Sentiment Management:
AI-based Evidence from Earnings Guidance

Abstract

We investigate whether firms manage sentiment within their disclosures, and whether such management plays a role in shaping investor reactions to information. Using FinBERT, we measure sentiment separately in the title, portions of the text, and the full text of earnings guidance. We use earnings guidance because firms have considerable discretion over the sentiment included in these disclosures. Our findings indicate firms amplify (suppress) the tone of positive (negative) information in the title and enhance the positive sentiment in the first portions of earnings guidance text. We do not find similar patterns in *WSJ* articles or titles generated by ChatGPT-4o for the same earnings guidance. We document that sentiment in the title, as well as in the first portions of the text, helps explain investor reactions to information in earnings guidance. Our findings suggest that firms strategically embed sentiment within corporate disclosures, and investors incorporate this sentiment into stock prices.

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1. Introduction

Firms disclose information to investors through various channels and in different formats. An important aspect of any corporate communication is the sentiment embedded in the title and the text of the disclosure. Prior research suggests that sentiment in the text of corporate disclosures helps explain investor perceptions of the information (Loughran and McDonald, 2011; Cao, Jiang, Yang, and Zhang, 2023). However, little is known about firms' strategic use of sentiment within corporate disclosures and whether such potential sentiment management plays a role in shaping investor reactions to information. We fill this gap by investigating whether firms strategically incorporate sentiment within corporate disclosures, and by examining whether sentiment in the title helps explain investor reactions to the information.

We address whether firms manage sentiment within corporate disclosures by investigating how sentiment varies across different sections of earnings guidance (e.g., sentiment in the title vs. the text; sentiment in the beginning vs. the end of the text).[1] We use earnings guidance because this form of voluntary disclosure provides firms with considerable discretion over the type, level, and structure of the sentiment they can embed in it. This feature of earnings guidance enables us to test whether firms manage sentiment, e.g., by using different sentiments in the title and the text or across various portions of the text. We examine the role potential sentiment management plays in shaping investor reactions to information by assessing the

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[1] Throughout we use the terms "firms" and "managers" interchangeably when referring to actions by firms' managers.

incremental relation between the sentiment in the title and abnormal stock returns and trading volume at earnings guidance releases.

We define sentiment as the difference between the positive and negative tones of a text and, for each earnings guidance, compute sentiment scores for (i) the title, (ii) each of the first ten portions of the text, and (iii) the full text. Our approach enables us to draw inferences regarding firm strategic disclosure behavior and the informativeness of the sentiment in the title by employing a within-firm-disclosure research design. Such a design offers more robust inferences, by holding fixed both the firm and the disclosure, relative to designs that rely on the analysis of a set of disclosures from various firms or from the same firm over time (e.g., Campbell, Lee, Lu, and Steele, 2020; Li, Nekrasov, and Teoh, 2020; Rawson, Twedt, and Watkins, 2023).

We assess the levels of positive and negative tones, and thus the sentiment scores, using FinBERT, a pre-trained Natural Language Processing (NLP) model that is designed for financial sentiment analysis. The FinBERT model is built on the Bidirectional Encoder Representations from Transformers (BERT) architecture and is pre-trained on a large corpus of financial documents and fine-tuned for tasks specific to the financial industry, such as financial sentiment analysis, risk assessment, and financial document classification (e.g., Devlin, Chang, Lee, and Toutanova, 2018; Liu, Huang, Huang, Li, and Zhou, 2021). The FinBERT model enables us to separately measure the levels of positive and negative tones in the title, portions of the text, and full text based on the context and narrative of the disclosure. This feature is pivotal, especially when analyzing short texts, such as those that appear in the title of earnings guidance. FinBERT also enables us to assess the sentiment scores without the need to develop or rely on any pre-existing "bag of words."

In efficient markets, investors presumably can extract all relevant information from the text of a firm's disclosure, rendering the differing sentiment in various portions of the text, or the sentiment in the title, not incrementally informative. However, prior research suggests capital market frictions play a role in how investors perceive information in corporate disclosures and react to it. First, investors may attach different valuation weights to information depending on its placement within the disclosure (Israeli, 2015; Luo, Shao, and Zhang, 2018). Second, since attention is a scarce cognitive resource (Kahneman, 1973), investors might react more strongly to disclosures that contain easily accessible information due to its salience and ease of processing (Hirshleifer and Teoh, 2003; Huang, Nekrasov, and Teoh, 2018). Third, many studies provide evidence consistent with managers disclosing financial information strategically (see, e.g., Blankespoor, deHaan, and Marinovic, 2020). These observations, combined with the lack of regulations governing the use of sentiment in corporate disclosures or providing guidelines for the structure and content of titles and texts, suggest that firms may exploit these frictions to manage investors' expectations.

We hypothesize that firms strategically embed sentiment within their disclosures by using different tones in the title relative to the text as well as in various portions of the text. We also predict that the sentiment in the title plays an incremental role in shaping investor reactions to information. The title of any disclosure is inherently shorter and easier to process than the text. Moreover, it is placed prominently within the disclosure and is likely to grab investor attention and anchor their perceptions of the information before they get to read and analyze the text. These features of the title have implications for both firms and investors. First, they make the title a potentially attractive tool for firms to manage investors' expectations. Accordingly, we predict that firms manage investors' perceptions by amplifying (suppressing) the positive

(negative) tone in the title. Using the same logic, we predict that firms use more positive sentiment in the first portions of the text as most investors are likely to form their perceptions of the disclosure based on its beginning. Second, these features of the title make it an important source of information for investors. Hence, we predict that the sentiment in the title is incrementally informative to investors.

We test our hypotheses using a sample of 18,046 press releases containing earnings guidance from 3,619 firms between 2001 and 2022. Using FinBERT, for each earnings guidance, we measure the levels of the positive, negative, and neutral tones in the title and in each of the first ten portions of the text, and compute sentiment scores for the title, each portion of text, and the full text. The FinBERT model can handle a maximum of 512 tokens per sequence. To analyze longer texts, it is necessary to split them into portions of no more than 512 tokens and process each portion separately. Because the number of words that correspond to 512 tokens varies depending on the language, context, and complexity of the text, and to ensure efficient coverage of the text in earnings guidance, we split the text of each earnings guidance into portions of 250 words.[2] Importantly, splitting the text of earnings guidance into portions provides us with the levels of tones for various portions of the text and allows us to examine whether and how the sentiment varies within the disclosure.

