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Narrative disclosure tone: A review and areas for future research

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ABSTRACT

Numerous studies have examined Narrative Disclosure Tone (NDT) in different channels of financial reporting over the past decade. Our review of 64 studies aims to analyze tone measurements and areas of debate in NDT literature and to suggest avenues for future research. First, we discuss previous studies that compared tone measures based on alternative wordlists and found that tone measures using domain-specific dictionaries are more powerful than those based on general dictionaries. Future research should benefit from the advanced methods considering natural language processing mechanisms and the meanings rather than word frequency for more accuracy. Second, from the theoretical perspective, studies that linked psychological theories to the tone context are limited. Therefore, we call for more evidence from the upper echelons theory that considers the interdependencies between executives. Finally, we critically review different directions of NDT studies and highlight areas for future research. Mainly, we suggest future research to investigate the determinants of NDT in the areas of top managers-specific characteristics, tax avoidance, audit quality, social capital, and regulatory bodies. We call for more research about tone consistency among different channels of disclosures in companies' communications with stakeholders.

1. Introduction

In the last decade, textual analysis has gained attention in the accounting and finance literatures (Li, 2010a; Loughran & McDonald, 2016), particularly regarding firms' communication strategies and their impacts on stock markets and financial outcomes (Henry, 2006; Merkl-Davies & Brennan, 2017). These analyses of texts within published communications between firms' managers and external users, known as narrative disclosures, take various forms, such as the Management Discussion and Analysis (MD&A) (Beattie, 2014). Financial statements are traditionally the cornerstone of accounting and various researchers acknowledge their contributions, but narratives also provide credible, valuable, and important information to external users (Francis et al., 2002: Henry, 2006). Furthermore, Li (2010a) documented that over 70 % of annual reports

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are narrative disclosures, with the implication being that researchers should actually give more attention to these textual disclosures than to hard information, such as financial statements. This also supports the aforementioned attention on this research area, the crucial contributions of NDT to such reporting and, thus, our focus here on '*how*' firms present information to external users.

Prior studies in accounting and finance literature on narrative disclosures have investigated various aspects, including risk reporting (Elshandidy et al., 2015; Tan et al., 2017), forward-looking disclosure (FLD) (Athanasakou & Hussainey, 2014; Hussainey et al., 2003; Liu, 2015), and corporate social responsibility (CSR) reporting (Dhaliwal et al., 2011; Gray et al., 1995). However, while such work offers new insights, it is also important to investigate how this information is being presented to stakeholders (Blankespoor, 2018; Henry, 2008; Pennebaker et al., 2003). Hence, exploring NDT and *how* managers use language to present information to external users is our main focus in this article. Tone refers to the optimistic (pessimistic) language used by managers in narrative reporting to convey material information about the company (Henry, 2008; Loughran & McDonald, 2016).

There is conflict among researchers about the concept of narrative tone and good versus bad news. Consequently, it is worth mentioning that we do not consider narrative tone as being good versus bad news disclosures. According to the literature, we discuss NDT as the use of language in financial reporting and business communication channels between managers and external users, whether they use more positive versus negative words (Henry, 2008; Loughran & McDonald, 2015, 2016). As Schleicher (2012) argues, not all positive sentences in corporate financial reporting reflect good news. Managers might use language to mislead the perception of external users by biasing their tone upwards. However, the actual good news and bad news are based on real events that happened during the fiscal year, such as earnings increases, sales growth, and dividends.

After exploring NDT literature, we identify the main areas of discussion for our review. Consequently, this study aims to critically review previous NDT research to investigate three things: First, what methods have been used in NDT textual analysis? Second, what are the methodological problems? Third, what are the main areas of debate in NDT studies, considering determinants and consequences? As a result, we suggest areas for future research after each stream against literature gaps and while considering key concerns hitherto mentioned.

We started by searching for tone related keywords in the international databases.[1] To insure we included the main NDT studies, we did not limit our search for a specific period or a specific type of disclosure. This resulted in a sample of 796 papers. To assure the level of quality, we kept only articles published in the Chartered Association of Business Schools (ABS) listed journals. Out of 133 papers published in ABS, we excluded 57 papers discussing different phenomenon such as the "tone at the top", which describe an organization's general ethical climate and leadership strategies, and 13 papers did not use tone as a main variable (e.g., Patelli & Pedrini, 2015; Hunton et al., 2011). However, as our main concern is reviewing NDT literature, we include in our sample domain wordlists created from financial documents used in accounting and finance studies by Henry (2008) and Loughran and McDonald (LM) (2011) wordlists. Although Henry (2008) was published in a journal not included in the ABS list, its presence is justified due to its over 900 google scholar citations and creating the first domain wordlist in the NDT literature specifically for financial reporting and business communication studies (Loughran & McDonald, 2016). Therefore, our final sample includes 64 papers presented in Table 1 and Fig. 1.

Fig. 1 presents a breakdown of our sample of 64 studies by the year of publication. It is noticeable that narrative tone studies as a financial reporting textual analysis trend have gained attention in the last decade, especially in the last few years. This indicates that researchers found the tone of narrative reporting a phenomenon requiring investigation, because they found narratives convey credible information to external users alongside financial statements.

This study contributes to accounting and financial reporting literature in general and tone literature as follows. First, we critically discuss previous studies that compared tone measures using alternative wordlists and show that tone measures using domain-specific dictionaries, such as Henry (2008) and LM (2011), are more powerful than those based on general dictionaries because their creation is based on financial documents. This is in line with Henry and Leone (2016), which found that domain-specific dictionaries as a measurement of tone are better in explaining stock market reaction to earnings announcements. However, future research should benefit from the advanced methods in accounting and finance literature that focus on the meanings rather than word frequency for more accuracy. This can be done by applying Natural Language Processing (NLP) mechanisms and combining manual and computerized content analyses which might lead to more accurate measure of NDT. In other words, the measure derived using NLP would more closely align with a human being's assessment of the tone for a given text. It can be argued that using word frequency by applying computerized content analysis in measuring NDT is biased, because it focuses on the number of words and ignores the meaning of the text. However, the suggested approach of combining manual and computerized textual analysis through NLP may ensure that the meaning of such text is included in capturing NDT (not just the number of words). In addition, more comparisons between Bag-Of-Words (BOWs) and machine-learning approaches can be conducted in order to identify the approach that has higher explanatory power as a measurement of NDT.

Second, from the theoretical perspective, few studies link psychological theories, such as upper echelons theory to the tone context. We acknowledge the contributions of Davis et al. (2015) as the first to link such theory in the tone of narrative

[1] We accessed EBSCO, Emerald, SAGE, Wiley Online Journals, ScienceDirect and Web of Science to search for Narratives tone, Tone, Impression Management, Textual Analysis, Tone management, Linguistic Tone, Optimism, and/or Content Analysis.

Table 1
Narrative disclosure tone articles reviewed, by journal.

