities.
Blau, Delisle, and Price	2015	Journal of Corporate Finance	US	Conference call	Loughran and McDonald list	net positive tone	Sophisticated investors(short sellers) interpret the abnormal tone more completely than unsophisticated investors.

Appendix I. Table 4 – Managerial tone: determinants institutional context

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
Huang, Roychowdhury and Sletten	2020	The accounting review	US	MD&A and earnings press release	Loughran and McDonald list	abnormal positive tone	Managers with more real earnings management will also use a more positive tone in MD&A and earnings press releases.
Goergen, Limbach and Scholz-Daneshgari	2020	Journal of Corporate Finance	US	proxy statement	Loughran and McDonald list	positive tone	Firms with CEO duality contain significantly more words and more distinct reasons and have a more positive tone.
Deboskey, Luo and Zhou	2019	Review of Quantitative Finance and Accounting	US	earning announcement	Loughran and McDonald list	net positive tone	Powerful CEOs use a more optimistic and aggressive tone in their earnings' announcements and stronger board oversight effectively constrains overt aggressiveness.
Rogers, Buskirk and Zechman	2011	The Accounting Review	US	earnings announcement related to the lawsuit	Diction list, henry list and Loughran and McDonald list	positive tone	Optimistic language increases litigation risk.
Cazier, Merkley and Treu	2020	The Accounting Review	US	press release related to the lawsuit	Loughran and McDonald list and Henry list	net positive tone	A positive tone in forward-looking qualitative statements is significantly less related to the likelihood of subsequent litigation than positive tone in non-forward-looking qualitative statements.
Lee and Park	2018	European Accounting Review	US	MD&A	Loughran and McDonald list	abnormal positive tone	Audit committee financial expertise, particularly that which is directly connected to accounting, curtails managerial opportunism in the form of upward management of MD&A tone.
Amoozegar, Berger and Pukthuanthong	2020	The Journal of Financial Research	US	conference call	Loughran and McDonald list	net positive tone	Higher institutional ownership is associated with a dampened, or more neutral, conference call tone.

(continued)

Table 4 (continued)

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
D'Augusta and DeAngelis	2020	Contemporary Accounting Research	US	MD&A	Loughran and McDonald list	net positive tone	Upward tone management is negatively associated with several accounting conservatism proxies.
Arslan-Ayaydin, Boudt and Thewissen	2016	Journal of Banking & Finance	US	earning press release	Henry list	net positive tone	The tone of earnings press releases tends to be more positive when the managerial portfolio value is more closely tied to the firm's stock price.
Chen, Miao and Valentine	2020	The Accounting Review	US	conference call	Loughran and McDonald list	net positive tone, negative tone distribution	Peer firms under control threat use a more negative tone in conference call presentations, and more evenly distribute negative tonal words throughout the presentation to heighten the visibility of bad news.
Allee, Do and Sterin	2021	Journal of Accounting and Economics	US	conference call	Loughran and McDonald list	net positive tone, uncertainty tone	The intensity of competition in the product market is associated with more negative and uncertain earnings conference calls.
Henry, Thewissen and Torsin	2021	European Accounting Review	US and cross-listed	earning press release	henry list	net positive tone	Culturally and institutionally, more distant firms are generally less positive in their disclosures and include more forward-looking statements than US firms.
Arslan-Ayaydin, Thewissen and Torsin	2018	Journal of Business Finance and Accounting	US	earning press release	Henry list	net positive tone	The tone of the qualitative information in earnings press releases is significantly less optimistic as the degree of unionization increases, and particularly when financial performance is strong.
Ji and Tan	2016	Journal of Business Finance and Accounting	US	10-K, 10-Q filing	Loughran and McDonald list	negative tone	Labour unemployment concerns affect corporate discretionary disclosure. Firms disclose more negative words in their annual and quarterly reports following increased unemployment insurance benefit generosity.

Appendix I. Table 5 – Managerial tone: determinants in managers characteristics

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
Bassyouny, Abdelfattah and Tao	2020	International Review of Financial Analysis	UK	annual report	Loughran and McDonald list	net positive tone	Older CEOs, female CEOs and CEOs with financial experience display a less positive tone in annual reports narratives. Narcissistic CEOs are more likely to display a positive tone compared with non-narcissistic CEOs.Companies with a high independence level of board of directors and audit committee have a less positive tone.
Amicis, Falconieri and Tastan	2021	Journal of Corporate Finance	US	conference call	Loughran and McDonald list	net positive tone, uncertainty tone	Female executives employ a more positive tone while being more direct and less ambiguous than male executives during the management discussion and the question and answer sessions of conference calls.
Davis, Ge, Matsumoto and Zhang	2015	Review of Accounting Studies	US	conference call	Diction list, Henry list, Loughran and McDonald list	net positive tone	Tone is significantly associated with manager-specific factors such as early career experiences and involvement in charitable organizations.
Brochet, Miller, Naranjo and Yu	2019	The Accounting Review	US	conference call	Loughran and McDonald list	net positive tone	Managers from ethnic groups with a more individualistic culture use a more optimistic tone and exhibit greater self-reference.
Arslan-Ayaydin, Bishara, Thewissen and Torsin	2020	International Review of Financial Analysis	US	earning press release	Loughran and McDonald list and Henry list	net positive tone	Career concerns lead managers to manipulate the content of corporate disclosures by inflating the tone of earnings press releases to convey a more optimistic picture about the firm's financial performance.
Bochkay, Chychyla and Nanda	2019	The Accounting Review	US	conference call	Loughran and McDonald list	net positive tone	CEOs' forward-looking disclosures and their disclosures' relative optimism decline in their tenure. Attenuating managerial career concerns lead to the decline in disclosure optimism.

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Table 5 (continued)

Authors	Year	Journal	Country	Disclosure media	Tone analysis methods	Tone variable	Key findings
Buchholz, Jaeschke, Lopatta and Maas	2018	Accounting, Auditing &Accountability Journal	US	10-K filing	Loughran and McDonald list	abnormal positive tone	The level of CEO narcissism is positively related to the occurrence of an abnormal optimistic tone in 10-K filings.
Ataullah, Vivian and Xu	2018	ABACUS	UK	Chairperson's Statement	Diction list, Loughran and McDonald list, Henry list and LIWC list	net positive tone	The managerial optimistic tone has a highly significant and negative impact on leverage.
Ataullah, Vivian and Xu	2018	The European Journal of Finance	UK	Chairperson's Statement	Diction list, Loughran and McDonald list, Henry list and LIWC list	net positive tone	Managerial overconfidence significantly increases debt maturity.
Vivian and Xu	2018	Review of Quantitative Finance and Accounting	UK	Chairperson's Statement	Diction list, Loughran and McDonald list, Henry list and LIWC list	net positive tone	Managerial overconfidence weakens the preference for debt over equity financing by a statistically significant and economically substantial amount.
Yan	2015	Journal of International Financial Markets, Institutions& Money	US	SEC filings	Loughran and McDonald list	negative tone	Overconfident managers experience worse performance, while realistic managers experience better performance.
Liu, Le and Thompson	2020	International journal of financial economics	US	MD&A	Diction list	net positive tone	Banks with overconfident CEOs have higher systemic risk than their counterparts with non-overconfident CEOs. Banks with overconfident CEOs also have a higher holding of private mortgage-backed securities and higher leverage.