For each portion of text that it analyzes, FinBERT generates separate values, each ranging from 0.00 to 1.00, for the levels of "positive", "negative" and "neutral" tones, and the three values sum up to 1.00. Therefore, the sentiment scores, which are defined as the difference

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[2] We use portions of 250 words because this number of words fits the 512 tokens limit for all earnings guidance in our sample. We consider the first ten portions of the text, i.e., 250*10 = 2,500 words, because 75% of earnings guidance in our sample contain no more than 2,500 words. Moreover, the text in earnings guidance beyond 2,500 words appears less informative. For disclosures that contain fewer than 2,500 words, averages are based only on portions for which tone scores are computed (e.g., for an earnings guidance with 2,100 words, the averages are based on the first eight portions). Our inferences remain the same if we instead consider five portions of text or just the first portion. We discuss these sensitivity analyses in section 6.2.

between the levels of positive and negative tones, can range from −1.00 to 1.00. For each earnings guidance, we calculate the sentiment score for the title and the first ten portions of the text. We compute the level of positive tone, the level of negative tone, and the sentiment score for the full text of earnings guidance by averaging the levels of positive tones, the levels of negative tones, and the sentiment scores of the first ten portions of text.[3] We classify earnings guidance as containing positive (negative) information if the sentiment score of the full text is positive (negative). This classification assumes the text contains the complete set of information provided by the firm.[4]

We begin by investigating how the positive and negative tones in the earnings guidance title vary with respect to the corresponding tones in the text, and by analyzing the distribution of sentiment scores across the different portions of the text. Consistent with our hypothesis that firms manage sentiment within earnings guidance, we find that when firms issue earnings guidance containing negative information, i.e., when the level of positive tone of the text is lower than that of the negative tone, the positive tone in the title is still higher than the negative tone. This finding suggests that, on average, when firms issue earnings guidance with negative sentiment scores, they use titles with positive sentiment scores.

When analyzing the sentiment scores of the first ten portions of the text separately, we observe a significant and steady reduction in the magnitudes of the sentiment scores as the text progresses. In particular, the average sentiment score of the first portion of text is the highest; for example, the difference in the sentiment scores between the 1st and 2nd portions of the text is

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[3] Throughout we use the terms "full text" and "text" interchangeable when referring to the sentiment score (or tone) for the full text of the earnings guidance.
[4] We further validate our FinBERT-based classification of earnings guidance containing positive and negative information by comparing it to the Capital IQ classification of earnings guidance (i.e., "Guidance Raised" or "Guidance Lowered"). We document that when the Capital IQ classification is "Raised" ("Lowered"), the level of positive tone of earnings guidance text is significantly higher (lower) than the level of negative tone.

0.08, and the difference between the 1st and other portions of text increases to as high as 0.40. This gradual reduction in the sentiment score of the text cannot be attributed to some unrelated linguistic features and/or the structure of typical firm-related financial disclosures. We do not find similar evidence when we analyze articles related to earnings guidance that are published by media outlets such as the *Wall Street Journal*. The evolution in sentiment scores across portions of the text supports the hypothesis that firms manage sentiment within corporate disclosures by frontloading positive information.

To further support our inference that firms manage sentiment within their disclosures, we estimate several equations in which the tone in the title (text) serves as the dependent (explanatory) variable. We find no evidence that the tone of the title is less positive, or more negative, when the disclosure contains negative information. On the contrary, we document that the tone in the title is significantly more positive, not more negative, when the disclosure contains negative information. This finding exists only in a sample of titles and texts from firm-issued earnings guidance, but not in a sample of *Wall Street Journal* (WSJ) articles or a sample of titles generated by ChatGPT-4o for actual earnings guidance texts. In the WSJ and the ChatGPT-4o samples, the tone of the title is significantly less positive, or more negative, when the disclosure contains negative information. Together, these findings support our hypothesis that firms manage sentiment within disclosures by amplifying (suppressing) the positive (negative) tone in the title.

To investigate whether sentiment management plays a role in shaping investor perceptions of the information in earnings guidance, we examine the relations between the sentiment in the title and abnormal stock returns and trading volume. We also examine how the sentiment scores in various portions of text relate to measures of investor reaction to information.

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Consistent with our prediction, we find that, incrementally to the sentiment in text itself, the sentiment in the title is positively related to abnormal stock returns during the three-day window around the issuance of earnings guidance. We further document that the sentiment in the title is negatively related to abnormal trading volume during the three-day window, suggesting the sentiment in the title is incrementally informative in that it helps reduce investor disagreement (Loughran and McDonald, 2011; Azimi and Agrawal, 2021). Consistent with the notion that investors form their perceptions of the disclosure using only the initial part of the text, we find that when considering sentiment scores of all portions of text, only the scores of the first four portions are significantly positively associated with abnormal stock returns. Moreover, in support of the view that the sentiment in the title is incrementally more informative when the firm's information environment is weak or in periods of bad firm performance, we document that the relation between sentiment in the title and abnormal stock returns is weaker when the firm is followed by more analysts or when it reports profits.

Our study contributes to the understanding of the interplay between the sentiment embedded in corporate disclosures and its capital market consequences across two key dimensions: firm strategic behavior and investor processing costs (e.g., Blankespoor et al., 2020). Firms exercise discretion over aspects of their disclosures, e.g., the type, level, and structure of sentiment the disclosures reflect, often acting strategically, in terms of placement and tone of disclosure components, to achieve economic benefits. For information in disclosures to be reflected in stock prices, investors must obtain, process, and act on it. This process is costly, demands substantial effort and cognitive resources, and is susceptible to opportunistic actions by firms.

By addressing whether firms employ different sentiments in the title, the text, and various portions of the text, we provide novel evidence of sentiment management within corporate disclosures, highlighting an additional channel firms use to manage investors' expectations. Examining the role sentiment in the title plays in shaping investor reactions to information helps clarify how different sections of corporate disclosures contribute to investors' interpretation of information. Our findings on sentiment management in earnings guidance and the incremental informativeness of the sentiment in the title are of interest to researchers, market participants, and regulators seeking to understand how firms structure their disclosures, embed sentiment, and the extent to which these disclosures reflect opportunistic behavior.

The remainder of the paper proceeds as follows. Section 2 reviews related research. Section 3 outlines our research design, and section 4 describes the sample and provides descriptive evidence of sentiment management. Section 5 reports the primary results from our analyses and section 6 reports robustness tests. Section 7 concludes the study.

2. Related research

Our study contributes to the literature examining firm disclosure strategies, including the opportunistic placement, representation, and tone of information in corporate disclosures. Prior research demonstrates that firms strategically release information to achieve economic benefits. Strategic behavior includes the preemptive release of positive or negative news (Skinner, 1994; Kasznik and Lev, 1995; Kothari, Shu, and Wysocki, 2009), and the emphasis on positive information (Bowen, Davis, and Matsumoto, 2005; Campbell et al., 2020; Chen, Gee, and Neilson, 2021). Firms may redact proprietary details (Verrecchia and Weber, 2006), withhold negative information (Boone, Floros, and Johnson, 2016; Li et al., 2020; Caskey, Huang, and Saavedra, 2023), or obscure negative disclosures by bundling them with unrelated press releases

(Rawson, Twedt, and Watkins, 2023). Other tactics include delaying unfavorable news until conditions improve (Sletten, 2012), selecting benchmarks to report favorable changes (Schrand and Walther, 2000), and timing negative news to periods of low investor attention, such as after market closures or on Fridays (DellaVigna and Pollet, 2009; deHaan, Shevlin, and Thornock, 2015; Segal and Segal, 2016; Michaely, Rubin, and Vedrashko, 2016). Managers may also adjust disclosure timing to maximize stock option compensation (Aboody and Kasznik, 2000) or influence share issuance outcomes (Barth, Gee, Israeli, and Kasznik, 2021).

Our study contributes to this literature by investigating firms' strategic use of sentiment in the title and different portions of text of corporate disclosures. We extend this literature by shedding light on another form of firm strategic behavior, i.e., sentiment management within corporate disclosures. We investigate whether firms use their discretion to structure the title and text of earnings guidance to amplify (supress) the positive (negative) tone of the disclosure, and emphasize the positive information by including it earlier in the text. Given limited investor attention, which potentially renders the sentiment in the title incrementally informative, and the earlier portions of the text more relevant for shaping investor perceptions, this strategic behavior potentially serves as an important tool for firms to manage investors' expectations.