Journal	Number of articles
The Accounting Review	9
International Review of Financial Analysis	7
Accounting and Business Research	5
Accounting, Auditing & Accountability Journal	5
Journal of Business Ethics	4
Contemporary Accounting Research	3
Journal of Accounting Research	3
Journal of Banking and Finance	3
Journal of Business Finance & Accounting	3
Review of Accounting Studies	3
The Journal of Finance	3
Journal of Accounting and Economics	2
ABACUS	1
Accounting Forum	1
Accounting, Organizations and Society	1
Economics Letters	1
European Accounting Review	1
Financial Analysts Journal	1
International Business Review	1
Journal of Accounting and Public Policy	1
Journal of Business Communication	1
Journal of Financial Markets	1
Journal of International Accounting, Auditing and Taxation	1
Journal of Real Estate Finance and Economics	1
Review of Quantitative Finance and Accounting	1
The British Accounting Review	1
Total	**64**

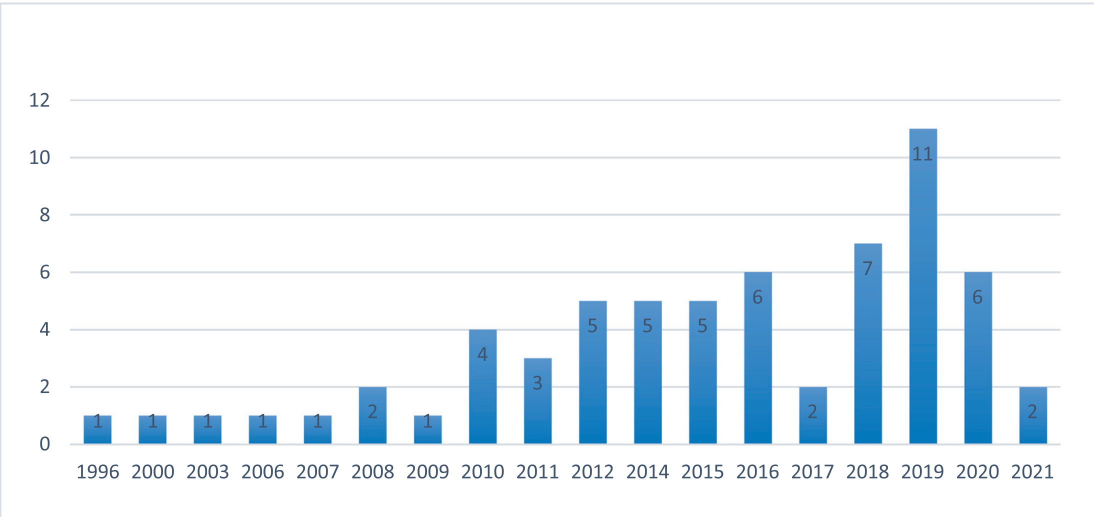

Fig. 1. Narrative disclosure tone articles reviewed, by year.

disclosure and Bamber et al. (2010) who examine the top managers' effect on voluntary disclosure. However, we call for more evidence using upper echelons theory, which considers the interdependencies between executives and the complements the effects of other Top-Management-Team personal and psychological characteristics.

Finally, most NDT studies focus on tone consequences, but this research area needs further investigations into NDT determinants and more comprehensive considerations of top-manager-specific characteristics, gender diversity, tax avoidance, audit quality, and social capital. Our review also indicates that over 80 % of studies use United States (US) data. This research area urgently needs more evidence from outside the US context, especially from the European context, whose regulatory settings differ from those in the US and where some regulation changes recently occurred. Furthermore, most narrative tone studies focus on the provider of information (managers), while few studies consider the sophistication level of investors. We call for more research about tone consistency among different channels of disclosures in companies' communications with stakeholders. Consequently, we contribute to the financial reporting literature by highlighting more avenues for future research based on gaps in NDT literature.

Regarding structure, Section 2 discusses NDT measures in accounting and finance literature. A critical review of the different directions of NDT and areas for future research comes in Section 3. Finally, Section 4 concludes this article's main findings.

2. Narrative disclosure tone measures in accounting and finance literature and suggestions for future research

2.1. General overview

Amid growing interest in using computer linguistics tools to investigate narrative disclosures in accounting and finance (Henry & Leone, 2016), one of the main tools is the BOWs approach, which is mostly used in accounting and finance textual analysis studies (Kearney & Liu, 2014). This approach aims to measure word frequency based on a wordlist that represents the investigated phenomenon (Loughran & McDonald, 2016). Several researchers examine NDT by identifying the frequency of positive and negative words, with a higher percentage of positive than negative words signalling a more optimistic (pessimistic) tone. This section discusses the four wordlists most commonly used in tone literature, namely the wordlists of Harvard GI, Diction, Henry (2008), and LM (2011). Further subdivisions classify these as general dictionaries (Harvard GI and Diction wordlists), domain-specific dictionaries (Henry (2008), and LM (2011) wordlists (Henry & Leone, 2016)).

Harvard GI, mainly used in sociology and psychology studies, contains 1,915 positive words and 2,291 negative words. Although not created based on financial documents, some accounting and finance researchers used it early on because it was the only available positive/negative wordlist at that time (Loughran & McDonald, 2016). Diction was created for politics and social media studies, but some researchers use it for textual analysis in accounting and finance research. It has five master categories named Activity, Optimism, Certainty, Realism, and Commonality, and contains 686 positive words and 920 negative words to examine the tone of such text.

Unlike the Harvard GI and Diction wordlists, to the best of our knowledge, Henry (2008) wordlist was the first wordlist created from financial documents to be used in financial reporting and business communication studies. She created a wordlist of 104 positive words and 85 negatives using 1,366 earning press releases in the US context. After that, Loughran and McDonald (2011) followed Henry (2008) and created a more comprehensive wordlist for a financial context by investigating over 50,000 annual reports (10-K filings) in the US context from 1994 until 2008, and creates a wordlist consists of 354 positive words and 2,329 negative words.

The next section summarizes previous studies that compared tone measures based on alternative wordlists.[2] Thus, it facilitates better understanding of NDT measurements in accounting and finance literature, and identifies suitable wordlists for financial reporting and business communication research. Based on this discussion, we then suggest areas for future research regarding to tone measurement.

2.2. Comparisons of alternative wordlists for narrative disclosure tone

LM (2011) compared Harvard's negative wordlist with their own wordlist. They found a negative tone is significantly associated with lower abnormal returns when using their own wordlist, but that the association is not significant using Harvard wordlist. This is consistent with their correlation analysis which found that almost 75 % of Harvard's negative words are not actually negative in the financial context – for example, 'tax', 'capital', 'board', 'depreciation', and 'vice'. Hence, for them these words are just adding noise to NDT measures. Loughran and McDonald (2015) also compared LM (2011) and Diction wordlists and concluded that using Diction in financial studies is misleading as most of its positive (negative) words do not reflect positive (negative) words in the financial context. In addition, they found the LM (2011) wordlist, but not Diction, significantly associated with subsequent return volatility at the 1 % level. These findings are consistent with LM's (2011) point about their domain-specific dictionary being better than general wordlists in the financial context.

Henry and Leone (2016) compared the accounting and finance literature's most popular four measures of tone – namely Henry, (2008), Diction, Harvard GI, and LM (2011) – and concluded that market reaction explanatory power is much better using wordlists created from financial documents such as Henry (2008) and LM (2011) than other general dictionaries. They noted the Henry (2008) wordlist's greater magnitude of the coefficient regarding change of tone than other dictionaries. To validate their results, they selected random subsamples with 250 regressions and checked the rejection rate when the p value is lower than 0.05. They found that Henry (2008) and LM (2011) wordlists have more power, almost 100 % rejection rate, in explaining the market reaction compared with other general dictionaries. However, when using the level measure of tone rather than change from the previous period, the results in Table 2 show that Henry's (2008) wordlist has higher power in explaining stock-market reaction. Henry and Leone (2016) also compared the BOWs approach and the Naïve Bayesian machine-learning approach that Li (2010b) followed to investigate the relationship between the tone of Forward-Looking Statements (FLS) in MD&A section and future earnings by repeating Li's (2010b) analysis but with Henry's (2008) wordlist.

