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The Structure of Voluntary Disclosure Narratives: Evidence from Tone Dispersion

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ABSTRACT

We examine tone dispersion, or the degree to which tone words are spread evenly within a narrative, to evaluate whether narrative structure provides insight into managers' voluntary disclosures and users' responses to those disclosures. We find that tone dispersion is associated with current aggregate and disaggregated performance and future performance, managers' financial reporting decisions, and managers' incentives and actions to manage perceptions. Furthermore, we find that tone dispersion is associated with analysts' and investors' responses to conference call narratives. Our results suggest that tone dispersion both reflects and affects the information that managers convey through their narratives.

JEL codes: G30; M41; M49

Keywords: codes: voluntary disclosure; conference calls; narrative structure; tone; analysts

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1. Introduction

There is now a considerable body of research in accounting and finance examining the role of linguistic tone in firm disclosures. These studies often use the "bag-of-words" approach to quantify tone (Henry [2008], Tetlock [2007], Loughran and McDonald [2011]), ignoring the underlying narrative structure in which tone words are used. However, managers do not present "loose bits of information" (Spivey [1990]), but rather a disclosure narrative that conveys and reinforces their interpretation of current performance and its implications for future firm performance (Sedor [2002]). The structure of this narrative reflects managers' organization of interrelated ideas and helps users interpret and comprehend their message (Strunk and White [1979], Kintsch and Yarbrough [1982], Sedor [2002]). In this paper, we develop and use a parsimonious measure of narrative structure, tone dispersion, to investigate the role of narrative structure in financial reporting.

We define tone dispersion as the degree to which tone is spread evenly throughout a disclosure narrative. Rhetoric and communication theory (Kintsch and Yarbrough [1982], Spivey [1990]) and related applications in computational linguistics (Kostoff, Eberhart, and Toothman [1997]) suggest that words are less likely to be topically related as the distance between them in the narrative increases. Since managers use narratives to "tell a story" about firm performance (Sedor [2002]), we expect that a more even distribution of tone (higher tone dispersion) throughout the narrative reflects a portrayal of good or bad news as pervasive, while a less even distribution (lower tone dispersion) isolates the news to fewer components of performance. Given prior research on the valuation implications of news in earnings components (Ou and Penman [1989], Fairfield, Sweeney, and Yohn [1996]) and sensitivity of individuals to how information is presented (Lee, Petroni, and Shen [2006], Bloomfield et al. [2014]), we posit that tone dispersion is incrementally informative to the level of tone because it captures the extent to which good or bad news is spread across different sections of the narrative.

We examine tone dispersion in earnings conference calls, an increasingly important and value-relevant channel of corporate communication (Frankel, Johnson, and Skinner [1999], Bushee, Matsumoto, and Miller [2003]). Prior research finds that analysts and investors make decisions regarding their earnings estimates based on what managers choose to discuss (Black et al. [2013]), as well as how they say it, documenting significant responses to word choice (Price et al. [2012]) and vocal cues (Mayew and Venkatachalam [2012]). Matsumoto, Pronk, and Roelofsen [2011] also find that the question-and-answer (Q&A) portion of the conference call elicits significant incremental information from managers and analysts. Since the Q&A occurs immediately after managers' prepared remarks, examining conference calls provides an opportunity to investigate the association between managers' narrative structure and analysts' questions.

We use a measure of linguistic dispersion from the computational linguistics literature, average reduced frequency (ARF), to measure the degree to which tone words are evenly distributed throughout the prepared remarks section of conference call transcripts. We find significant variation in tone dispersion across firms but little time-series variation within firms, indicating a significant firm- or manager-specific component to tone structure. In examining the relationship between the level of tone and its dispersion, we find that only a small portion of this variation is mechanically related to the level of tone. Together, these findings suggest that managers deliberately structure tone as part of their overall narrative.

We further investigate whether narrative structure complements other aspects of managers' financial reporting. We provide evidence of associations between tone dispersion and three characteristics of firm disclosures. First, we find that tone dispersion is significantly associated with firm performance (e.g., changes in performance margins and missing analyst's expectations). Second, consistent with prior evidence that managers use multiple strategies to manage users' expectations, including disclosure timing (Kasznik and Lev [1995], Libby and Tan [1999]) and pro forma earnings (McVay [2006], Curtis, McVay, and Whipple [2013]), we find that tone dispersion is associated with managers' financial reporting choices (e.g., earnings guidance news in the conference call, the magnitude of special items and discussions of pro forma earnings). Third, we find evidence of strategic motivations for tone dispersion. We find that tone dispersion is associated with managers' incentives to manage perceptions when firm performance is unusually high or low (Graham, Harvey, and Rajgopal [2005]), classification shifting (McVay [2006]), and the readability of disclosure narratives (Li [2008]). Overall, our findings suggest that tone dispersion both reflects and affects the information that managers convey through their narratives.

We next examine whether tone dispersion is associated with analysts' and investors' responses. We document that analysts ask more positive (negative) questions and the market responds more positively (negatively) when positive (negative) tone is more dispersed in the prepared remarks section of the conference call. Additionally, we document that the market responds strongly to the tone of analyst questions. Since the tone of analyst questions is also strongly associated with tone dispersion, this finding suggests that the association between tone dispersion and market reaction is partially mediated by analyst response.

This study makes several contributions. First, our study unifies two strands of accounting and finance literature examining word choice and linguistic structure in firm disclosures. Whereas prior research uses word counts to measure information content and word and sentence structure to measure the costs of analyzing that information (e.g., Li [2008], Lehavy, Li, and Merkley [2011], Lee [2012]), we examine linguistic structure across the entirety of a disclosure narrative. In addition, despite concern that the so-called "bag-of-words" approach to textual analysis ignores the context in

which those words are used (Li [2010], Loughran and McDonald [2014]), prior research suggests few alternatives. Our approach, while still relying on word choice to identify tone, introduces the idea that a word's placement, in addition to its presence or absence, provides insight into information content.

Second, we introduce a parsimonious and useful measure of linguistic dispersion into the financial reporting literature. ARF, originally designed to quantify the "commonness" of words within document collections (Savicky and Hlavacova [2002]), combines word placement with word choice to determine the distribution of words within a text. Although a relatively simplistic view of narrative structure, linguistic dispersion provides a useful first look at the effect of structure on meaning.[1]

Third, our study adds to a growing body of literature suggesting that qualitative disclosures convey incremental information about and are associated with user interpretations of firm performance (Loughran and McDonald [2011], Kravet and Muslu [2013]). Prior research suggests that qualitative disclosure can serve as a complement or a substitute for quantitative disclosure (Baginski et al. [2012]) and that managers can use qualitative disclosure to influence analyst and investor perceptions of firm value (Schrand and Walther [2000], Curtis, McVay, and Whipple [2013]). Our results shed light on managers' use of disclosure narratives to shape users' understanding of financial results.