We also contribute to the literature by conducting AI-based textual analysis of corporate disclosures, to draw insights about sentiment management within these disclosures and about the informativeness of the sentiment in the title incremental to that in the text. Previous studies that use textual analysis typically employ word-count approaches using pre-structured dictionaries (Loughran and McDonald, 2011). However, recent advancements in the analysis of financial text involve the use of more sophisticated AI tools (e.g., Bochkay, Brown, Leono, and Tucker, 2023; Ranta, Yelinen, and Järvenpää, 2023). These studies use NLP models, pre-trained on financial

data, to discover the overall type of information (Siano and Wysocki, 2021) or to analyze the content of corporate disclosures given the context in which they are written (Kim and Nikolaev, 2024). For example, Huang, Wang, and Yang (2023) shows that the FinBERT model outperforms existing textual analysis methods in sentiment classification of financial related texts. Kim, Kim, and Choi (2023) use FinBERT on summaries from the *New York Times* and find that it can predict stock returns in the S&P 500 index.[5] This newly developed tool, fueled by the advancement in machine learning methods, increases the range of possible analyses and potential inferences researchers can derive using textual analysis.

We use FinBERT on a large sample of press releases containing earnings guidance to measure the levels of positive and negative tone in the title, the first ten portions of the text, and the full body of the earnings guidance. For each earnings guidance, FinBERT enables us to calculate separate sentiment scores—defined as the difference between positive and negative tones—for (i) the title, (ii) each of the first ten portions of the text, and (iii) the full text. The separate sentiment scores allow us to test whether firms manage sentiment within disclosures, as well as whether the sentiment in the title helps explain investor reactions to information incremental to the sentiment in the text.

To the best of our knowledge, the only other study that analyses the capital markets consequence of titles of corporate disclosures is Huang et al. (2018) who examine the informativeness of earnings announcements' headline salience, defined as the frequency of numbers listed in the headline. They find that headline salience is positively associated with

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[5] Azimi and Agrawal (2021) use deep learning to measure sentiment in 10-K filings and show that they contain value-relevant information. Brown, Hinson, and Tucker (2023) focus on the MD&A section of the 10-K and using deep learning find that firms use more forward-looking statements when their financial statements are inadequate. In addition, several studies focus on GPT models and find they are effective in summarizing disclosures, identifying topics, and deciphering technical language (Hansen and Kazinnik, 2023; Kim et al., 2023).

short-term market reactions and long-term reversals and conclude that investors are misled by managers' strategic disclosure practices. We extend this research in two key aspects. First, we analyze the tone and sentiment in both the title (i.e., the headline) and the text of earnings guidance. These analyses allow us to shed light not only on the informativeness of the sentiment in the title, but also on firm strategic use of sentiment in different sections within the same disclosure. Second, we employ AI-based tools to separately measure the sentiment in the title, different portions of the text, and the full text, taking into consideration the context in which it was written. This is in contrast to using a simple "bag-of-words" approach that only counts the appearance of positive or negative words or the appearance of numbers (Frankel, Jennings, and Lee, 2022; Cao et al., 2023). Importantly, we find that after controlling for the sentiment in the title, headline salience is not significantly related to stock returns at earnings guidance. In other words, our FinBERT-based measure of title sentiment dominates the salience measure in a sample of earnings guidance.[6]

Cao et al. (2023) find that after the introduction of the BERT model by Google in 2018, more AI-savvy firms show a decrease in BERT-measured sentiment in their 10-K filings. However, Cao et al. (2023) do not analyse corporate press releases or corporate disclosures that contain both title and text or that provide firms with substantial discretion of the type, level, and structure of the sentiment they embed in them. Furthermore, our sample spans the period from 2001 to 2022, having the majority of sample before 2018.[7]

3. Research design

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[6] Huang et al. (2018) focus on a sample of earnings announcements, whereas we focus on a sample of earnings guidance. Thus, results in the two studies are not directly comparable.

[7] In untabulated analyses we find that our inferences remain unchanged before and after the introduction of the BERT model by Google in 2018. We attribute this finding to the fact that not all investors use AI-based tools to analyze firm disclosures.

3.1. Measuring sentiment in the title, portions of the text, and the full text

To measure the sentiment in the title and the text of a large sample of corporate disclosures we use the FinBERT model developed by Araci (2019).[8] Because the model can handle a maximum of 512 tokens per sequence, when analyzing longer texts it is necessary to split them into portions of no more than 512 tokens and process each portion separately. Because the number of words that correspond to 512 tokens varies depending on the language, context, and the complexity of the text, and to ensure efficient coverage of the text in earnings guidance, we split the text of each press release into portions of 250 words and base our inferences on the first ten portions. Texts of 250 words fit the 512 tokens limit for all press releases that contain earnings guidance in our sample. The first ten portions of the text, i.e., 2,500 words, provide full coverage for 75% of earnings guidance, and the text in press releases beyond 2,500 words appears less informative in conveying the sentiment of the disclosure.[9]

Compared to conventional "bag-of-words" approaches, the FinBERT model introduces a more faceted method to measure tone. The model is trained on financial texts and it generates context-related levels of positive, negative, and neutral tones of each text it analyzes.[10] For each text FinBERT analyzes, it generates separate values, each ranging 0.00 to 1.00, for the levels of "positive", "negative," and "neutral" tones, and the three values sum up to 1.00. Equipped with levels of positive, negative, and neutral tones of the title and the first ten portions of the text, we

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[8] The model is available at https://huggingface.co/ProsusAI/finbert. Due to computing restrictions, our sample of 18,046 earnings guidance requires the downloaded version of the FinBERT model. Among several online applications of the model, we choose the Araci (2019) model over options like the Huang et al. (2023) model, as we find that the downloaded version of the latter might produce inconsistent levels of positive, negative, and neutral tones for the same text.

[9] Our inferences remain the same if we consider portions of 350 words instead.

[10] To train FinBERT, Huang et al. (2023) utilize every financial-related text available online, amassing roughly 60 GB of text data. There is a chance the texts in our sample were part of the FinBERT training data. However, this overlap is minimal at best, as our sample size represents a very negligible portion of the corpus used to train FinBERT.

calculate twelve sentiment scores, one for the title, one for each of the first ten portions of text, and one for the full text. We measure the sentiment score as:

$$TI\_SENT = TI\_POS - TI\_NEG$$

$$TXT\_SENT_{Pi} = POS_{Pi} - NEG_{Pi}, i \in [1, 10]$$

$$TXT\_SENT = \frac{\sum_{i=1}^{10}(POS_{Pi} - NEG_{Pi})}{10}$$

where TI_POS and TI_NEG denote the levels of positive and negative tones of the title; POS_{Pi} and NEG_{Pi} denote the levels of positive and negative tones for portion i of the text (i ranges from 1 to 10 to indicate the first ten portions of the text of earnings guidance).[11] Because the levels of positive and negative tones range from 0.00 to 1.00, the sentiment scores for the title, the portions of 250 words, and the full text (i.e., TI_SENT, TXT_SENT_{Pi}, and TXT_SENT) range from –1.00 to 1.00. We use the levels of the positive and negative tones as well as the twelve sentiment scores to test our predictions.