[2] We would like to thank the anonymous reviewer for suggesting the idea of summarizing prior studies that have compared tone measures based on alternative wordlists and for suggesting a format of the comparison table.

Table 2
Research comparing explanatory power of alternative tone measures.

Study	Data Analyzed	Tone measure	Dependent or Outcome Variable	Criteria	Dictionaries compared	Dictionaries with most powerful results
Loughran & McDonald (2011, p52)	50,115 10-Ks	(Neg / total words)	CAR	Significant versus non-significant coefficient of tone.	LM Harvard	LM
Rogers et al. (2011, p2173)	1,253 earnings announcements.	(Pos-Neg) / (total words), Level	Litigation Indicator (sued/not sued)	Significant versus non-significant coefficient of tone.	Diction Henry LM	Diction Henry LM
Price et al. (2012, p1001-1002)	2,880 earnings conference calls	(Pos-Neg) / (Pos + Neg), Level	CAR	Differences in returns of portfolios sorted by tone.	Henry Harvard	Henry
Davis et al. (2015, p657)	3,996 earnings conference calls.	(Pos-Neg) / (total words), Level	Future Return on Assets (ROA)	Significant versus non-significant coefficient of tone.	Henry LM Diction	Henry LM
Loughran & McDonald (2015, p8)	77,158 10-Ks	(Pos (Neg)) / total words)	Subsequent volatility	Significant versus non-significant coefficient of tone.	Diction LM	LM
Arslan-Ayaydin et al. (2016, p145)	7,038 earning press releases	(Pos-Neg) / (total words), abnormal	CAR	Significant versus non-significant coefficient of tone.	Diction Henry LM	Henry LM
Henry & Leone (2016, p164)	63,357 earnings announcements	(Pos-Neg) / (Pos + Neg) Change from previous period, standardized.	CAR	Explanatory power of regression and magnitude of coefficient on standardized variable.	Henry LM Diction GI Harvard	Henry
Henry & Leone (2016, p167)	63,357 earnings announcements, from which 250 random subsamples of varying sizes ranging from 50 to 2,000 observations.	(Pos-Neg) / (Pos + Neg), Change from previous period	CAR	Percentage of 250 regressions in which coefficient on TONE was significant	Henry LM Diction GI Harvard	Henry LM
Henry & Leone (2016, p168)	63,357 earnings announcements, from which 250 random subsamples of varying sizes ranging from 50 to 2,000 observations.	(Pos-Neg) / (Pos + Neg), Level	CAR	Percentage of 250 regressions in which coefficient on TONE was significant	Henry LM Diction GI Harvard	Henry
Ataullah et al. (2018, p461)	2,236 chairman statements	(Pos-Neg) / (total words), Level	Leverage (debts/ assets).	Significant versus non-significant coefficient of tone.	Henry LM	Henry LM

Notes: i. "Tone measure" refers to the computation of the tone measure where "Pos" is the frequency count of the dictionary's positive words appearing in the narrative, "Neg" is the frequency count of the dictionary's negative words appearing in the narrative, and "Total words" is the total word count of the narrative. ii. "Dependent or outcome variable" is the comparative statistical tests documented on the referenced page numbers – for example, the dependent variable in a regression, where the alternative tone measures are included as independent variables. "CAR" = cumulative abnormal returns. iii. "Criteria" is the statistical criteria against which the paper measured the efficacy of the alternative tone measures. iv. "Dictionaries compared" is the alternative dictionaries used in creating the tone measure: LM is the dictionary developed in Loughran and McDonald's (2011) analysis of 10-K filings; GI Harvard is the dictionary from the General Inquirer program developed and used by Philip Stone, a specialist in social psychology; Henry is the dictionary developed in Henry's (2006, 2008) analysis of earnings announcements; and Diction is the dictionary from Diction software developed and used by Roderick Hart, a specialist in politics and mass media.

They concluded that the BOWs approach has the same power as Naïve Bayesian machine learning in explaining future earnings. However, both Li (2010b) and Henry and Leone (2016) agreed that general dictionaries are not suitable for the financial context based on Li (2010b) not finding any significant association between the tone of FLS in MD&A section and future performance using the Harvard GI and Diction wordlists. In their survey, Kearney and Liu (2014) also deemed domain-specific dictionaries more applicable to financial studies than general dictionaries, and reported that previous studies found that machine leaning approach gives higher accuracy than the BOW approach.

Similarly, but focusing on the long-term effect of tone, Davis et al. (2015) found that managers-specific tone is significantly associated with firms' future performance when they used the domain-specific dictionaries of Henry (2008) and LM (2011), but not when using Diction wordlists.

Price et al. (2012) found that the Henry (2008) wordlist better explains stock-market reaction to the tone of conference calls than the Harvard wordlist, as the former is significantly associated with market reaction in both the short and long term. Similarly, Arslan-Ayaydin et al. (2016) found a positive association between abnormal optimistic tone and abnormal return in their short-window event study using the Henry and LM wordlists but not with Diction wordlists. These results are consistent with Henry and Leone's (2016) about domain-specific dictionaries having better explanatory power regarding market reaction than general wordlists.

In addition, other studies found no statistical differences between general dictionaries and domain-specific dictionaries when explaining their results. Using Diction, Henry, and LM wordlists, Rogers et al. (2011) found that both general dictionaries and domain-specific dictionaries have similar statistical results in finding that an optimistic tone, is associated with higher litigation risk. Previous research used both domain-specific dictionaries, Henry and LM, as a robustness analysis for their results and they found both have similar explanatory power on firms' outcomes. Boudt et al. (2018) found tone more informative to predict future returns when firms are smaller, younger, and have a high growth ratio. Ataullah et al. (2018) found that firms with more managers-specific optimistic tone, measured by Henry and LM wordlists, follow more conservative financing strategies. Studies that compare tone measures using alternative wordlists are summarized in Table 2.

2.3. Narrative disclosure tone measures and areas for future research

The previous section critically discussed prior studies that compared tone measures using alternative wordlists and showed that tone measures using domain-specific dictionaries, such as Henry (2008) and LM (2011), are more powerful than those based on general dictionaries. This aligns with Henry and Leone's (2016) point about domain-specific dictionaries as tone measurement better explains stock-market reaction to earnings announcements. More specifically, most studies that compare tone measures based on alternative wordlists deem that domain-specific dictionaries better explain firms' financial outcomes, as Table 2 showed. The root explanation is that these domain wordlists are created based on financial documents, press releases, and 10-K fillings, which reflect real financial positive/negative words. With this being evidenced, we calls for three avenues for future research regarding NDT measurement in accounting and finance literature.

First, Henry and Leone's (2016) comparison between the BOWs approach and the Naïve Bayesian machine-learning approach was limited to the FLS in MD&A sections in 10-K and 10-Q filings. Thus, future research can apply such a comparison in different contexts with different settings and using different channels of communications rather than FLS in MD&A to investigate whether the BOWs approach really has similar power to Naïve Bayesian machine learning or if it actually depends on the context and the channel of communication for narrative reporting. Moreover, future research should give more attention to the research settings while choosing the best tool to capture the tone. For instance, a researcher might use more complex approach such as the machine-learning approach if the main research question is directly pertinent to NDT. However, a simpler BOWs approach can be used where NDT is not the main focus of the research.[3] In addition, considering the research settings and context, future research should benefit from Henry and Leone's (2016) conclusion about when it is better to use machine-learning approach. Henry and Leone (2016) argue that machine-learning can be useful for studies that have a main outcome of creating a categorical variable. Therefore, we argue that future research in NDT should consider the context and the settings of such research while determining the best tool of measuring the tone of narratives.