2. *Background and Development of Research Questions*

Accounting research acknowledges that structure is important for understanding financial reports. Research on firm communications finds that investors are more optimistic when managers structure their future plans in scenarios (Sedor [2002]) and more responsive to earnings metrics that managers emphasize (Schrand and Walther [2000], Bowen, Davis, and Matsumoto [2005]). In addition, audit research finds that auditors are influenced by the order of information (Boritz [1985], Butt and Campbell [1989]) and the presentation of decision-irrelevant information with relevant information (Hackenbrack [1992], Shelton [1999]). Similarly, narrative structure provides the reader with cues on how to organize and understand the meaning of a text (Kintsch and Yarbrough [1982], Spivey [1990]). Due to limits on working memory, readers process a narrative sequentially in semantic "chunks" and gradually organize those chunks into their mental representation of the text's meaning. Only the portion of text deemed useful for understanding is retained and used to integrate subsequent chunks (Kintsch and van Dijk [1978]). Managers can use this

[1] While prior studies have examined narrative structure in firm disclosures (e.g., Sydserff and Weetman [1999]), ours is the first, to our knowledge, to propose a measure of structure that does not rely on hand-coding by researchers.

narrative structure to shape users' understanding of multiple dimensions of firm performance, providing "causal orderings that link current states, planned actions, and anticipated future outcomes" (Sedor [2002, p. 738]).

Word proximity is commonly used in computational linguistics research to determine the strength of the relationship between words (Kostoff, Eberhart, and Toothman [1997]) and to augment algorithms for information retrieval (Khoo, Myaeng, and Oddy [2001], Zhao, Eck, and Vogel [2004]), the extraction of relationships between concepts and entities (Kambhatla [2004], Sayeed et al. [2010]), word sense disambiguation (Mavroeidis et al. [2005], McCarthy et al. [2007]), and detection of deception and sentiment (Bachenko, Fitzpatrick, and Schonwetter [2008], Hasan and Adjeroh [2011]). Given the above, we expect that observing two words in close proximity has different narrative implications from observing the same two words at opposite ends of the text.

We apply the above insights to our setting by examining tone dispersion, or the degree to which tone words are spread evenly throughout a disclosure narrative. Prior studies have established the importance of linguistic tone in identifying the news content of qualitative disclosures (Davis, Piger, and Sedor [2012], Price et al. [2012]). Boudoukh et al. [2013] find that measures of linguistic tone improve the explanatory power of market models by up to 62%. We extend these studies by investigating whether the relative placement of tone words within disclosure narratives is associated with the information content of and users' responses to firm disclosures.

We investigate the relationship between tone dispersion and three characteristics of firm disclosures. First, we examine the relationship between tone dispersion and the underlying performance news. Following Sedor [2002], we expect that managers will structure their narratives to tell a story about how components of performance contribute to aggregate performance. If aggregate performance news is the result of improvements or declines in many different performance components, we expect increased tone dispersion as managers sequentially discuss positive or negative news in each of these components (for instance, managers likely place the discussion of each component in its own sentence or paragraph). An association between tone dispersion and news in earnings components suggests that tone dispersion reflects a discussion by managers of detailed performance information useful for predicting future earnings (Penman [1992], Elliott, Hobson, and Jackson [2011]). For our first research question, we investigate the relationship between tone dispersion and firm performance:

RQ_1: Is tone dispersion associated with aggregate performance and/or performance components?

Second, we anticipate that tone dispersion is affected by managers' financial reporting choices. As these choices are subject to discretion, they may be either informative or strategic. The extent to which managers make adjustments to earnings (Elliott and Hanna [1996], Doyle, Lundholm,

and Soliman [2003]) and special items (McVay [2006], Fan et al. [2010]) likely affects the placement of tone within the conference call narrative by concentrating negative words into fewer sections. Managers also make choices about what news to include in the conference call versus disclosing that information separately. For instance, managers increasingly issue earnings guidance along with discussions of current earnings (Anilowski, Feng, and Skinner [2007]). The choice to issue earnings guidance within a conference call would affect tone dispersion if it creates a section of the narrative in which the manager discusses positive or negative forward-looking information. Additionally, managers' "preannouncement" of earnings news (Skinner [1994], Libby and Tan [1999], Soffer, Thiagarajan, and Walther [2000]) allows them to exclude or downplay certain news items from the narrative. This leads to our second research question:

RQ_2: Is tone dispersion associated with managers' financial reporting choices?

Third, we investigate whether managers strategically use their disclosure narratives to manage perceptions of and expectations for the firm. Prior research suggests that, in addition to managing earnings to meet performance targets (Dechow, Ge, and Schrand [2010]), managers prepare their disclosures to put a positive spin on reported performance (Davis and Tama-Sweet [2012]) and alter benchmarks and reporting complexity in an effort to make it more difficult for investors to analyze reported performance (Schrand and Walther [2000], Li [2008], Riedl and Srinivasan [2010]).

If managers structure their disclosure narratives to manage perceptions, we expect that they will increase the dispersion of positive tone and decrease the dispersion of negative tone. First, more evenly dispersed positive tone suggests that positive news is pervasive, while less evenly dispersed negative tone suggests that negative news is restricted to a few components of performance. Second, prior research finds that investors (Kasznik and Lev [1995]) and analysts (Libby and Tan [1999]) respond more negatively to bad news when that news is released in stages rather than all at once. We anticipate that users similarly respond more strongly to news when it is spread across a narrative than when it is condensed into a few sections. Third, prospect theory predicts that individuals' perceptions of value are greater when an increase in value is spread across many gains and a decrease in value is condensed into a single loss (Tversky and Kahneman [1974], Thaler and Johnson [1990]). Managers' attempts to split good news items into several pieces and combine several items of bad news into one, perhaps nonrecurring, piece (McVay [2006], Christensen et al. [2011], Whipple [2014]) are likely to increase positive tone dispersion and decrease negative tone dispersion. Fourth, dispersing positive tone and condensing negative tone maximizes (minimizes) the amount of time that managers spend discussing positive (negative) news. All of these factors incentivize managers

to increase the dispersion of positive tone and decrease the dispersion of negative tone.

We note, however, that bad news tends to be less likely to recur than good news on average, which could lead to condensed discussions of one-time bad news items such as restructuring charges and asset impairments (Elliott and Hanna [1996], McVay [2006]). As such, observing that negative tone dispersion is lower than positive tone dispersion overall would not in itself indicate that managers structure tone strategically. Therefore, we investigate whether tone dispersion is associated with managers' incentives and behaviors to behave strategically, leading to our third research question:

RQ_3: Is tone dispersion associated with managers' incentives and actions to manage perceptions?

Finally, we examine the association between tone dispersion and users' (i.e., analysts and market participants) responses to firm disclosures. Prior research finds that analysts participate actively in the call, clarifying the information presented (Matsumoto, Pronk, and Roelofsen [2011]), challenging management's assertions (Black et al. [2013]), and providing more timely and accurate forecasts (Mayew, Sharp, and Venkatachalam [2013]). Additionally, qualitative disclosures convey incremental information about and are associated with user interpretations of firm performance (Henry [2008], Merkley [2014]). If narrative structure is informative regarding the implications of tone for firm value, or if managers are successful in using tone dispersion to influence users, we anticipate that more positive (negative) tone dispersion is associated with more positive (negative) tone on the part of analysts when they ask their questions and a more positive (negative) market reaction. This logic leads to our fourth research question:

RQ_4: Is tone dispersion associated with users' responses to the conference call?