3.2. Do firms manage sentiment within their disclosures?

To test whether firms manage sentiment within their disclosures we examine how the levels of positive and negative tones of the title vary relative to the corresponding levels of tone in the text, and how the sentiment scores vary across the different portions of the text. We do so by estimating several versions of the following equations:

$$TI\_POS_{i,t} = \beta_1 TXT\_POS_{i,t} + \beta_2 TXT\_NEG_{i,t} + \beta_3 I(TXT\_SENT_{NEG})_{i,t}$$

$$+ \beta_4 TXT\_NEG_{i,t} \times I(TXT\_SENT_{NEG})_{i,t} + \beta_5 NumWords_{i,t} + \gamma_i + \delta_t$$

$$+ U_{i,t} \tag{1a}$$

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[11] For earnings guidance that contain fewer than 2,500 words, the TXT_SENT considers only those portions for which the tone for portions of 250 words can be computed (e.g., for an earnings guidance with 2,100 words, the averages consider the levels of positive and negative tones in the first eight portions of 250 words each). Our inferences remain the same if we instead consider five portions of text or just the first portion. We discuss these sensitivity analyses in section 6.2.

$$TI\_NEG_{i,t} = \beta_1 TXT\_POS_{i,t} + \beta_2 TXT\_NEG_{i,t} + \beta_3 I(TXT\_SENT_{NEG})_{i,t}$$

$$+ \beta_4 TXT\_NEG_{i,t} \times I(TXT\_SENT_{NEG})_{i,t} + \beta_5 NumWords_{i,t} + \gamma_i + \delta_t$$

$$+ U_{i,t} \hspace{6cm} (1b)$$

TI_POS (TI_NEG) indicates the level of the positive (negative) tone in the title, and TXT_POS (TXT_NEG) denotes the level of positive (negative) tone in the text. $I(TXT\_SENT_{NEG})$ is an indicator variable taking the value 1 when the sentiment in the text, i.e., the difference between levels of positive and negative tones in the text, is negative, and 0 otherwise. $NumWords$ is the natural logarithm of the number of words in the earnings guidance. γ_i and δ_t denote Fama and French (1997) 48 industry and year-quarter fixed effects, respectively. We include these fixed effects as controls for time-invariant industry characteristics and time-varying economic conditions that could be associated with the tone of the title and the text of earnings guidance.

If firms manage sentiment within corporate disclosures, we expect β_4 in equation (1a) to be greater than or equal to 0; a non-negative coefficient on the interactive term in (1a) indicates that, all else being equal, when the sentiment in the text is negative, the more negative tone in the text does not result in less positive tone in the title. Moreover, a positive coefficient implies that when the sentiment in the text is negative, the tone of the title is more positive, suggesting firms attempt to obfuscate the negative tone of the text by using more positive tone in the title. Similarly, we expect β_4 in equation (1b) to be less than or equal to 0; a non-positive coefficient on the interactive term in (1b) indicates that, all else being equal, when a sentiment in the text is negative, the more negative tone in the text does not result in more negative tone in the title. Moreover, a negative coefficient suggests that when the sentiment in the text is negative, the tone of the title is less negative, consistent with firms managing sentiment within the disclosure by using less negative tone in the title.

3.3 Does sentiment management play a role in shaping investor reactions to information?

To examine whether sentiment management in earnings guidance play a role in shaping investor reactions to information, we examine the relation between sentiment scores of the title, portions of the text, and full text and measures of abnormal stock returns and trading volume around the issuance of earnings guidance. We start by estimating several versions of the following equation:

$$CAR[-1,\ 1]_{i,t} = \beta_1 TXT\_SENT_{i,t} + \beta_2 TI\_SENT_{i,t} + \sum_k \beta_k\ Controls_{i,t} + \gamma_i + \delta_t + U_{i,t} \quad (2)$$

$CAR[-1,\ 1]$ denotes the firm's cumulative abnormal equity return during days $[-1,\ 1]$ relative to the earnings guidance release date.[12] We calculate $CAR[-1,\ 1]$ as the firm's raw return minus the value-weighted return for a portfolio of firms matched on 5×5 sorts of equity market value and market-to-book ratio (Daniel, Grinblatt, Titman, and Wermers, 1997). The $Controls$ vector includes several variables that prior research suggests are associated with the market reaction to firm disclosures. These are return on equity, ROE; log of equity market value, $Size$; log of equity book-to-market ratio, BTM; an indicator variable for whether a firm reports a loss, $Loss$; the natural logarithm of the number of analysts following the firm, $Analyst$; return momentum, Mom. We also include the natural logarithm of the number of words in the earnings guidance document, $NumWords$. As before, γ_i and δ_t denote industry and year-quarter fixed effects, respectively. All variable definitions appear in Appendix A.

If the sentiment in the title is informative to investors, incremental to the sentiment in the text itself, we expect β_2 to be positive. A positive coefficient on TI_SENT in equation (2)

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[12] In untabulated analyses we consider an alternative measure of abnormal return: $CAR[0,1]$ starting on the day of the earnings guidance release and ending one trading day after. Our inferences remain the same.

suggests that a more positive sentiment in the title is associated with higher abnormal stock returns when the earnings guidance is issued.

Next, we estimate several versions of the following equation, to examine the relation between the sentiment in the text and the title of earnings guidance and trading volume:

$$ATVol_{i,t} = \beta_1 TXT\_SENT_{i,t} + \beta_2 TI\_SENT_{i,t} + \sum_k \beta_k\, Controls_{i,t} + \gamma_i + \delta_t + U_{i,t} \quad (3)$$

$ATVol_{i,t}$ denotes the firm's abnormal trading volume on days $[-1,\ 1]$ around earnings guidance release date, and $Controls$ denotes a vector of control variables as before. Prior studies document that positive (negative) sentiment of corporate disclosures is negatively (positively) related to abnormal trading volume, as positive sentiments convey less uncertainty to the market and engenders less disagreement (Loughran and McDonald, 2011; Azimi and Agrawal, 2021). Accordingly, if the sentiment in the title is informative to investors and thus helps alleviate uncertainty about prospects of the firm and reduce disagreement, we expect β_1 in equation (3) to be negative. A negative coefficient on TI_SENT indicates that a more positive sentiment in the title is associated with lower abnormal trading volume at earnings guidance and thus less investor disagreement.

4. Sample selection and descriptive evidence of sentiment management

We start with an initial sample of 42,148 earnings guidance events issued by firms, as recorded by Capital IQ, from December 2001 to December 2022. To access the original firm-issued press releases containing earnings guidance, rather than the edited versions available on Capital IQ, we limit our sample to earnings guidance events that can be directly linked back to the firms' original press releases.[13] Specifically, for inclusion in our sample, a press release must

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[13] The two main sources of firm press releases that contain earnings guidance are Business Wire and PR Newswire. We therefore limit our sample to earnings giudances from these two sources. We retrieve the actual press releases

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be matched to an earnings guidance event and include the firm's name, along with keywords related to "earnings" and "guidance."[14] For matching firm names, we begin with the name as listed on Compustat and employ a fuzzy matching process using names manually extracted from the titles in Capital IQ. This method allows us to accurately capture instances where the company name has changed over time. Additionally, each observation in our sample must have corresponding fundamental data in Compustat and stock returns and trading volume data in CRSP. These criteria result in a final sample of 18,046 earnings guidance events from 3,619 unique firms for the period from December 2001 to December 2022.[15] This approach ensures that we analyze the text of earnings guidance issued directly by the firm. A potential limitation of this approach is that investors may receive these disclosures through third-party data providers, and these intermediaries might change, or even undo, the sentiment that the firm embeds into the original press release. Such a scenario would work against us finding a result in any of our capital market tests as investors would disregard the sentiment in firm-issued disclosures and focus on the sentiment in these other sources.