Second, one shortcoming of the BOWs approach is that it innately focuses on word frequency and not textual meaning. While we acknowledge the recent contribution of El-Haj et al. (2020) in creating new software to capture the tone of narratives from PDF structured annual reports, it still focuses on word frequency for measuring the tone. However, we argue that future research should benefit from the advanced methods in accounting and finance narrative reporting literature that consider textual meaning rather than word frequency when they measure the tone of narrative reporting. One way of doing this is by following El-Haj et al.'s (2019) suggestion of applying NLP mechanisms in computer science literature to the accounting and finance context, specifically to capture tone. NLP allows combinations between manual and computerized content analysis using specific software, which may produce a more accurate measure of tone as it considers textual meaning (El-Haj et al., 2019). Moreover, this method can combine BOWs and machine learning – the most common methods for measuring NDT in accounting and finance (Kearney & Liu, 2014).

Third, an increasing number of studies link the tone of social media with firms' financial outcomes (Bartov et al., 2018; Bhardwaj & Imam, 2019). However, to the best of our knowledge no textual analysis approach has been conducted to build a measure for the tone of social media and online disclosure platforms. Bartov et al. (2018) supported this argument when they examined whether Twitter can help predict future earnings. They acknowledged that their approach using Harvard GI and LM (2011) wordlists probably lacks accuracy as these wordlists are created for general texts and financial documents, respectively (Bartov et al., 2018). Henry and Leone (2016) argue that machine-learning approach is more likely to be useful in studying a type of narrative where no predefined wordlists exist. Consequently, future research may apply machine-learning textual analysis using social media channels of communication, such as tweets, in order to extract a better measure of the tone of social media and online disclosure platforms, especially when companies may use different language on social media platforms (Bartov et al., 2018).

[3] We would like to thank the anonymous reviewer for suggesting this point to be discussed in our areas for future research.

3. A review of the current strands on narrative disclosure tone and suggestions for future research

Researchers in accounting and finance literatures argue it is important to investigate not only the information content of such disclosures, but also how this information is presented to stakeholders (Henry & Leone, 2016; Pennebaker et al., 2003). As a result, scholars investigate the main narrative's characteristics, such as tone and readability (Loughran & McDonald, 2016). We specifically focus on narrative tone, and in this section we review different areas of debate in studies that examined NDT. We group the reviewed articles into two groups: first, studies on the determinants of NDT with tone as the dependent variable; and second, studies on the effect of NDT with tone as the main explanatory variable. The next subsection focuses on determinants of NDT, while subsequent subsections respectively address the consequences of NDT (3.2) and areas for future research (3.3).

3.1. Determinants of narrative disclosure tone

Although few studies examine the determinants of NDT as most tone studies focus on consequences (Loughran & McDonald, 2016; Marquez Illescas et al., 2019), some studies did investigate the key driving factors of NDT. However, these studies investigated tone's determinants for a specific type of disclosures when they investigated the tone's determinants of FLD (e.g., Li, 2010b; Schleicher & Walker, 2010) or considered just firm financial characteristics and accounting strategies as key drivers of tone (Iatridis, 2016). This section nevertheless reviews research on NDT determinants, which will facilitate subsequent suggestions for future research.

Li (2010b) used the Naïve Bayesian machine-learning approach to measure the tone of FLS in MD&A sections and found that small-sized, less-volatile, older age, and lower accrual companies display more optimistic FLD than their respective counterparts. Schleicher and Walker's (2010) manual content analysis of how managers frame tone in FLS revealed that firms with declining performance tend to bias their tone upwards, and they concluded that loss-making and risky companies deliver a more positive tone. However, Schleicher's (2012) continuation of this research aims to investigate whether positive FLD statements provide real good news or managers just bias the tone in financial reporting. He found that good-news positive statements occur when managers discuss firms' sales and make comparisons with last year's performance and position, but bad-news positive statements more likely happen when managers refer to firms' aims, objectives, and strategies.

In Davis and Tama-Sweet's (2012) scrutiny of analysts' expectations as NDT determinants, companies that exceed expectations used less negative language in press releases. Differently, Iatridis (2016) investigated accounting strategies as NDT determinants found that companies with lower earning manipulations, lower cost of capital, and high conservatism display a more pessimistic tone in their narrative reporting.

Davis et al. (2015), the first to investigate the effect of top managers' characteristics on NDT, noted how managers with experience in charity organizations use a more positive tone but also that female managers generally use a less-optimistic tone. On gender, García-Sánchez et al. (2019) found that boards with more gender diversity provide less impression management in their sustainability reporting. Considering the psychological features of Chief Executive Officers (CEOs), US studies reported that narcissistic CEOs use a more optimistic tone than other managers (Buchholz et al., 2018; Marquez Illescas et al., 2019). Similarly, Bassyouny et al. (2020) deemed narcissistic CEOs to have a more positive tone but that this declines in companies with a more independent board. They added that female and financial-expert CEOs display a less-optimistic tone, the point on females concurs with Davis et al. (2015). Also, Bassyouny et al.'s (2020) other point on financial-expert CEOs parallels Lee and Park's (2019) about more financial experts on audit committees decreasing the abnormal positive tone in MD&A.

More specifically on how firms present information to external users, Asay et al. (2018) found managers highlight positive information by making it more readable. They added that managers try to present poor performance positively by focusing on future strategies, and when presenting negative information, they use more passive sentences. Inversely, it seems that managers use more active sentences for positive information. Moreover, DeBoskey et al. (2019) found CEO power to be positively related to optimistic tone, though effective Corporate Governance (CG) mitigates this relationship. All these findings align with Merkl-Davies and Brennan's (2017) argument that CEO personalities can influence accounting communication strategies. Table 3 summarizes studies on NDT determinants.

3.2. Consequences of narrative disclosure tone

The literature documents two main consequences of disclosure tone: immediate stock-market reaction (short-term effect) and narrative tone predictive power (long-term effect). The following sections discuss prior studies that examined both these NDT consequences so that we can understand the role of tone in narrative reporting further, and then we call for future research to fill gaps in the tone literature.

As investors can gain information about firms from different communication channels between firms and external users (Merkl-Davies & Brennan, 2017), prior studies investigated NDT of these channels, including press releases (Davis et al., 2012; Davis & Tama-Sweet, 2012; Henry, 2008; X. Huang et al., 2014; Kimbrough & Wang, 2014), social media and online reportage (Bartov et al., 2018: Sprenger et al., 2014; Tetlock, 2007; Tetlock et al., 2008), conference calls (Davis el al., 2015; Price et al., 2012), and annual reports (Kothari et al., 2009; Loughran & McDonald, 2011; Yekini et al., 2016). Moreover,

Table 3
Summary of studies on the determinants of narrative disclosure tone.