3. Sample, Measures of Tone Dispersion and Descriptive Statistics

3.1 SAMPLE

We collect 73,201 conference call transcripts from SeekingAlpha.com between 2004 (the earliest year available) and June 2014. We use Perl to separate the conference call into three sections: the list of participants, the prepared remarks section, and the Q&A section. We only include a transcript in our sample if our Perl script is able to detect all three sections because some of the available transcripts either do not contain some of these sections or use inconsistent formatting. This reduces the sample to 63,570 transcripts. To make sure our analysis contains only manager or analyst speech, we clean the prepared remarks and Q&A sections of all HTML, special characters, and comments by the operator. We also remove

paragraphs containing the phrase "forward-looking statement" in order to avoid boilerplate cautionary language. We then use Perl and the list of participants to separate the speech of managers and analysts in the Q&A section. In order to do this, we require at least one person from the list of participating managers to be identified in the Q&A, leaving 61,298 transcripts.

We then match the sample based on the ticker from SeekingAlpha.com to the Compustat quarterly database by the quarter and year reported in the conference call, ensuring that the report date of quarterly earnings (*rdq*) for that firm-year-quarter is within three days of the call. This leaves 40,625 transcripts with Compustat data available for 3,735 unique firms. We lose additional firm-quarter observations when matching with CRSP and I/B/E/S, resulting in 33,428 observations for 3,345 unique firms with the requisite data for our analyses. Additionally, to these firm-quarter observations we add guidance data from First Call's Company Issued Guidelines files maintained by Thomson Reuters, where there was either guidance in the conference call or a preannouncement of the earnings news. We define a preannouncement as an announcement made on earnings from two weeks before the end of the quarter until two days before the conference call date.

3.2 QUANTIFYING TONE DISPERSION

We use Loughran and McDonald's [2011] word list to measure positive and negative tone because it is tailored for financial reporting settings, unlike general tone word lists such as the Harvard IV-4 dictionary, and has been shown to perform better in these settings (Davis and Tama-Sweet [2012], Price et al. [2012]). In keeping with our conference call sample, we eliminated the word "question" from our list of negative words because managers tend to refer to analyst questions in both the prepared remarks section and the Q&A. We also adjusted for negation and did not count the word "good" if it was followed by "morning," "afternoon," "evening," or "day"; the word "effective" if it was followed by "income," "tax," or "rate"; the word "efficiency" if it was followed by "ratio"; or the word "closing" if it was followed by "remark" or "remarks." We calculate tone dispersion over the entire length of the prepared remarks section of the conference call, as prior research suggests that the full narrative, including the information communicated by each manager and the order in which managers speak, is carefully scripted (Matsumoto, Pronk, and Roelofsen [2011], Lee [2014]). To examine our research questions, we use a measure from the corpus linguistics literature, average reduced frequency (ARF) (Savicky and Hlavacova [2002]), to quantify tone dispersion.

ARF is a robust version of reduced frequency (RF), which measures the degree to which words are evenly spread throughout a document or corpus. We calculate RF for tone words (positive or negative) as follows. Starting with the first word in the transcript, we divide the prepared remarks section into equally sized sections equal to the number of tone words. We

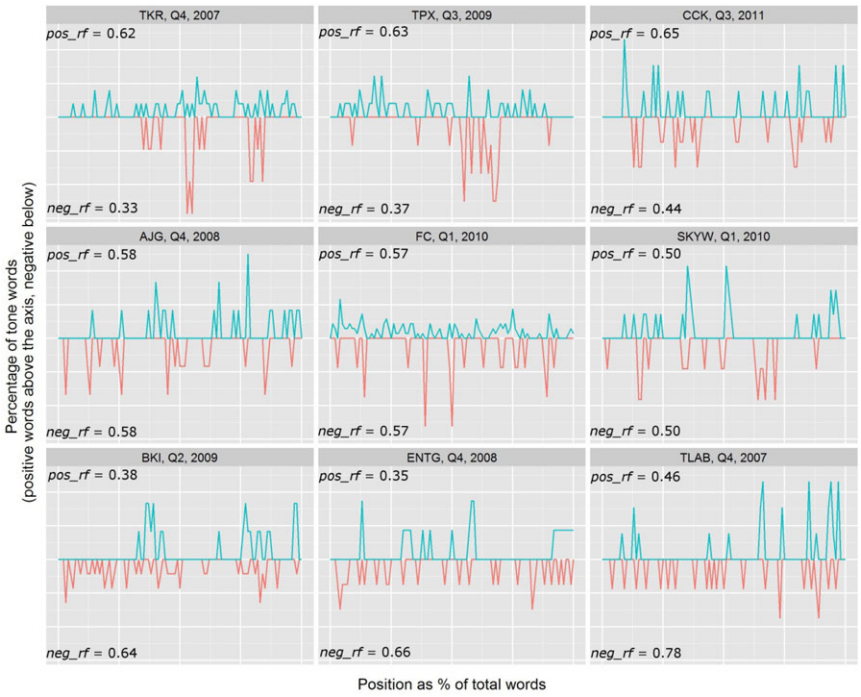

FIG. 1.—Dispersion of positive and negative words in various conference calls. This figure shows RF calculations for a selection of conference calls. The first row shows calls that disperse positive tone more than negative tone, the second row shows calls that disperse positive and negative tone equally, and the third row shows calls that disperse negative tone more than positive tone.

then count the number of sections containing at least one tone word and divide by the total number of sections to arrive at RF. As an example of how we would calculate RF for positive tone, we count all positive words in each transcript. We then divide the transcript into sections based on the number of positive words: if there are 50 positive words, then the corpus is divided into 50 sections of equal length starting with the first word. RF is the proportion of these sections containing at least one positive word. If all of the positive words are clustered together into one section, then RF is 1/50. Alternatively, if every section contains one positive word, then RF is 50/50. Thus, a higher RF (closer to 1) indicates that words are more "evenly" distributed throughout the transcript, while smaller values of RF indicate a "chunkier" distribution.

Figure 1 plots the relative placement of words in a few selected conference calls to demonstrate the idea of RF. The first row of selected conference calls (Tickers: Timken Company (TKR), Tempur-Pedic (TPX), and Crown Holdings Inc. (CCK)) illustrates conference call narratives that disperse positive tone more than negative tone. TKR has a positive RF of 0.62

but a negative RF of only 0.33. TPX and CCK are two other examples of this type of disclosure narrative with positive RF values (*pos_rf*) of 0.63 and 0.65 and negative RF values (*neg_rf*) of 0.37 and 0.44, respectively. Note that, for these firms, negative words are far more likely to be placed together (as demonstrated by the spikes in percentage of tone words) relative to the placement of positive words. This phenomenon seems to vary by firm such that, according to our measure, the firms on the second row of figure 1 (AJG, FC, and SKYW) have equal dispersion of positive and negative words and the third row of firms (BKI, ENTG, and TLAB) disperse negative tone more than positive tone. Figure 1 and the descriptive statistics reported in table 1 reveal that there is significant variability in tone dispersion between firms.

A weakness of RF is that section boundaries are drawn based solely on word position. As a result, words within the same sentence may be assigned to separate sections, causing grammatical structure to affect RF. In addition, it is possible for tone words that are close together to be placed in different sections if they occur near a section boundary. To address this issue, we calculate ARF by repeating the RF calculation across all possible sets of section boundaries. We repeat the procedure above starting with the second word in the transcript, again dividing the transcript into equal sections (with the first word of the transcript included in the last section) and calculating RF. We continue to calculate RF measures starting at the third word, then the fourth, and so on until we reach the end of the first original section (at which point subsequent divisions are identical to those we have already calculated). We average across these calculations to arrive at our ARF measure.