Table 1 panel A presents summary statistics for the FinBERT measures of tone and sentiment for the title, i.e., *TI_POS*, *TI_NEG*, and *TI_SENT* and the text, i.e., *TXT_POS*, *TXT_NEG*, and *TXT_SENT* of earnings guidance in our sample. Panel A reveals that the mean positive tone of the title is higher than the mean negative tone (mean *TI_POS* = 0.304, mean *TI_NEG* = 0.124) rendering the mean sentiment of the title significantly positive (mean *TI_SENT* = mean *TI_POS* – mean *TI_NEG* = 0.180, untabulated *t-stat.* = 52.37). Importantly for our

hypothesis, panel A indicates that while the mean positive tone in the text (mean *TXT_POS* = 0.286) also exceeds the mean negative tone in the text (mean *TXT_NEG* = 0.221) and thus renders the mean sentiment in the text significantly positive (mean *TXT_SENT* = mean *TXT_POS* – mean *TXT_NEG* = 0.065, untabulated *t-stat.* = 32.15), the mean sentiment in the title is significantly more positive than in the text (mean *TI_SENT* – mean *TXT_SENT* = 0.116, untabulated *t-stat.* = 28.93). This evidence suggests firms include more positive sentiment in the title than in the text.

Panel B of table 1 presents comparisons of the tones and sentiments in the title and the text in subsamples of earnings guidance, depending on whether the sentiment of the text is positive or negative. Assuming the sentiment of the text of earnings guidance reflects the type of news the firm releases (i.e., positive or negative news), panel B shows how the tones and sentiments in the title vary with the tones and sentiment in the text, depending on whether earnings guidance contains positive or negative information. Specifically for our hypothesis, panel B reveals that when earnings guidance contains positive news (mean *TXT_SENT* = 0.233), the mean sentiment score of the title is significantly higher than that of the text (mean *TI_SENT* = 0.270, *t-stat.* for the difference = 7.87). Moreover, panel B shows that even when earnings guidance contains negative news (mean *TXT_SENT* = −0.216), the mean sentiment in the title is positive (mean *TI_SENT* = 0.031). The difference between the sentiments is significantly positive (*t-stat.* for the difference = 45.73). This evidence suggests firms embed more positive sentiment in the title both when the overall news of the disclosure is positive and when it is

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negative. Appendix B presents three examples of earnings guidance along with the levels of positive and negative tones in the title and in the text that represent such cases.[16]

A potential concern regarding our analyses and inferences in panel B of table 1 is that our classification of the disclosure as containing positive or negative information is in based on the sentiment of the text as computed by FinBERT, and might not fully reflect the actual positive (negative) information in the disclosure. To mitigate this concern, we also split the sample using the Capital IQ classification of "Raised" and "Lowered." We assume that the sample for which the Capital IQ indicates "Raised" ("Lowered") contains positive (negative) information. As panel C of table 1 presents, consistent with our assumption that positive (negative) sentiment of the text indicates positive (negative) information, we observe that for the "Raised" ("Lowered") sample the mean text sentiment is positive (negative) (mean *TXT_SENT* = 0.148 for "Raised" and −0.113 for "Lowered"). Importantly for our hypothesis, we continue to observe that in the sample with positive information the mean sentiment of the title is significantly more positive than mean sentiment of the text (mean *TI_SENT* = 0.295, *t-stat* for the difference = 18.23). In addition, consistent with panel B, the mean sentiment in the title is significantly higher than the mean sentiment in the text when the latter is negative (mean *TI_SENT* −0.011, *t-stat* for the difference = 9.76).

To further investigate whether firms manage sentiment within corporate disclosures, we analyze how the sentiment scores vary across the first ten portions of text. Figure 1 graphs the mean levels of positive, negative, and neutral tones for the first ten portions of 250 words of our sample of earnings guidance. As figure 1 shows, while the levels of positive tones decrease as we

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[16] Panel B of table 1 also indicates that texts with positive information tend to have significantly more words than texts with negative information, i.e., mean *NumWords* = 2,319 vs. 2,169. Hence, in all our analyses we include *NumWords* as an additional control variable

proceed further into the text, the levels of negative tones remain relatively flat, resulting in reduction in sentiment scores across the portions of earnings guidance text. This pattern is consistent with our hypothesis that firms advance positive sentiments in the earnings guidance to the front of the text. Table 2 panel A outlines the differences between the sentiment scores of the various portions of text and indicates the significance of the differences between the sentiment scores of the various portions. As column 1 of panel A indicates, the sentiment score of the first portion is significantly higher than those in every other portion of text that follows. For example, the difference between the sentiment scores of portions 1 and 2 is 0.079 (*p-val.* < 1%) and between the sentiment scores of portions 1 and 3 is 0.226 (*p-val.* < 1%). Overall, the table suggests the sentiment scores of the various portions steadily decrease across the earnings guidance. Only the sentiment scores of portions 9 and 10 appear to be statistically equivalent.[17]

A potential concern regarding our analyses and inferences in table 2 panel A is that we might be capturing some unobservable attributes of the English language in the financial context that, among others, results in systematically more positive sentiment in the first portions of text. To address this concern, we also collect a sample of 5,500 articles from the *Wall Street Journal* (WSJ) that during our sample period cover firm earnings guidance, and we use FinBERT to compute, for each article, the levels of positive, negative, and neutral tones, as well as sentiment scores for the first five portions of 250 words each.[18] Figure 2 graphs the levels of positive, negative, and neutral tones for the first five portions of 250 words within the WSJ articles. As figure 2 shows, in contrast to firm-issued earnings guidance, the positive tones in WSJ articles

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[17] Because not all earnings guidance are of the same length, the samples across the portions do not remain the same. The sample reduces from 18,046 observations for $SENT_{P1}$ to 7,436 observations for $SENT_{P10}$. Our findings are robust to using the reduced sample size to make these comparisons.

[18] We use FinBERT to compute the levels of tone and sentiment scores for only the first five portions of 250 words, because the WSJ articles that discuss earnings guidance are shorter, containing, for the majority of articles, not more than 1,250 words.

are largely flat across the portions and, if anything, the sentiment scores are more negative in the first portions of the text compared to the later ones (mean $SENT_{P1} = -0.34$ and mean $SENT_{P5} = -0.25$). This trend is also evident in table 2 panel B which presents a matrix of differences across the sentiment scores of the five portions. For example, the difference between the sentiment scores of portions 1 and 3 is -0.036 (*p-val.* $< 1\%$) and between the sentiment scores of portions 1 and 5 is -0.092 (*p-val.* $< 1\%$), suggesting the sentiment scores of the later portions are significantly higher than the earlier ones. This evidence provides support to the view that our inferences in table 2 panel A that firms push positive sentiment to the front of the text of corporate disclosures is not driven by the nature of English language or financial texts in general.