Study	Data and Approach	Country	Main Findings
Li (2010b)	-MD&A annual report. -Naïve Bayesian algorithm	US	Optimistic tone is driven by firm-specific characteristics.
Schleicher & Walker (2010)	-Outlook section in annual reports. -Manual content analysis.	UK	Companies with impending declines bias the tone. Loss and risky firms display more optimistic tone.
Davis & Tama-Sweet (2012)	-Press releases and 10-Ks.-LM (2011) , Henry (2008), and Diction wordlists.	US	Managers report less pessimistic languages and more optimistic languages in press release compared with MD&A disclosures.
Schlcheicher (2012)	-Outlook section in annual report. -Manual content analysis.	UK	Real positive information is connected to sales; otherwise it is just tone management.
Davis et al. (2015)	-Conference calls.-LM (2011) , Henry (2008), and Diction wordlists	US	Female CEOs use less optimistic tone. Managers with experiences in charity organizations use high positive tone.
Iatridis (2016)	-Annual reports.-LM (2011) wordlist.	UK	Companies with high level of pessimistic tone display high conservatism, stronger corporate governance, and lower earnings manipulation.
Asay et al. (2018)	-N/A	US	Managers write negative news in less readable way. They aim to present poor performance in positive way.
Buchholz et al. (2018)	-Annual reports.-LM (2011) wordlist.	US	Narcissistic CEOs display more optimistic tone.
DeBoskey et al. (2019)	-Earning announcement.-LM (2011) wordlist.	US	More CEO power is associated with higher optimistic tone.
García-Sánchez et al. (2019)	-Sustainability reporting.-LM (2011) wordlist.	US	Greater female percentage decreases impression management.
Lee & Park (2019)	−10-Ks.-LM (2011) wordlist.	US	More financial experts on audit committees decreases abnormal optimistic tone.
Marquez–Illescas et al. (2019)	-Earning announcement-LM (2011) wordlist.	US	Narcissistic CEOs use more optimistic tone compared to non-narcissistic CEOs.
Bassyouny et al. (2020)	-Annual reports.-LM (2011) wordlist.	UK	CEO characteristics drive NDT and it is moderated by corporate governance attributes.

tone differs among different communication channels, therefore, external users should not expect managers to always adopt the same tone (Davis & Tama-Sweet, 2012). The next subsections discuss and criticize studies that investigated NDT across different communication channels.

3.2.1. Immediate stock-market reaction (short-term effect)

Most studies on the consequences of narrative tone focus on short-term effects (Wisniewski & Yekini, 2015) and use a short-window event study. Subsections within section 3.2.1 discuss these studies according to their channel of narrative disclosure.

3.2.1.1. Narrative disclosure tone in press releases. Using her own wordlist, Henry (2008) pioneered investigations into stock-market reactions to NDT in the press releases of US companies. She argues that managers are more likely use an optimistic than pessimistic tone to encourage investors to consider positive aspects of company performance, as she identified positive associations between positive tone disclosures and abnormal returns. Similarly, Kimbrough and Wang (2014) investigated investors' reaction to managers' self-serving attributes in quarterly press releases. As with most accounting disclosure tone studies, they found managers that tend to attribute good news to internal causes and negative news to external factors. Also, firms are more likely adopt a defensive attribution (blame external factors) when other firms in their industry also experience bad performance. These points highlight the importance of industry type in NDT research; hence, we deem industry type an important NDT determinant.

Davis and Tama-Sweet (2012) argue that investors often assume managers use the same language across different channels of disclosure in their communications with stakeholders, but they found out this is not the case. In their comparisons of NDT in quarterly press releases and MD&A in 10-K filings they noted how managers use more optimistic language in quarter press releases than in the MD&A section in 10-Ks. They argue that managers aim to shift or delay negative information (pessimistic tones) from press releases, which are more sensitive to stock market reaction, to MD&A sections in Securities and Exchange Commission (*SEC*) filings. We argue that these results can be explained by the *SEC* restricting the MD&A sections in 10-K filings and that managers cannot use an overly positive tone here as they can in press releases. In contrast, X. Huang et al. (2014) and Arslan-Ayaydin et al. (2016) conducted three different event studies to investigate immediate and long-term market reactions to NDT. Both researcher groups confirm the same results: abnormal positive tone might include some bad news in the stock market, but managers want to present it to investors in a good way. They noticed that investors react positively to an abnormal positive tone immediately after press releases, but react negatively in the long term (+120 days). These results suggest that managers sometimes mislead investors by conveying an overly optimistic tone to elicit positive market reactions in the short term.

3.2.1.2. Narrative disclosure tone in conference calls and earning announcements. Price et al. (2012) investigated if quarter conference calls have incremental information. They found positive significant association between tone in the question-and-answer part of conference calls and the cumulative abnormal return (CAR) and abnormal trade volume in their short-window event study. Price et al. (2012) highlighted the importance of trade volume as a proxy for stock-market activity. Other researchers similarly found positive association between optimistic tone and short-term market reaction, as analysts ask more positive questions and this makes investors react more positively (Allee & DeAngelis, 2015; Davis et al., 2012; Doran et al., 2012).

In a different way, Borochin et al. (2018) found a negative association between tone in conference calls and US market uncertainty in terms of abnormal return volatility. Specifically, they found firm-value uncertainty to be more sensitive to analysts' rather than managers' tone in conference calls. Guillamon-Saorin et al. (2017) only found a positive market reaction to non-Generally Accepted Accounting Principles (GAAP) disclosures with low impression management levels. Investors ignored non-GAAP information which had a high level of impression management. This means that investors in stock markets can recognize managers' biased communications about a firm's performance. We argue that whether this condition exists depends on investors' level of sophistication. As researchers noted, small investors are more likely misled by optimistic tone compared with sophisticated investors, especially when the text has low readability (Baginski et al., 2018; Tan et al., 2014). Loughran (2018) argues that other factors may influence this relationship, including manager credibility, as investors likely trust more-credible managers, another factor is inside traders who might try to mislead investors by managing the tone of the managerial forecast. Thus, we propose that future studies could distinguish between investors' sophistication levels to see how different investors react to the same company disclosures.

On earning announcements, firms tend to disclose positive information when much attention is on the stock market and delay negatives until after trading hours when investor attention on it wanes (DeHaan et al., 2015; Segal & Segal, 2016). Consequently, such authors argue that more positive market reactions occur during trading hours. We argue that these findings support impression management theory, whereby in this instance managers drive greater attention to more positive news and thereby appeal to investors (Merkl-Davies & Brennan, 2017). Although Rogers et al. (2011) associated optimistic tone with higher litigation risk, they deemed this risk even higher when managers engage in abnormal selling more. They added that the tone from sued firms is more optimistic during bad news periods compared with other periods. Rahman (2019) found positive associations between market reaction and positive tone in the third quarter but not the first quarter. This aligns with X. Huang et al.'s (2014) finding about managers trying to mislead investors by increasing their positive tone at the end of the fiscal year. Despite much focus on managers and managerial qualities, some nevertheless say that certain manager characteristics are irrelevant. Brochet et al. (2019) noted how the stock market reacts positively to optimistic tone regardless of managers' cultural backgrounds, as investors focus just on companies' performance.

3.2.1.3. Social media and online disclosure tone. In recent years, social media has played a key role in the stock market and even influenced investors' decisions (Blankespoor, 2018; Yang & Liu, 2017). Studies linking the role of social media with accounting and financial outcomes have increased (Bartov et al., 2018; Bhardwaj & Imam, 2019), but the first to link social media to disclosure tone settings and stock-market influenced derived from Tetlock (2007) and Tetlock et al. (2008). Using the Wall Street Journal Stock Column, these authors found a lower stock return when journalists' tone in their daily stock report was pessimistic.