Figure 2 illustrates how ARF is calculated in an example document. This document contains 60 words, 5 of which are tone words (represented by a plus sign), resulting in five sections containing 12 words each. A calculation of RF would include only the first row of figure 2, in which the five sections are separated starting with the first word, and would be equal to 3/5 or 0.6. ARF, on the other hand, is the average of RF across all 12 rows, which includes separating the sections starting at each of the first 12 words. In this example, the second, third, and fourth tone words are close together, but RF separates the first of these from the other two. Calculating ARF leads to the second, third, and fourth tone words being placed in the same section for 7 out of the 12 RF calculations, leading to a lower ARF value of 0.53. Note that starting at the 13th word is identical to starting at the first word in terms of section boundaries, so only 12 RF calculations are necessary.

3.3 ADJUSTED TONE DISPERSION

The calculation of ARF depends on the number of tone words, creating a mechanical relationship between tone dispersion and the level of tone that could affect our results. For instance, the presence of a single tone word always results in RF equal to one, while the presence of two tone words always results in RF equal to 0.5 or 1 (since the words can either share one

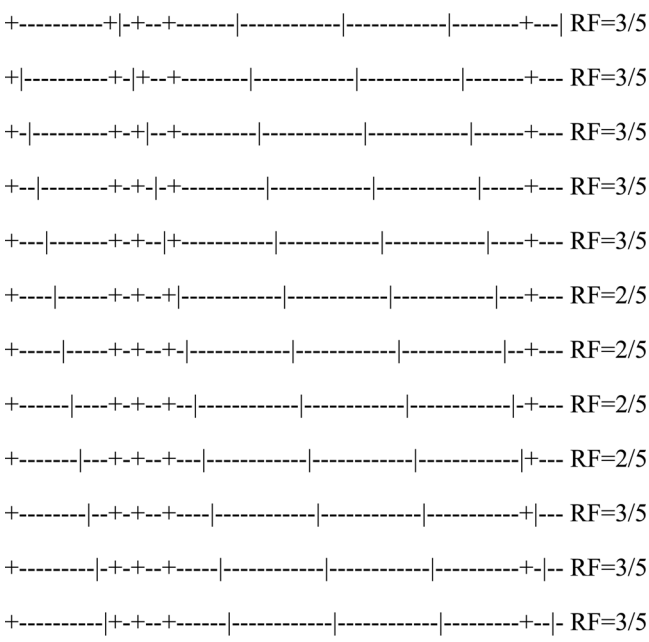

FIG. 2.—Illustration of average reduced frequency calculation. This figure shows the calculation of ARF for a document containing 60 words, 5 of which are positive tone words. Positive tone words are represented by the plus sign (+), nontone words are represented by a hyphen (-). The rows show calculations of RF for each possible section division (represented by |) starting at the first word position, the second word position, and so on.

of the two sections or be spread across them). To address this issue, we simulate an unconditional expectation of RF and calculate adjusted ARF by subtracting this expectation from our ARF measure.

We simulate expected RF as follows: First, we define an interval between 0 and 1 that represents all possible positions of a tone word within a document. That is, a word can occur somewhere between the first position (at which point, 0% of the remaining text exists before the word) and the last position (at which point, 100% of the remaining text exists before the word). Second, for each level of tone in our sample (count of positive or negative words), we randomly draw a position within the interval for each tone word, assuming that each position is equally likely, and calculate RF based on these random positions. Although it is unlikely that the probability of observing a tone word in a given position is equal throughout a transcript, this assumption only makes a difference if the word occurs within a small distance from a section boundary. We expect that repeated simulation will eliminate any bias from word positions relative to section boundaries, which also removes the necessity of proceeding to calculate ex-

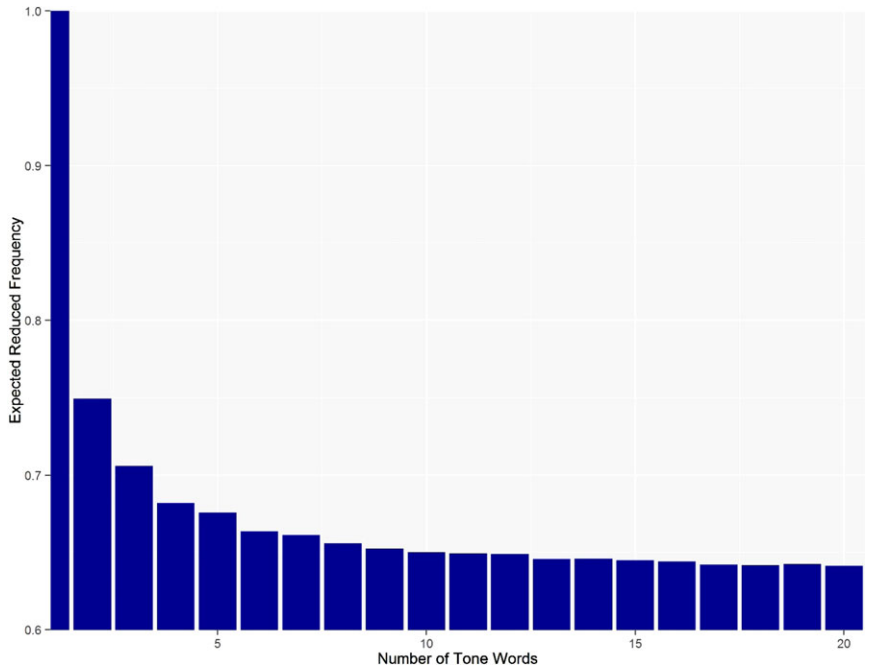

FIG. 3.—Distribution of expected average reduced frequency.

pected ARF. We simulate RF 10,000 times for each level of tone and average across these simulations to arrive at expected RF.

Our simulation is roughly equivalent to sampling from a binomial distribution N times within each section with a $1/N$ probability of encountering a tone word, where N is equal to the number of tone words, and truncating positive values to 1 (since we count each section that contains one or more tone words). As such, the expected value is less than one (unless N is equal to 1) and approximately equal to the probability that the number of tone words in a section is greater than zero. Figure 3 shows a negative relationship between expected RF and the level of tone. Consistent with the example above, expected RF is 1 when the level of tone is 1 and 0.75 when the level of tone is 2. However, the sensitivity of RF to the number of tone words quickly tapers off, leading to a negligible decrease in expected RF for a one-word increase in the level of tone above 10 tone words. We find (not shown) that expected RF asymptotically approaches 0.63 as the level of tone increases (for instance, RF is 0.633 when the number of tone words is 500). Since the first quartile of both positive and negative tone in our sample is above 10 words, these results suggest that a majority of the variation that we observe in RF is due to active word placement rather than random chance. Nonetheless, we include adjusted ARF in

our empirical analyses to remove bias due to this mechanical relationship between ARF and tone.[2]

3.4 DESCRIPTIVE STATISTICS

Table 1 contains descriptive statistics for our conference call sample. We find that the average (median) length of the prepared remarks section is 2,844 (2,705) words, which is comparable to the 2,928 (2,798) words reported in Matsumoto, Pronk, and Roelofsen [2011]. There are substantially more positive words than negative words in the prepared remarks section, with a mean of 53.8 positive words and 26.6 negative words. Table 1 also indicates that 22% (34) of our firm-quarter observations are loss (I/B/E/S miss) quarters and that the median firm beats analysts' expectations by about 3.3%. Consistent with Chen, Demers, and Lev [2012], we find that approximately 19% of our firms make conference calls at or after 5 PM EST.