Taken together, the descriptive evidence in tables 1 and 2, as well as in figures 1 and 2, supports our hypothesis that firms manage sentiment within corporate disclosures by amplifying the positive tone in the title and by incorporating more positive tone in front of the text of the disclosure. These patterns in the tone and sentiment within corporate disclosures are consistent with firms attempting to take advantage of investors' limited attention and information processing costs to manage their expectations by making the positive sentiment more salient (i.e., the title) and more accessible (i.e., the first portions of text).

5. Results

5.1 Do firms manage sentiment within their disclosures?

Table 3 presents regression summary statistics from estimating equations (1a) and (1b) using our sample of earnings guidance and a sample of titles generated by ChatGPT-4o for the text of firm-issued earnings guidance. Panel A presents results for the sample of earnings guidance. We observe significantly positive (negative) coefficients on TXT_POS (TXT_NEG) in columns (1)-(2) when TI_POS is the dependent variable, and significantly negative (positive)

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coefficients in columns (3)-(4) when TI_NEG is the dependent variable. These estimates indicate that a positive (negative) tone of the text is positively associated with positive (negative) tone in the title. Thus, all else being equal, a more positive (negative) tone of the text leads to a more positive (negative) tone in the title. Importantly for our hypothesis, we observe that the coefficient on the interaction term between TXT_NEG and $I(TXT\_SENT_{NEG})$ is significantly positive in column (2) (*coef.* $= 0.196$, *t-stat* $= 3.27$) and not significantly different from zero in column (4) (*coef.* $= -0.018$, *t-stat* $= -0.64$). These coefficients indicate that for earnings guidance containing negative information, the relation between the positive (negative) tone of the title and the negative tone of the text becomes less negative (not more positive) as the negativity of the earnings guidance information increases. In other words, all else being equal, when firms issue earnings guidance with negative information, more negative tone in the text does not result in less positive, or more negative, tone in the title.

In column (2) (column (4)) of panel A, the sum of the coefficients on TXT_NEG and $TXT\_NEG \times I(TXT\_SENT_{NEG})$ is $-0.374 + 0.196 = -0.178$ $(0.168 - 0.018 = 0.15)$. These magnitudes suggest that when earnings guidance contains negative news, a one unit increase in the level of negative tone in the text reduces the positive level of the tone in the title by a magnitude that is 0.196 units smaller than when the information is positive, representing a reduction of $0.196/0.374 = 52.4\%$ in the consequences of negative tone in the text on the tone in the title. This evidence suggests that in face of negative information, firms mitigate the reduction in the level of positive tone in the title.

To bolster our inference that firms manage sentiment in corporate disclosures, we estimate equations (1a) and (1b) using the levels of positive and negative tone of AI-generated, as opposed to firm-generated, titles as our dependent variables. Specifically, we provide

ChatGPT-4o with each one of the earnings guidance in our sample and prompt it with: "*The following is the press release issued by a company, please generate a title of approximately 6 to 12 words for the press release.*"[19] This procedure yields a set of AI-generated titles for each of the 18,046 earnings guidance press releases in our sample, allowing us to examine how the tone in AI-generated titles varies with the tone in the text. If firms do not manage sentiment in earnings guidance, we should expect to observe similar associations between the tone of AI- or firm-generated titles and the tone in the text.

Panel B of table 3 presents the results of estimating equations (1a) and (1b) using the tones of AI-generated titles. Unlike panel A, the results in panel B indicate that for earnings guidance with negative information, the relation between negative tone in the text and positive (negative) tone in the title and becomes more negative (positive) as the tone in the text becomes more negative. These results suggest that, unlike firm-generated titles, in AI-generated titles a more negative tone in the text leads to a less positive, or more negative, tone in the title. For example, in column (2) (column (4)) of panel B, the sum of the coefficients on TXT_NEG and $TXT\_NEG \times I(TXT\_SENT_{NEG})$ is $-0.319 - 0.151 = -0.47$ ($0.292 + 0.290 = 0.582$). This implies that the AI-generated titles do not exhibit the same attributes as the firm-generated ones. This inference further supports our hypothesis that firms manage sentiment in corporate disclosures by amplifying (suppressing) the tone of positive (negative) tone in the title.

5.2 Does sentiment management play a role in shaping investor reactions to information?

Our inferences so far indicate that firms manage sentiment by amplifying the positive tone and suppressing the negative tone in the title. By examining the incremental informativeness

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[19] We ask for titles of 6 to 12 words, because this range of words reflects the ranges of 90% of titles of corporate earnings guidance in our sample.

of the sentiment in the title within equations (2) and (3), we can test whether sentiment management plays a role in shaping investor perceptions of information in corporate disclosures.

Table 4 panel A presents descriptive statistics of the variables we use in equations (2) and (3), investigating the incremental informativeness of the sentiment in the title. As panel A of table 4 shows, the mean abnormal stock return during the three day window around earnings guidance is nearly zero (mean *CAR[−1, 1]* = −0.003), suggesting our method for adjusting stock returns is successful. The mean abnormal trading volume, mean *ATVol*, of 1.1 indicates that on average, at earnings guidance firms experience trading volume that is 10% higher than on other days. Panel A also reveals that the mean market value of equity of firms in our sample is $1.3 billion (mean *Size* = 7.149). Moreover, the panel suggests that firms are profitable (mean *ROE* = 0.011), only 24.1% of them report a loss (mean *Loss* = 0.241) in the most recent earnings announcement, and are followed by 8.5 analysts. Panel B of table 5 presents Pearson (Spearman) correlations above (below) the diagonal of the main variables we use in equations (2) and (3). Consistent with the hypothesis that the sentiment in the title is informative to investors, we observe a significantly positive correlation between *TI_SENT* and *CAR[−1, 1]* (*Pearson* and *Spearman corr.* = 0.15 and 0.14) and significantly negative correlation between *TI_SENT* and *ATVol* (*Pearson* and *Spearman corr.* = −0.01 and −0.02).

5.2.1 Sentiment in the title and stock returns

Table 5 panel A presents regression summary statistics from estimating equation (2), exploring the association between the sentiment in the title and abnormal stock returns at earnings guidance. Columns (1) and (2) show that the sentiment in the text and title is significantly positively associated with abnormal stock returns (*coef.* in column (1) = 0.071, *t-stat.* = 13.53; *coef.* in column (2) = 0.031, *t-stat.* = 13.00). Importantly for our hypothesis, in

column (3) we observe that after controlling for the sentiment in the text, the coefficient on the sentiment in the title continues to be significantly positive (*coef.* = 0.022, *t-stat.* = 10.62). The magnitudes of the coefficient estimates on *TI_SENT* and *TXT_SENT* indicate that the informativeness of the sentiment in the title corresponds to 30.14% of the informativeness of the sentiment in the text.