Barakat et al. (2019) examined the effects of financial institutions' risk-announcement tone in the media on market reaction. They found that a net negative tone and an uncertain tone have strong reputational effects on equity and debt-based market reactions. However, Liebmann et al. (2019) investigated stock and Credit Default Swap (CDS) traders' different perceptions of tone in financial news by classifying news tone into results-focusing news and debt-focusing news. They found that while stock traders focus on corporate results news and ignore debt topics, CDS traders focus equally on debt news and results news. However, Choi (2020) found a negative relationship between optimistic tone and insider trading, suggesting that managers use a negative tone to create opportunities for buying low-cost shares.

Yang and Liu (2017) noticed how firms generally avoid publishing negative earnings news on their Twitter account while using it for positives, and firms with a better performance have more earnings-related tweets. Moreover, when firms post about improved performance, they present it multiple times and in different ways. However, when Sprenger et al. (2014) used Twitter, they found that negative events posted on Twitter brought stronger reactions from investors than those for positive events. Moreover, Shan (2019) noted positive associations between the tone of firms' news in social media and their extent of voluntary disclosure. Recently, certain NDT studies revealed the importance of social media in stock markets when they found a positive relationship between immediate market reaction and aggregate opinions on Twitter, with the implication being that the tone of the tweets predict earnings surprises (Bartov et al., 2018). A similar outcome results from the inverse as companies with a low-negative tone on social media have higher future returns (Liu & Han, 2020).

3.2.2. Narrative disclosure tone predictive power (long-term effect)

This section discusses how NDT can influence firm's outcomes in the long term. Annual reports provide the largest sample of narratives in financial reporting and offer a reliable narrative disclosure proxy from investors' perspectives (Bassyouny & Abdelfattah, 2022; Loughran & McDonald, 2011, 2016; Yekini et al., 2016). Most studies on disclosure tone through annual reports investigated particular sections rather than whole narratives, such as letters to shareholders (Abrahamson & Amir, 1996; Patelli & Pedrini, 2014), Chairman's Statements (Schleicher & Walker, 2010; Smith & Taffler, 2000), and MD&A sections (Davis & Tama-Sweet, 2012; Feldman et al., 2010).

On the content of company presidents' letters to shareholders and their effects on firm performance, certain studies find narrative reporting to be significantly associated with firm performance, stock returns, and firm failure (Abrahamson & Amir, 1996; Mayew et al. 2015; Patelli & Pedrini, 2014; Smith & Taffler, 2000). However, in examining both positive and negative tone separately in 10-K filings, LM (2011) and Kothari et al. (2009) said a negative tone is associated with lower abnormal returns and higher volatility while a positive tone leads to higher returns, higher performance, lower volatility, and fewer risks. Specifically considering effects of tone change over time, Feldman et al. (2010) found a positive relationship between changes of narrative tone and short-term CAR. It is important to mention that Feldman et al. (2010) found that Harvard GI wordlists provide stronger results with future return drift in a longer event study (90 days). They explained these results by arguing that the Harvard dictionary is more comprehensive, especially having more positive words, and that at this time of the study in 2010 the LM (2011) wordlist had not been widely tested like Harvard wordlists. Similarly, Campbell et al.'s (2019) investigation into US disclosure tone volatility found that both a firm's operation risk and manager transparency drive tone volatility, though investors react only when disclosure tone volatility provides information about operation risks. In the financial industry, Del Gaudio et al. (2020) found that higher negative tones in US banks' narrative reporting can predict bankruptcy risks, and they advised analysts and investors to use tone for predicting their investments' futures. D'Augusta and DeAngelis (2020) considered relationships between managerial tone and earning performance, finding a positive association when companies fail to beat investors' expectations and a negative association when companies exceed expectations. They argue that managers downplay positive changes in earnings so they can manage future earnings expectations, with the implication being that managers employ different tone-management strategies to manipulate investors' expectations.

As Cho et al. (2010) found lower environmental performance to be associated with higher optimistic tone, managers may use optimistic language in their narrative disclosures either to conceal bad environmental performance and/or influence investors. Considering the firm's performance perspective, Clatworthy and Jones (2003, 2006) reported that firms with an improving performance disclose positive information more than negatives, though they argued that both groups blame the environment for bad news and take credit for good news. Yekini et al. (2016) found a positive association between positive tone and abnormal returns around the date of annual reports. Considering the effect of NDT on firms' strategies and financial behaviour, Ataullah et al. (2018) found that firms with more managerial optimism display lower leverage and dividends and higher cash holdings. They conclude that firms with more optimistic tones use more conservative strategies. Ahmed and Elshandidy (2016) found that conservative bidders who provide more negative tone in the annual reports are rarely engaged in Mergers and Acquisitions (M&A) deals, and when they do engage they use stock acquisition more than cash acquisition. However, Wang et al. (2021) found that companies with higher positive tone are more likely to accelerate capital structure adjustments. Moreover, Cho and Kim (2021) found that companies with higher optimistic tone are more likely to have an increase in stock liquidity.

Rich et al. (2016) found that an optimistic tone leads to timelier financial reporting, as a proxy for financial reporting quality. They argue that positive tone presents more confidence in financial reporting as there are no delays in the subsequent years reporting. More recently, Fisher et al. (2019) considered different corporate narrative reporting documents in New Zealand and Australia and conclued that chairmen's statements and CSR reports are the most positive narrative reporting documents. They also noted that poorly performing companies use less optimistic words in their narrative reporting. Similarly, Du and Yu (2021) found that CSR reports include important information as companies with more optimistic reports have higher CSR future performance.

Bryan (1997) argues that narratives contain useful information about a firm's future vision and operations. Tone has indeed been noted as having an explanatory power for predicting future abnormal returns in long-window event studies (Bartov et al., 2018; Boudt et al., 2018; Price et al., 2012; Li et al., 2019). However, some researchers broke this down when demonstrating that positive tone is associated with positive market reactions only in the short term, as in their research they found abnormal positive tone negatively influenced market reactions in the subsequent two quarters (Arslan-Ayaydin et al., 2016; A.H. Huang et al., 2014). Prior studies examined the ability of tone to predict the subsequent quarter performance using future return on assets (ROA) (Davis et al., 2012; Davis & Tama-Sweet, 2012; Li, 2010b; Li et al., 2019). They found more pessimistic tone is associated with lower future ROA in the next quarter. In addition, Li (2010b) found that the tone of FLS is associated with future earnings and can decrease the mispricing of accruals. Recent NDT studies also found that companies with a less optimistic tone have higher stock price crashes and lower performance, but the overall point here is that these same studies indicate that tone can indeed predict future company events (Druz et al., 2020; Fu et al., 2021). Table 4 below summarizes studies on NDT consequences.

3.3. Areas for future research

Given the previous discussion of different directions in NDT studies, we next highlight areas for future research.

First, as most NDT studies focus on tone consequences, relatively few focused on NDT determinants. Of those that do, their focus was on firms' financial characteristics as key driving factors for affecting NDT (Iatridis, 2016; Li, 2010a; Schleicher & Walker, 2010). However, future research might move to top managers-specific characteristics while examining NDT determinants. This could be conducted by applying upper echelons theory in tone settings. This theory argues that all firms' outcomes and strategies are predicted by their top managers' characteristics (Hambrick & Mason, 1984). While we acknowledge the contribution of Davis et al. (2015) as the first to link such theory into the tone of narrative disclosure context and Bamber et al. (2010) who examine the top managers' effect on voluntary disclosure, we call for more investigations in NDT literature using the upper echelons theory as follows. While Davis et al. (2015) investigated the effect of managers' characteristics on conference calls' tone in the US context, more evidence from outside the US context is still needed in order to generalize the idea that NDT can be driven by CEOs characteristics. In addition, it is important to examine not only the effect of CEOs characteristics on NDT but also how the interdependencies between Top-Management Team (TMT) can drive the tone of narrative reporting. Therefore, future research might investigate the complement between CEOs and Chief Financial Officers (CFOs) personal and psychological characteristics on NDT in different contexts. Moreover, future research can examine the moderating effects of board members' characteristics, as part of TMT, on the relationship between CEOs characteristics and NDT to investigate if strong CG mechanisms can moderate the tone of top managers.