The descriptive statistics on the ARF measures indicate that on average positive and negative tone distribution are roughly the same (*pos_arf* = 0.570 and *neg_arf* = 0.563). However, the mean and median differences between positive and negative tone dispersion are consistent with a very slightly higher dispersion of good news than bad news (i.e., positive tone dispersion, less negative tone dispersion, is statistically greater than 0 at less than the 1% level for both the mean and median values). This univariate difference is consistent with our supposition in section 2 that bad news is inherently more condensed than good news, but the difference is not very pronounced. Consistent with figure 1, there appears to be significant variation in firms' tone dispersion, with only some conference calls dispersing good news and condensing bad news. Adjusted ARF for both positive and negative words reported in table 1 (*adj_pos_arf* and *adj_neg_arf*) are both negative.

In order to provide a reference point for the tone dispersion measures, we examine the difference between positive and negative tone dispersion in narratives prepared for oral presentation by Presidents of the United States. In a sample of 139 State of the Union, Annual, Inaugural, and Farewell Addresses from 1901 to 2014, we find a statistically significant difference between positive and negative tone dispersion of around 3% (in untabulated results, a mean *pos_arf* of 0.59 and *neg_arf* of 0.56). These results are consistent with our conference call setting and suggest that, on average, tone words (and especially negative tone words) tend to be less evenly distributed than would be expected if word placement was random.

Table 1 also reports that the average total length of analysts' questions is 1,100 words, which is approximately one-third the length of the prepared

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[2] We calculate additional residual ARF measures by regressing *pos_arf* and *neg_arf* on *poscount* and *negcount*, respectively, and *totalcount*. The results of these analyses using the residuals are nearly identical to those reported in the paper for the *pos_arf* and *neg_arf* variables.

TABLE 1
Descriptive Statistics

Variable	Mean	Median	Std	Q1	Q3
Tone Dispersion Variables:					
pos_arf	0.570	0.573	0.052	0.540	0.603
neg_arf	0.563	0.559	0.086	0.513	0.606
adj_pos_arf	–0.067	–0.063	0.052	–0.097	–0.033
adj_neg_arf	–0.084	–0.082	0.077	–0.130	–0.037
Current Performance Variables:					
disagg_perf	1.904	1.946	0.354	1.792	2.197
loss	0.217	0	0.412	0	0
ibes_miss	0.341	0	0.474	0	1
%Δibeseps	–0.030	0.033	1.244	–0.077	0.167
poscount	53.782	48	30.069	32	70
negcount	26.644	22	19.843	13	35
roa	0.007	0.010	0.049	0.001	0.023
Financial Reporting Variables:					
%specialitems	0.023	0	0.088	0	0.009
pfcount	3.243	1	4.951	0	4
pos_earn_guide	0.044	0	0.205	0	0
neg_earn_guide	0.072	0	0.258	0	0
preann_adjret	0.000	0	0.015	0	0
Strategic Reporting Variables:					
nontrading	0.189	0	0.391	0	0
fog	14.603	14.596	1.512	13.627	15.576
Additional Variables:					
totalcount	2,844.45	2,705	1,166.55	2,043	3,476
late	0.130	0	0.336	0	0
sizemktvl	9,232.51	2,135.02	26,800.0	622.49	6,586.20
btom	0.726	0.488	3.899	0.276	0.813
lev	0.561	0.557	0.265	0.387	0.717
stdfcasteps	0.053	0.030	0.080	0.010	0.060
an_following	10.658	9	6.999	5	15
participantcount	3.587	3	1.338	3	4
Q&A Variables:					
analystnetopt	0.076	0.091	0.347	–0.167	0.333
analysttotalcount	1,100.51	1,056	481.93	753	1,391
mgrqatotalcount	2,962.24	2,871	1,321.08	1,994	3,783
mgrqaposcount	40.33	37	22.78	23	54
mgrqanegcount	20.08	17	13.19	11	26
Market Returns:					
adjret	0.13%	–0.05%	9.05%	–4.05%	4.20%
adjret_ff3pm	0.09%	0.02%	8.93%	–3.96%	4.19%

Descriptive statistics above are calculated using the 33,428 observations used in tables 2, 4, 5, and 6, except for *adjret_ff3pm*, which is based on 33,252 observations. Variables that are logged for the analyses are presented in unlogged form in this table. *%Δibeseps*, *%specialitems*, and *stdfcasteps* are winsorized at the 1st and 99th percentile due to concerns with outliers. See the appendix for variable descriptions.

remarks section of the call. Managers' responses to analysts questions are about the same length as the prepared remarks section with a word count of 2,962 on average (2,871 at the median). Managers are significantly more optimistic in their responses to analysts than analysts are in their questions.

In an untabulated analysis, we investigate the degree to which tone dispersion varies over time within a given firm, as we expect firm- and manager-specific components to narrative structure. We find that average persistence of ARF on both a quarter-to-quarter and a year-to-year basis (i.e., within-firm, serial correlations) is very high for positive (99%) and negative (98%) tone dispersion. We find that the cross-sectional correlation for positive and negative tone dispersion between firms is much lower at 32% and 24%, respectively. We incorporate this finding when we design our statistical tests.

4. *Research Design and Tests of Research Questions*

4.1 TONE DISPERSION AND CHARACTERISTICS OF FIRM DISCLOSURES

In order to address our first three research questions, we model the decision to disperse tone as a joint function of whether tone structure in the prepared narrative is related to aggregate and disaggregated performance (RQ_1), managers' financial reporting choices (RQ_2), and managers' incentives and actions to manage perceptions of firm value (RQ_3). The variables *pos_arf* and *neg_arf* are the ARF of positive words and negative words, respectively, as described above. Values closer to one (zero) suggest a more dispersed (condensed) distribution of tone words within the text of the conference call. Adjusted tone dispersion (*adj_pos_arf* and *adj_neg_arf*) is calculated as described in section 3.3.

We define all variables included in our tests in the appendix. To investigate RQ_1, we first examine whether managers' performance discussions in conference calls are related to aggregate and disaggregated current performance. We measure disaggregated current performance, *disagg_perf*, by calculating margins on the income statement categories provided by Compustat for each firm-quarter and taking the natural log of the number of these margins that improved over last quarter. Our measures of positive (negative) tone dispersion should increase (decrease) if managers discuss a greater number of improvements in the conference call narrative.

We also include several measures of aggregate earnings performance news: an indicator variable coded one if the firm has negative earnings (*loss*); an indicator variable equal to one if the firm misses analyst expectations (*ibes_miss*), and the percentage difference between the firm's actual earnings and consensus analyst expectations ($\%\Delta ibeseps$). We include both indicator and continuous variables to examine whether tone dispersion is associated with both the direction and magnitude of the news. As the level of linguistic tone conveys incremental information about firm performance (Price et al. [2012]), we include the log of the number of positive words (*poscount*), and the log of the number of negative words ($negcount$) in the prepared remarks section of the conference call to investigate whether tone is more dispersed as sentiment increases. Finally, as an alternative aggregate profitability metric, we include current return on assets (*roa*).