Columns (4)-(6) repeat the analyses in columns (1)-(3) after splitting the sentiment variables into the two separate components of levels of tone that comprise it, i.e., *TXT_POS* and *TXT_NEG* for *TXT_SENT*, and *TI_POS* and *TI_NEG* for *TI_SENT*. The goal of these analyses is to examine whether both components of the sentiment score contribute to the informativeness of the title. Consistent with the view that both types of tone contribute to the incremental informativeness of the sentiment in the title, columns (5) and (6) show significantly positive (negative) coefficients on the levels of positive (negative) tones in the title, i.e., on *TI_POS* (*TI_NEG*). In column (5), *coef.* on *TI_POS* = 0.034, *t-stat.* = 11.31 and the *coef.* on *TI_NEG* = −0.022, *t-stat.* = −5.41. Importantly for our hypothesis, in column (6) where the two components of the sentiment in the title are used together with the two components of the sentiment in the text, we observe a significantly positive (negative) coefficient on the level of positive (negative) tone in the title, i.e., on *TI_POS* and *TI_NEG*. In column (6), the *coef.* on *TI_POS* = 0.025, *t-stat.* = 9.98 and the *coef.* on *TI_NEG* = −0.012, *t-stat.* = −3.09. These findings indicate that after controlling for the sentiment of the text or its components, the sentiment in the title, as well as the components of the sentiment in the title, help explain the variations in stock price reaction to earnings guidance.

Table 5, panel B repeats the analyses in panel A using longer window returns. Columns (1)-(3) use abnormal stock returns in the six-day period following the issuance of the press

release, $CAR[2,7]$, and columns (4)-(6) use abnormal stock returns during the twenty-day period following the issuance of the press release, $CAR[2,21]$. The goal of these analyses is to investigate whether in panel A we capture the full scale of market reaction to the sentiment in the title and the text of earnings guidance. Consistent with the view that the three-day window abnormal stock returns provide a sufficient statistic to gauge the informativeness of the sentiment in the title of earnings guidance, the coefficients on both *TI_SENT* and *TXT_SENT* are statistically not different from zero. Moreover, these findings imply that any information conveyed by the sentiment in the title or the text of earnings guidance is incorporated into stock prices within the three-day period around the disclosure date.

5.2.2 Sentiment in the title and the first ten portions of text

As figure 1 and table 1 suggest, the sentiment scores of the text exhibit steady reduction across the first ten portions of earnings guidance. This pattern in the sentiment scores across the ten portions of text, based on which we determine the sentiment score of the full text, raises the concern that our analyses in table 5 might not appropriately consider the sentiment in the text when investigating the incremental informativeness of the sentiment in the title. To address this concern, in table 6, we estimate a modified version of equation (2) in which we consider the ten sentiment scores of the text separately, i.e., $SENT_{P1}$, ..., $SENT_{P10}$ as separate ten explanatory variables, instead of the one sentiment score variable for the text, i.e., *TXT_SENT*.

Columns (1)-(10) of table 6 present summary regression statistics from estimating a modified version of equation (2) in which *TXT_SENT* is replaced with a sentiment score of one of the first portions of text. For example, in column (1), $SENT_{P1}$, i.e., the sentiment score of the first portion of text, reflects the sentiment of the text. Similarly, in column (10), $SENT_{P10}$, i.e., the sentiment score of the tenth portion of text, is used to measure the sentiment in the text.

Consistent with the hypothesis that the sentiment in the title is incrementally informative to investors, columns (1)-(10) show that the coefficient on *TI_SENT* is significantly positively related to abnormal stock returns at earnings guidance in the presence of sentiment score of any of the ten portions of text. These findings suggest that the sentiment in the title plays a role in shaping investors' perceptions of the information in earnings guidance in face of the sentiment of any single portion of the text.

Column (11) presents summary regression statistics from a version of equation (2) in which all sentiment scores of the first ten portions of text are included simultaneously. As column (11) shows, the coefficient on *TI_SENT* retains its significant explanatory power (*coef.* = 0.011, *t-stat.* 3.46) in the presence of all sentiment scores of the text. However, only the sentiments scores in the first, second, and fourth portions of text contribute to the explanation of abnormal stock returns at earnings guidance. The evidence in column (11) helps alleviate the concern that our inferences regarding incremental informativeness of the sentiment in the title is driven by improper representation of the sentiment in the text. At the same time, the evidence in table 6 provides support to our approach to measuring the sentiment of the full text by using only the first portions of the text of earnings guidance.[20]

5.2.3 Sentiment in the title and the information environment of the firm

To enhance our understanding of the incremental informativeness of the sentiment in the title, we explore how title informativeness varies with respect to the information environment of the firm or the demand for firm information by investors.

We start by augmenting equation (2) with interaction terms, $TI\_SENT \times Analysts$ and $TXT\_SENT \times Analysts$, allowing to examine how the information environment of the firm

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[20] In unablated analyses, we redefine *TXT_SENT* as an average of the sentiment scores in the first four portions of text (instead of ten) and re-estimate our equations using this measure. Our inferences remain the same.

mitigates the association between the sentiment score in the title, as well as the sentiment score in the text, and abnormal stock returns at earnings guidance. We expect the role of sentiment in the title in shaping investors' perceptions of corporate disclosures to be smaller for firms with a better information environment, such as those followed by more analysts. Table 7 presents regression summary statistics of this specification. Column (1) shows statistics using an interaction between the sentiment in the title, TI_SENT, and the natural logarithm of one plus the number of analysts following a firm, $Analysts$. The coefficient on the interaction term is significantly negative (*coef.* = −0.008, *t-stat.* =−3.24). Column (2), in which an interaction term between the sentiment of the text, TXT_SENT, and the natural logarithm of one plus the number of analysts, $Analysts$, is included also provides evidence in support of our prediction (*coef.* on $TI\_SENT \times Analysts$ = −0.006, *t-stat.* =−2.91; *coef.* on $TXT\_SENT \times Analysts$ = −0.010, *t-stat.* = −2.73). These findings suggest that when the firm is followed by more analysts, sentiment in the title, as well as in the text, plays a smaller role in shaping investors' perceptions of information in firm disclosures. Importantly, the evidence sheds light on the information role of sentiment in the title and how it varies with firm information environment.

We continue by estimating another version of equation (2) in which we interact the sentiment variables, TI_SENT and TXT_SENT, with an indicator variable that equals 1 when the company reports profit and 0 otherwise, $Profit$. The $Profit$ indicator is designed to capture cases in which investor demand for corporate information is lower because it reports positive results. Table 7, columns (3) and (4) present regression summary statistics from estimating this specification. Column (3) presents findings using an interaction between the sentiment in the title, TI_SENT, and the indicator variable for profit, $Profit$. The coefficient on the interaction term is significantly negative (*coef.* on $TI\_SENT \times Profit$ = −0.015, *t-stat.* = −5.97). Column

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(4) presents similar evidence after including both interaction terms for the sentiment in the title and in the text together (*coef.* on $TI\_SENT \times Profit$ = -0.012, *t-stat.* =-4.96; *coef.* on $TXT\_SENT \times Profit$ = -0.014, *t-stat.* = -1.92). The significantly negative coefficients on the interaction terms suggest the sentiment in the title, as well as the sentiment in the text, play a smaller role in shaping investors' perceptions of corporate disclosures for firms that report profits. This evidence suggests that when investors' demand for additional information is lower, the informativeness of the sentiment in the title, as well as the sentiment in the text, of corporate disclosures is smaller.