Second, future research might investigate CG-specific mechanisms as determinants of NDT as follows. Prior research found that gender diversity is associated with higher financial reporting quality (Poletti-Hughes & Briano-Turrent, 2019). Moreover, previous studies show that audit committee characteristics and audit quality can influence the quality of financial reporting (Habib et al., 2018; Lee & Park, 2019; Samaha et al., 2015). Therefore, future research might consider such CG mechanisms as determinants of NDT. Consequently, it can answer the question of whether the tone of narrative reporting is CEO driven, CG driven, firm driven, or a combination of different factors.

Third, NDT is an important proxy for financial reporting quality as it can predict future performance and risks (Li, 2010a; Melloni et al., 2016). While prior studies associate corporate tax avoidance with firm risk (Guenther et al., 2016), CG (Kovermann & Velte, 2019), and financial reporting quality (Durnev et al., 2017), we argue that corporate tax avoidance might be associated with the tone of narrative reporting as a proxy for financial reporting quality. Moreover, one can argue that companies might use over optimistic tone to cover up their tax avoidance as an impression management strategy. Therefore, we suggest future research to consider tax avoidance as an important NDT determinant.

Fourth, based on Table 3 and Table 4 which present a summary of prior studies that investigated NDT, over 80 % of NDT studies examined US data. As a result, more evidence about NDT from outside the US is still needed for researchers to compare their results based on different contexts (Plöckinger et al., 2016). Consistent with this point, future research might investigate the different regulatory settings effect on NDT by comparing companies that follow common law (e.g., US, Canada, and the United Kingdom (UK)) with other European countries which follow civil law (e.g., Germany, Italy, and Spain). No one can expect firms that follow different regulatory settings to have the same financial reporting style. Moreover, considering the regulation changes in the European context, future research might investigate the change in financial reporting frequency effect on NDT. The European Commission introduced a mandatory quarterly Interim Management Statements (IMSs) by early 2007 for all European Union (EU) members. However, in 2013 the European Commission stopped this mandatory requirement because they found it affected long-term investments (European Commission, 2013). Therefore, this regulation change might affect corporate financial reporting style in general and narrative tone in particularly.

Fifth, prior research argue that financial reporting attributes are derived by societal values (Mazzi et al., 2018). Recently, the concept of social capital was introduced as a measure of trust and honesty in a business environment. The norms of a society with higher social capital are likely to have higher financial reporting quality and fewer impression management mechanisms (Jha, 2019). As a result, we suggest future research to consider social capital as a determinant of NDT in order to investigate whether companies with higher social responsibilities or that are located in countries/states with high level of social capital, as a measure of honesty in the business environment, affects the tone of narrative reporting.

Sixth, most narrative tone studies focus on the provider of information (companies or managers). Relatively few consider investors' sophistication level, and those that do provide mixed results. Baginski et al. (2018) found that small traders are more likely mislead by using an optimistic tone compared with sophisticated investors, especially when text readability is low (Tan et al., 2014). Henry (2008) found that investors' sophistication level is not associated with abnormal returns in her study of market reactions to the tone of press releases. Notably, both Baginski et al. (2018) and Henry (2008) used US data but found different results, perhaps due to their different channels of communication with investors as unit of analysis (Baginsku et al. (2018) used managerial forecast announcements and Henry (2008) used press releases). Moreover, according to the framework Merkl-Davies and Brennan (2017) introduced, the organizational audience is an important aspect of accounting communication. Therefore, future research might investigate this relationship in different channels of communication to identify when the sophistication level of investors does matter in the market reaction to the tone of narrative reporting. Moreover, this area still requires further evidence from outside the US context about the different reac-

Table 4
Summary of studies on the consequences of narrative disclosure tone.

Author	Data and Approach	Country	Main Findings
Abrahamson & Amir (1996)	-letters to shareholders. -self-constructed index.	US	Negative words are negatively associated with firm performance and earnings.
Smith & Taffler (2000)	- Chairman statements. -self-constructed index.	UK	The information content of chairman statements can predict firm failure.
Clatworthy & Jones (2003)	- Chairman statement. - Content analysis.	UK	Firms with better performance concentrate on positive information than negatives.
Clatworthy & Jones (2006)	-Chairman statements. -Manual content analysis.	UK	Companies are selective in their disclosure to make it associated with the firm performance.
Tetlock (2007)	-Wall Street Journal -Harvard wordlist	US	Positive association between pessimistic tone and stock return and trade volume.
Henry (2008)	-Press releases -Henry (2008) wordlist.	US	Positive association between optimistic tone and abnormal returns.
Tetlock et al. (2008)	- Dow Jones firm specific news -Harvard wordlist.	US	Negative association between pessimistic tone of firm news and subsequent earnings.
Kothari et al. (2009)	−10-Q, 10-K, and analysts' reports -Harvard wordlist.	US	Positive tone leads to lower stock volatility, cost of capital, and forecast dispersion.
Cho et al. (2010)	10-Ks. -Diction wordlist.	US	Negative association between environmental firm performance and the optimistic tone.
Feldman et al. (2010)	- MD&A in 10-Qs and 10-Ks.-Harvard and LM (2011) wordlists.	US	Positive relationship between changes of tone and short-term abnormal returns moderated by earnings surprises.
Loughran & Mcdonald (2011)	−10-Ks.-Harvard and LM (2011) wordlists.	US	Negative tone is associated with lower abnormal return, trade volume, and higher stock volatility.
Merkl-Davies & Brennan (2011)	- Focus on managers' disclosure behavior resulting in reporting bias	N/A	They provide an explanation framework about consistency between assumptions, predictions, and interpretation in impression management
Rogers et al. (2011)	-Earning announcement -Henry (2008), Diction, and LM (2011) wordlists.	US	Optimistic tone is associated with higher litigation risk. The tone of sued firms is more optimistic during damage periods.
Davis et al. (2012)	-Quarter press releases. -Diction wordlists.	US	Optimistic tone in quarter press release is positively associated with the subsequent quarter performance.
Doran et al. (2012)	-Conference calls. -Henry (2008) wordlist.	US	Positive tone is related to higher abnormal returns. Positive tone diminishes the effect of negative news surprises.
Price et al. (2012)	-Quarter conference calls. -Henry (2008) and Harvard wordlists.	US	Optimistic tone is associated with higher abnormal return with higher market activity.
A. H. Huang et al. (2014)	-Analyst's reports.-LM (2011) wordlist.	US	Investors react more to negatives than positives. Analysts can predict earnings growth for the next five years.
X. Huang et al. (2014)	-Press releases.-LM (2011) wordlist.	US	Abnormal optimistic tone is related to lower future earnings and less cash flow for one to three subsequent years
Patelli & Pedrini (2014)	-Letters to shareholders in 10-Ks. -Diction wordlist.	US	Positive tone is related to past and future performance.
Sprenger et al. (2014)	-Firm's Twitter official account. -Harvard wordlist.	US	Stock market reacts much stronger in the negative events compared with positive ones.
Tan et al. (2014)	-N/A.	US	Tone does not affect participants' earnings judgment when the text is easy to read.
Allee & DeAngelis (2015)	-Conference calls.-LM (2011) wordlist.	US	Analysts ask more positive questions and investors react positively when the tone is positive.
DeHaan et al. (2015)	-Earning announcement	US	Managers report negative earnings news in busy trading days and after trading hours.
Mayew et al. (2015)	-MD&A in 10-Ks.-LM (2011) wordlist.	US	Management opinion and MD&A tone can predict firm going concern (bankrupt).
Wisniewski & Yekini (2015)	-Annual reports. -Diction wordlists.	UK	Two variables (Activity and Realism) are significantly positively associated with future performance.
Arslan-Ayaydin et al. (2016)	-Press releases.-LM (2011) , Diction, and Henry (2008) wordlists.	US	Positive relationship between tone and abnormal return in the short term, with less reaction in long-term.
Henry & Leone (2016)	-Press release. - Henry (2008) wordlist.GI Harvard, Diction, and LM (2011) wordlists.	US	Market reaction explanation of domain wordlists such as Henry (2008) and LM (2011) is better than other general dictionaries.
Liebmann et al. (2016)	-Thompson Reuters News. -Self constructed dynamic wordlist.	US	Stock and Credit Default Swap (CDS) traders have different interpretations and focus on different content of the same news.
Segal & Segal (2016)	−8-Ks.-LM (2011)	US	More positive news during trading hours, and more negative news