To examine RQ_2, we include measures of attributes related to managers' financial reporting decisions. Managers often structure their discussions of performance in order to classify expenses as income-decreasing special items and propose pro forma earnings adjustments. Our negative word list contains many words such as "abandon," "restructuring," and "writedown" that suggest discussions of earnings adjustments are related to tone dispersion. We include the magnitude of negative special items (*%specialitems*), calculated following McVay [2006] by setting positive special items equal to zero, multiplying the remaining negative special items by –1, and scaling by sales. We also include *pfcount*, calculated as the natural log of the total number of pro forma words from Black et al. [2013], in the analysis to proxy for the amount of pro forma discussion.

Tone dispersion is also likely to be affected by managers' choices to include or exclude positive or negative news. Billings, Jennings, and Lev [2014] find that more than 30% of conference calls contain management guidance. Thus, we include *pos_earn_guide* and *neg_earn_guide* to capture the inclusion of positive and negative EPS guidance. We capture the effect of positive and negative discussions of future earnings using First Call. If First Call identifies earnings guidance on the date coincident with our conference call, we code the news of that guidance using the Guide_Code variable in the database. Prior research finds that managers divide earnings news into two components: a component (often negative) that is preannounced as a "warning" prior to the official earnings release and a remaining component at the earnings announcement (e.g., Soffer, Thiagarajan, and Walther [2000]). Tone dispersion in the conference call will likely be affected by the extent to which managers shift negative news to the preannouncement. We measure preannouncement news as the three-day market-adjusted holding period return (*preann_adjret*) surrounding the earnings preannouncement date or zero if no preannouncement was made.

To examine RQ_3, we first investigate whether tone dispersion is related to extreme performance. Prior research indicates that managers prefer to "ratchet down" expectations of future earnings when they report large earnings surprises (DeFond and Park [1997], Graham, Harvey, and Rajgopal [2005]). As such, managers should emphasize bad news when doing so helps them to avoid future negative earnings surprises (Soffer, Thiagarajan, and Walther [2000]). Similarly, managers can "bunch" together the disclosure of multiple pieces of bad news to reduce the total negative market reaction and mitigate the negative impact of individual bad news (Kasznik and Lev [1995], Libby and Tan [1999], Richardson, Teoh, and Wysocki [2004], Kothari, Shu, and Wysocki [2009]). Consistent with this strategy, we expect that managers decrease (increase) positive (negative) tone dispersion to draw attention to bad news when earnings are very high or very low. To examine this possibility, we include *linguistic_bath* (*ratchet_down*), an indicator variable coded one if the value of actual EPS less than I/B/E/S consensus expectations is in the lowest (highest) decile of all observations in the sample, and zero otherwise. Prior research also

finds that managers disclose bad news after trading hours to mute the market response to the news (Patell and Wolfson [1982], Francis, Pagach, and Stephan [1992]). We include an indicator variable if the conference call was made during nontrading hours or weekends (*nontrading*). Finally, prior research finds evidence that managers strategically hide adverse information through less readable disclosures (Li [2008]). Thus, we include the Fog Index (*fog*) of the prepared remarks section of the conference call.

We include a number of additional variables to examine the relationship between tone dispersion and firm- and call-specific characteristics. We include the log of the number of total words (*totalcount*) to examine the effect of disclosure length on the level of tone and tone dispersion. Since Chen, Demers, and Lev [2012] find that tone is related to the timing of the conference call, we include a variable indicating whether the call is made late (*late*) in the day (i.e., after 3:59 PM EST). We include firm size (*sizemktvl*) to examine whether the managers of large firms, who are likely more sophisticated, use tone dispersion to a greater degree than other managers. We include the firm's book-to-market ratio (*btom*) to see whether managers of growth firms, which are under higher pressure to meet expectations (Skinner and Sloan [2002]), are more likely to structure tone. Similar to Chen, Demers, and Lev [2012], we include leverage (*lev*), defined as total liabilities divided by total assets, to proxy for the degree to which firm managers use debt versus equity to finance investments. Firms with more equity in their capital structure are likely more sensitive to investors' reaction to their earnings news. To examine the possibility that managers are more likely to use tone dispersion when uncertainty about the firm is high, we include the standard deviation of analyst forecasts prior to the call (*stdfcasteps*). Additionally, we include the degree of analyst coverage for the firm (*an_following*), calculated as the natural log of the number of analysts forecasting EPS estimates one month prior to the conference call, to proxy for interest in firm earnings by sophisticated market participants. We include *participantcount,* the number of managers in the prepared remarks section of the conference call, to see whether the presence of additional speakers affects tone dispersion. Consistent with our finding that the persistence of tone dispersion is very high, we include firm fixed effects to control for firm- and manager-specific factors. Finally, prior research finds evidence that managers use quarterly voluntary disclosures to "walk down" analysts to a beatable annual consensus forecast (Soffer, Thiagarajan, and Walther [2000], Richardson, Teoh, and Wysocki [2004]), so we include quarterly fixed effects in the model.

We present our results in the multivariate regressions reported in table 2. Columns 1 and 3 report results for our unadjusted ARF measures (*pos_arf* and *neg_arf*), while columns 2 and 4 report the results for the adjusted ARF measures *adj_pos_arf* and *adj_neg_arf.*

Consistent with an association between tone dispersion and discussions of aggregate and disaggregated performance (RQ_1), table 2 indicates that tone dispersion is significantly related to aggregate and disaggregated

TABLE 2

Tone Dispersion and Current Performance, Financial Reporting, and Strategic Reporting Variables

Dependent	*pos_arf*		*adj_pos_arf*		*neg_arf*		*adj_neg_arf*	
Variable	Coeff	*t*-stat	Coeff	*t*-stat	Coeff	*t*-stat	Coeff	*t*-stat
Current Performance Variables:								
disagg_perf	0.002	2.13**	0.002	1.77*	–0.008	–4.91***	–0.006	–4.03***
loss	−0.002	−1.43	−0.002	−1.72*	−0.002	−1.02	−0.003	−2.09**
ibes_miss	−0.004	−5.01***	−0.004	−4.90***	0.003	2.81***	0.002	1.73*
%Δibeseps	0.000	0.72	0.000	0.79	0.001	1.04	0.001	1.22
poscount	−0.003	−1.25	0.009	4.69***	−0.010	−4.48***	−0.006	−2.75***
negcount	−0.005	−5.23***	−0.004	−4.95***	−0.064	−30.14***	−0.031	−21.25***
roa	0.000	−0.04	0.002	0.18	0.000	0.01	0.007	0.50
Financial Reporting Variables:								
%specialitems	−0.015	−3.39***	−0.013	−3.02***	0.022	3.75***	0.016	2.86***
pfcount	−0.004	−5.94***	−0.004	−6.21***	−0.001	−1.13	−0.001	−1.03
pos_earn_guide	0.004	2.69***	0.004	2.56**	−0.002	−0.72	−0.002	−0.84
neg_earn_guide	−0.002	−1.19	−0.001	−1.07	0.006	2.84***	0.004	2.00**
preann_adjret	0.000	0.00	0.001	0.03	−0.020	−0.82	−0.014	−0.58
Strategic Reporting Variables:								
linguistic_bath	−0.002	−1.01	−0.001	−0.88	0.006	2.67***	0.005	2.36**
ratchet_down	−0.003	−2.08**	−0.003	−2.47**	0.005	2.66***	0.005	2.49**
nontrading	0.003	2.00**	0.003	1.89*	−0.001	−0.61	−0.002	−0.71
fog	0.001	3.61***	0.001	3.22***	0.001	2.07**	0.001	1.72*
Additional Variables:								
totalcount	0.002	0.74	−0.002	−0.77	0.048	11.27***	0.033	9.32***
late	0.001	0.66	0.001	0.64	−0.002	−0.78	−0.002	−0.89
sizemktvl	0.001	0.65	0.000	0.42	−0.010	−7.12***	−0.007	−4.84***
btom	0.000	−0.16	0.000	−0.31	0.000	0.52	0.000	0.72
lev	0.001	0.18	0.000	0.06	−0.009	−1.34	−0.008	−1.44
stdfcasteps	−0.014	−2.18**	−0.014	−2.18**	0.033	3.54***	0.022	2.54**
an_following	0.002	1.28	0.002	1.20	0.009	4.28***	0.007	3.68***
participantcount	0.000	−1.28	−0.001	−1.47	−0.001	−1.30	−0.001	−1.90*
Firm Fixed Effects	Included		Included		Included		Included	
Year Fixed Effects	Included		Included		Included		Included	
Qtr Fixed Effects	Included		Included		Included		Included	
Adj. R^2	23.34%		25.10%		24.34%		14.65%	
n	33,428		33,428		33,428		33,428	