5.3 Sentiment in the title and investor disagreement

Table 8 presents regression summary statistics from estimating several versions of equation (3), using abnormal trading volume, $ATVol$, as the dependent variable. The goal of these analyses is to examine whether the sentiment in the title is incrementally informative to investors by helping reduce investor disagreement. Columns (1) and (2) examine the sentiment in the text and title separately and show that each sentiment is negatively associated with abnormal trading volume (in column (1), *coef.* on TXT_SENT = -0.057, *t-stat.* =-2.45; in column (2), *coef.* on TI_SENT= -0.032, *t-stat.* = -3.11). When examining both sentiments together, column (3) indicates that the sentiment in the title retains its negative association with abnormal trading volume at earnings guidance (*coef.* on TI_SENT = -0.026, *t-stat.* =-2.85) along with the sentiment in the text (*coef.* on TXT_SENT = -0.045, *t-stat.* =-2.15).

These findings reveal that the sentiment in the title of earnings guidance is incrementally informative in that it is not only associated with abnormal stock returns but also with lower abnormal trading volume. Consistent with prior literature, the negative association between sentiment in the title and abnormal trading volume during corporate information events suggests

that positive sentiment reflects greater firm confidence in its future prospects, thereby reducing investor uncertainty (Loughran and McDonald, 2011; Azimi and Agrawal, 2021).

6. Robustness tests

6.1 Salience of the title

Huang et al. (2018) examine titles of press releases and construct a measure they call "salience". This measure counts the "number of numbers" in the title of the press release, truncating it at 3, and which is intended to capture the amount of quantitative information the company chooses to include in the title. Huang et al. (2018) conclude that the salience of the title is informative to investors and that it shapes their perceptions of corporate information to a large extent. To ensure our measure of sentiment in the title does not merely represent the previously documented salience of the title, we re-estimate equations (2) and (3) after controlling for Huang et al. (2018)'s measure of salience.

Table 9 presents regression summary statistics for equations (2) and (3) with the addition of salience in the title, $TI\_Salience$, as a control variable. In columns (1)-(3), we present summary statistics from the estimation of equation (2). Column (1) reveals that the salience in the title is informative to investors, even after controlling for the sentiment in the text. This finding supports Huang et al. (2018)'s inference regarding the informativeness of the title salience. However, as column (2) shows, when we control for the sentiment in the title, the salience in the title is no longer significantly related to abnormal stock returns, but the sentiment in the title maintains its significant relation with stock returns. Importantly, column (3) demonstrates that when we control for the sentiment in the text and include the sentiment in title as well as the salience of the title, only TI_SENT and TI_TEXT maintain the significant relation with abnormal stock returns; $TI\_Salience$ is insignificant.

Columns (4)-(6) of table 9 present regression summary statistics from estimating equation (3) where we use abnormal trading volume as the dependent variable and control for the silence of the title. Similar to columns (1)-(3), columns (4)-(6) show that the coefficient on *TI_Salience* is significant only when we do not control for the sentiment in the title. Importantly, in column (6) of table 9, where we control for *TXT_SENT* and include both *TI_SENT* and *TI_Salience*, the coefficients on *TI_SENT* and *TXT_SENT* maintain their significant negative relation with abnormal trading volume, whereas the coefficient on *TI_Salience* is insignificant.

Together, the evidence in table 9 suggests our measure of sentiment in the title is not subsumed by the previously introduced measure of title salience. If anything, our measure of sentiment outperforms the salience measure in providing incremental information to the market and reducing investor disagreement in the context of earnings guidance.

6.2 Alternative measures of text sentiment

To construct our measure of text sentiment, we calculate the average sentiment from the first ten segments of text, specifically the initial 2,500 words of the earnings guidance. This approach captures the entire text of approximately 75% of the earnings guidance in our sample. To confirm that our inferences are not an artifact of the choice of the number of portions of text in measuring the sentiment of the full text of earnings guidance, we re-run our analyses using alternative approaches to measure sentiment in the text. These include the sentiment in the first 350 words in the text or the average sentiment in the first five portions of 250 words each. Table 10 presents results using these alternative measures.

Table 10 panel A presents regression summary statistics from estimating equations (1a), (1b), and (2) using text sentiment based on the first 350 words of the earnings guidance as a proxy for the sentiment in the text. Columns (1) and (2) report regression summary statistics

from estimating equations (1a) and (1b). Importantly, the results indicate that when the sentiment of the earnings guidance is negative, a more negative tone of the text is more positively (negatively) associated with the positive (negative) tone of the title. Columns (3)-(5) report regression summary statistics from estimating equation (2), suggesting that the sentiment in the title helps explain investor reaction to earnings guidance. Together, the results in panel A indicate that the alternative measure of text sentiment, which considers just the initial part of the earnings guidance, provides inferences consistent with our predictions that firms manage sentiment by amplifying (suppressing) the positive (negative) tone in the title, and the sentiment in the title plays a role in shaping investor perceptions of information in earnings guidance.

Panel B of table 10 presents similar results to the ones presented in panel A, using the first five portions of text of the earnings guidance as a proxy for the sentiment in the text. As panels A and B indicate, the results and thus our inferences regarding sentiment management and the incremental informativeness of the sentiment in the title are robust.

7. Summary and concluding remarks

We investigate whether firms manage sentiment within their disclosures, and whether such sentiment management plays a role in shaping investor reactions to information. We hypothesize that firms amplify positive tone and suppress negative tone in the title, and that they embed more positive sentiment in the first portions of the text. This is because investors are likely to form their perceptions of the disclosure based on easy to process information in the title, as well as easily accessible information at the beginning of the text. Furthermore, we predict that the sentiment in the title plays an incremental role in shaping investor perceptions of the information in earnings guidance.

To address our research questions, we analyze a sample of 18,046 press releases containing earnings guidance from 3,619 firms spanning the years 2001 to 2022. We focus on these corporate disclosures because they represent a form of voluntary disclosure where firms have considerable discretion over the type, level, and structure of sentiment they embed in the disclosure. This feature of earnings guidance is crucial for identifying whether firms manage sentiment, e.g., by using different sentiment in the title and the text or across different portions of the text. We measure sentiment as the difference between the levels of positive and negative tones in the title or portions of text of the disclosures. We calculate sentiment separately for the title, the first ten portions of the text (each consisting of 250 words), and the full text using FinBERT, a pre-trained Natural Language Processing (NLP) model designed specifically for financial sentiment analysis (Devlin et al., 2018; Liu et al., 2021).

We find evidence in support of our predictions. We document that firms amplify (suppress) the level of positive (negative) tone in the title. This finding is not attributable to characteristics of the English language or the structure of financial disclosures, as the same is not observed for articles in the *Wall Street Journal* (WSJ) focusing on earnings guidance or for titles generated by ChatGPT-4o for actual texts of corporate earnings guidance. We further document that the sentiment in the first portions of the earnings guidance is the most positive, becoming less positive as the text progresses. This suggests that firms push positive information to the front of the disclosure to manage investors' expectations.

We also show that the sentiment embedded in the title helps explain variation in abnormal stock returns at the earnings guidance issuance, incremental to the sentiment in the text. This relation is weaker for firms covered by analysts or reporting profits, as their information environments are stronger or the demand for their information is weaker. In

addition, the sentiment in the title helps reduce investor disagreement, suggesting that investors form perceptions of information from the sentiment firms embed in the titles. The results remain robust across different specifications, alternative measures of text sentiment, and controls for previously introduced measure of title salience.

Current regulations do not govern the use of sentiment in corporate disclosures (Blankespoor et al., 2020). Therefore, our findings provide insights both to regulators and market participants about firm strategic use of sentiment within corporate disclosures. Our findings also suggest sentiment management as reflected in the title shapes investor perception of the information in the disclosure.