Table 4 (*continued*)

Author	Data and Approach	Country	Main Findings
	wordlist.		after trading hours.
Yekini et al. (2016)	-Annual reports. -Henry (2008) wordlist.	UK	Positive tone is associated with higher returns in the short-term.
Guillamon-Saorin et al. (2017)	-Earning announcement. -Machine-learning approach.	EU	Positive market reaction to non-GAAP disclosures with low impression management.
Yang & Liu (2017)	Twitter -Manual content analysis	UK	Firms reduce publishing negative earnings news on their account on Twitter and focus more on positives.
Ataullah et al. (2018)	-Chairman statements. -Henry (2008) and LM (2011) wordlists.	UK	Optimistic tone decreases leverage and dividends, also it increases cash holding
Baginski et al. (2018)	-Managerial forecast reports.-LM (2011) wordlist	US	Positive tone leads to more disagreement between investors. However, small investors are more likely to be misled.
Bartov et al. (2018)	-Twitter.-Harvard and LM (2011) wordlists.	US	Aggregate opinion tone from individuals on Twitter can predict the subsequent earnings
Borochin et al. (2018)	-Conference calls.-LM (2011) wordlist.	US	There is a negative relationship between conference calls' tone and market uncertainty.
Boudt et al. (2018)	-Press release. -Henry (2008) and LM (2011) wordlists.	US	Tone is more informative to predict future returns when firms are smaller, younger, and have a high growth ratio.
Barakat et al. (2019)	-Risk announcements at Media news.-LM (2011) wordlist.	INT	Net negative tone and uncertainty tone have a strong reputational effect on market reaction.
Bhardwaj & Imam (2019)	-News articles. -Manual analysis.	US	Tone is more optimistic in non-crisis time and more pessimistic during the global crisis.
Brochet et al. (2019)	-Conference calls.-LM (2011) wordlist.	US	Managers with individualistic culture use more optimistic tone and self-referencing.
Campbell et al. (2019)	−10-Ks, 8-Ks, and conference calls.-LM (2011) wordlist.	US	Both firms' operation risk and managers' transparency drive tone volatility.
Fisher et al. (2019)	-Different documents. -Diction wordlist.	New Zealand and Australia	Chairman's statements and CSR reports are the most positive narrative reporting documents.
Rahman (2019)	-Interim Management Statements. -Manual content analysis.	UK	Third-quarter's tone, but not first quarter's tone, is positively associated with annual earnings and market reactions.
Shan (2019)	-Newspaper -Diction wordlist.	China	Positive association between the tone of firms' news in social media and the extent of voluntary disclosure.
Choi (2020)	−10-Ks.-LM (2011) wordlist.	US	More abnormal optimistic tone is associated with lower insider trading.
D'Augusta & DeAngelis (2020)	−10-Ks.-LM (2011) wordlist.	US	The relationship between tone and earning performance depends on whether the company meets or beats investors' expectations.
Del Gaudio et al. (2020)	-Annual reports.-LM (2011) wordlist.	US	Higher negative tone helps explain bankruptcy risks.
Druz et al. (2020)	-Conference calls-LM (2011) wordlist.	US	Negativity is associated with future performance.
Liu & Han (2020)	-Media-LM (2011) wordlist.	US	Low negative media tone is associated with higher returns.
Du & Yu (2021)	-CSR reports.-LM (2011) wordlist.	US	Optimistic tone is associated with future CSR performance.
Fu et al. (2021)	-Conference calls-LM (2011) wordlist.	US	Tone can predict company's stock price crash risks.

tions of small traders and sophisticated investors, especially from countries that follow a principle-based approach with more flexibility in financial reporting style and more opportunity for tone management.

Seventh, most narrative tone studies investigate managers' word choice and its effects on stock markets. Thus, it seems an interesting and perhaps rewarding idea to conduct a case study with one company to compare managers' 'wording choices' with their real 'actions' and thereby investigate whether tone is an impression management strategy or real informative tone. In other words, future research can examine the tone of directors' narrative reporting in annual report and its association with accounting strategies in the company, such as tax avoidance and earnings management. Therefore, it will be possible to investigate if managers use positive tone as impression management tool or to provide a really positive picture about the company. Moreover, to investigate tone consistency, future research might compare the tone of CEOs letters to shareholders with the tone of answering the questions in the general annual meeting.

Finally, previous research provided evidence for tone differing among different channels of disclosures in companies' communications with stakeholders. For example, Davis and Tama-Sweet (2012) found that managers had more optimistic language in press releases compared with MD&A section in the 10-K filings, while LM (2011) found different market reaction to the tone of the entire 10-K filings and that of just the MD&A sections. In addition, Beattie (2014) called for research into narrative dynamics and how narrative choices can be different among different communications channels. Therefore, future research might extend this work and investigate NDT in different channels of disclosures related to CSR, strategic reports, and environmental performance reports. Consequently, future research might be able to report on company's tone consistency across different sections of annual reports and examine the informativeness of each section. Moreover, it might compare the tone of CEOs' textual communications in their letters to shareholders with that in the annual general meeting to report on tone consistency and how investors react to each.

4. Conclusion

We review 64 articles to critically discuss tone measurement and the areas of debate in NDT literature, from which we emphasize the following conclusions. First, we discuss previous studies that compared tone measures based on alternative wordlists and showed that tone measures using domain-specific dictionaries, such as Henry (2008) and LM (2011), are more powerful than those based on general dictionaries. However, future research should benefit from the advanced methods considering NLP mechanisms and the meanings rather than word frequency for more accuracy. Second, researchers such as Davis et al. (2015) have linked psychological theories such as upper echelons theory to the tone context. However, we call for more research in this area considering the interdependencies between executives and the moderation effect of Top-Management personal and psychological characteristics. Third, we critically review the different directions of NDT studies, considering determinants and consequences. Consequently, we highlight areas for future research according to the gaps in the literature that could enhance our understanding of NDT in financial reporting.

Data availability

No data was used for the research described in the article.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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