The dependent variables in the fixed effects regression models estimated above are listed as column headers. See the appendix for variable descriptions. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively (two-tailed). We test for statistical significance of the parameter estimates by using heteroskedasticity robust standard errors clustered by firm in our regressions. *%Δibeseps*, *%specialitems*, and *stdfcasteps* are winsorized at 1st and 99th percentile due to concerns with outliers.

performance. We find that positive (negative) tone is more (less) dispersed when the firm has improvements in multiple components of earnings (*t*-stat = 2.13 and –4.91, respectively) and positive (negative) tone is more condensed (dispersed) when the firm misses I/B/E/S expectations (*ibes_miss*) (*t*-stat = –5.01 and 2.81).[3] Although of marginal economic

[3] Our results are robust to including alternative measures of earnings news such as standardized unexpected earnings (SUE) and unscaled unexpected earnings variables. Although

significance, these findings suggest that performance news is a significant factor in tone dispersion. Managers also tend to spread out good news when they have more positive things to say (*t*-stat = 4.69 for *adj_pos_arf* on *poscount*) but condense bad news when they have more bad news to share (*t*-stat > 20 for *neg_arf* and *adj_neg_arf* on *negcount*), suggesting that the relationship between tone dispersion and performance is asymmetric.

Given prior research on the future value implications of news in earnings components (Penman [1992], Elliott, Hobson, and Jackson [2011]), we also examine whether tone dispersion is associated with future aggregate and disaggregated performance. In an untabulated analysis, we include two measures in the model in table 2: future disaggregated performance (*disagg_perform_f1*) and future return on assets (*roa_f1*), both of which are calculated in the same quarter one year ahead. While we find no evidence that tone dispersion is predictive of future disaggregated performance, positive tone dispersion is marginally positively associated with *roa_f1* (*t*-stat = 1.86 and 1.84 for *pos_arf* and *adj_pos_arf*, respectively) and negative tone dispersion is marginally negatively associated with *roa_f1* (*t*-stat = –1.72 and –1.88 for *neg_arf* and *adj_neg_arf*, respectively).

In examining RQ_2, we find evidence that tone dispersion is associated with managers' financial reporting choices. Table 2 indicates that positive (negative) tone dispersion decreases (increases) when managers have more negative special items to discuss and positive tone dispersion decreases when managers expand their discussion of pro forma earnings. We examine this relationship further in our evaluation of RQ_3. In addition, consistent with a relationship between tone dispersion and discussions of future earnings, positive (negative) tone dispersion increases in the presence of positive (negative) earnings guidance. We find no evidence of an association between tone dispersion and preannouncement returns.[4] Overall, it appears that tone dispersion is related to managers' choices about how to frame current earnings by including or excluding components of current performance and future performance in their disclosure narratives.

With respect to RQ_3, we find that the associations between *neg_arf* and both very low and very high levels of performance (*linguistic_bath* and *ratchet_down*) are positive and significant (*t*-stats of 2.67 and 2.66). Additionally, the association between *pos_arf* and higher performance levels (*ratchet_down*) is significantly negative. These results are consistent with managers emphasizing bad news and drawing attention away from

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there are significant correlations between *ibes_miss* and %Δ*ibeseps*, the variance inflation factors (VIFs) from the model are 2.26 VIF for %Δ*ibeseps* and 1.44 for *ibes_miss*, suggesting no empirical issues. Additionally, the inferences on the variables of interest remain unchanged if either is excluded from the models.

[4] Results are not sensitive to replacing *preann_adjret* with indicator variables for preannouncements with positive, negative, and no news relative to I/B/E/S expectations at the time of the preannouncement.

good news in order to temper expectations of extreme performance and emphasizing bad news when they are incentivized to take a linguistic "big bath." We also find that managers disperse positive tone more when the conference call takes place outside of trading hours (t-stat = 2.00), suggesting a slight complementary relationship between these strategies. We find that both positive and negative tone dispersion are negatively associated with the readability of the conference call, providing mixed evidence of an association between obfuscation and tone dispersion. This finding is consistent with the observation that reduced readability can be either strategic or informative (Li [2008], Bushee, Gow, and Taylor [2014]). On the whole, our results suggest that tone dispersion is associated with strategic reporting decisions.

Results reported in table 2 on additional variables suggest that tone dispersion is also related to the total count of words in the prepared remarks section of the call, size of the firm, analyst uncertainty, the number of analysts following the firm, and the number of participants on the call. One item of note is that larger firms seem to disperse negative tone less than smaller firms (t-stat = –7.12). One explanation for this finding is that the use of tone dispersion in reporting is related to the sophistication of management or the ability of managers of larger firms to hire editors for their prepared remarks.

We note that the model fit increases significantly (from about 7% to 23% for *pos_arf* and 14% to 24% for *neg_arf*) when firm fixed effects rather than industry fixed effects are included, consistent with a significant firm-specific component to tone dispersion. In addition, we observe a statistically significant ($p < 0.01$) difference between the adjusted R^2 on the model with *adj_neg_arf* (14.65%) and *neg_arf* (24.34%), suggesting that it is particularly important to adjust for the mechanical relationship between tone dispersion and tone level for *neg_arf*. The low model fit for *adj_neg_arf* compared to the other measures, and particularly *adj_pos_arf*, further suggests that there are key differences in the structure of good and bad news in disclosure narratives.

To provide additional evidence regarding RQ_3, we examine whether tone dispersion is associated with classification shifting by managers and the strategic use of special items. McVay [2006] provides evidence that managers reclassify positive nonrecurring items as core earnings and negative recurring items as special items in order to inflate perceptions of firm performance. Managers who engage in classification shifting are likely reluctant to disaggregate total earnings into its components if doing so reveals these manipulations. On the other hand, some disaggregation is necessary in order to suggest earnings exclusions. In order to investigate whether tone dispersion is related to classification shifting, and thus to expectations management, we follow the testing procedure in McVay [2006] and Fan et al. [2010]. We calculate expected core earnings (sales minus cost of goods sold and SG&A, scaled by sales) by regressing core earnings on core earnings from the prior year and quarter, asset turnover,

accruals from the prior quarter and year, current year change in sales, the magnitude of negative sales (equal to sales if sales are negative and zero otherwise), and returns for the current quarter and the quarter previous. We estimate this regression by industry and quarter-year and exclude the firm quarter-year of interest for each regression. Unexpected core earnings is calculated as the actual value of core earnings minus this estimate.

In order to test the relationship between tone dispersion and classification shifting, we regress unexpected core earnings on the percentage of negative special items (*%specialitems*). We then interact our tone dispersion measures with *%specialitems* to examine whether tone dispersion moderates the relationship between negative special items and unexpected core earnings. Fan et al. [2010] note that a positive coefficient on the interaction, which suggests a more positive relationship between negative special items and unexpected core earnings, is consistent with higher classification shifting in the presence of the variable of interest. We also include and interact the length of the prepared remarks section and the total number of positive and negative words in order to see whether levels of tone and disclosure are associated with classification shifting, and control for size, book-to-market ratio, leverage, whether the call is held during trading hours, analyst following, and the standard deviation of analyst forecasts.

Table 3 presents the results of our classification shifting analysis. The coefficients on the interactions between *pos_arf* (*adj_pos_arf*) and *%specialitems* are significantly positive (negative), suggesting that positive tone is more dispersed in the presence of classification shifting, and the coefficients on the interactions between *neg_arf* (*adj_neg_arf*) and *%specialitems* are (marginally) significantly negative, suggesting that negative tone is less dispersed in the presence of classification shifting. These results are consistent with managers shifting positive (negative) news to core earnings (special items) while also dispersing positive (condensing negative) tone in order to make that classification more convincing. Inconsistent with the findings in Fan et al. [2010], the coefficient on *%specialitems* is not significant unless we exclude the interactions.[5] Our results are unaffected when we use our measures of adjusted ARF.

4.2 TONE DISPERSION AND USERS' RESPONSES

In examining RQ_4, we test whether analysts' tone in their questions during the Q&A is associated with the structure of tone in the prepared remarks section. We model analysts' tone as a function of financial reporting news, firm characteristics, and the ARF measures. The dependent variable in the regression is *analystnetopt* (the total number of positive words minus

[5] The variance inflation factors (VIFs) on the *%specialitems* × *neg_arf* interaction suggests that multicollinearity may affect our results.

TABLE 3
Tone Dispersion and Classification Shifting

	Unexpected_CoreEarnings			
Dependent Variable	Coeff	*t*-stat	Coeff	*t*-stat
%specialitems	0.816	1.18	1.283	1.93*
pos_arf	−0.020	−0.78	—	—
neg_arf	0.010	0.59	—	—
adj_pos_arf	—	—	–0.021	–0.80
adj_neg_arf	—	—	0.010	0.60
%specialitems × *pos_arf*	1.301	2.74**	—	—
%specialitems × *neg_arf*	–0.556	–1.70*	—	—
%specialitems × *adj_pos_arf*	—	—	1.304	2.75***
%specialitems × *adj_neg_arf*	—	—	–0.612	–1.75*
poscount	0.006	1.54	0.006	1.59
negcount	−0.005	−2.01**	−0.005	−2.16**
%specialitems × *poscount*	0.062	0.79	0.052	0.68
%specialitems × *negcount*	0.068	1.21	0.074	1.30
nontrading	0.005	1.21	0.005	1.21
totalcount	−0.005	−0.70	−0.005	−0.70
%specialitems × *totalcount*	−0.216	−1.62	−0.213	−1.61
late	−0.002	−0.37	−0.002	−0.37
sizemktvl	0.005	2.78***	0.005	2.78***
btom	0.001	0.93	0.001	0.92
lev	0.003	0.28	0.003	0.29
stdfcasteps	−0.019	−0.65	−0.019	−0.66
an_following	−0.006	−1.80*	−0.006	−1.81*
Intercept	−0.003	−0.06	−0.010	−0.19
Adj. R^2	0.80%		0.80%	
n	13,051		13,051	

See the appendix for variable descriptions. We test for statistical significance of the parameter estimates by using heteroskedasticity robust standard errors clustered by firm in our regressions. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively (two-tailed). *%specialitems* and *stdfcasteps* variables are winsorized at the 1st and 99th percentile due to concerns with outliers.

the total number of negative words as a percentage of the total number of positive and negative words in analysts' Q&A). The variables of interest are the tone dispersion variables (*pos_arf* and *neg_arf*) and the adjusted tone dispersion variables (*adj_pos_arf* and *adj_neg_arf*). A significantly positive coefficient on *pos_arf* or *adj_pos_arf* and a significantly negative coefficient on *neg_arf* or *adj_neg_arf* indicates that managers' dispersion of positive (negative) news is associated with more (less) optimistic tone in analysts' questions.

We include variables for earnings news and firm and conference call characteristics from the prior analysis and add additional variables to reflect characteristics of the Q&A section of the conference call. First, we include the total number of analysts' words in the Q&A (*analysttotalcount*). Since analyst tone in later questions will likely be affected by managers' responses to their earlier questions, we also include *mgrqatotalcount*, the natural log of the total number of words used by managers in the Q&A section of the conference call, and *mgrqaposcount* (*mgrqanegcount*), the natural log of the

number of positive (negative) words used by managers in the Q&A section of the conference call.[6]

Table 4 reports the results from regressing analyst net optimism on our variables of interest. Column 1 (2) presents the results for *pos_arf* and *neg_arf* (*adj_pos_arf* and *adj_neg_arf*). These results suggest that analysts' net optimism is associated with the degree to which managers disperse tone in the prepared remarks section of the conference call. Consistent with an affirmative answer for RQ_4, analysts ask questions with more positive (fewer negative) words when managers disperse (condense) their discussions of positive (negative) news. These results are consistent with our expectation that dispersing positive (negative) tone throughout a narrative is perceived more positively (negatively) by users. The magnitude of the coefficients on *pos_arf* (*neg_arf*) relative to the coefficients on *poscount* (*negcount*) interpreted at the mean suggests that a 1% increase in *pos_arf* (*neg_arf*) has approximately the same effect on analyst net optimism as a 1% increase in *poscount* (*negcount*).

We note that an alternative interpretation of the results is possible. Cohen, Lou, and Malloy [2013] find that managers hide bad news in conference calls by calling on analysts with more optimistic views on the firm. This strategy may complement the use of tone dispersion, leading to the observed associations.

Finally, we model the degree to which tone dispersion in narratives is associated with investor perceptions of firm value. We investigate the relationship between tone dispersion and the market response to the conference call by regressing the three-day, market-adjusted cumulative abnormal return surrounding the conference call date (the day before, the day of, and the day after) on our ARF measures.

Columns 1 and 2 of table 5 present the results on *adj_pos_arf* and *adj_neg_arf* when we adjust for market returns *(adjret)* and a Fama-French three-factor model plus a momentum factor *(adjret_ff3pm)*. We find that market-adjusted and Fama-French returns are statistically significantly lower when negative tone is dispersed. We also find that market-adjusted returns are marginally significantly higher (t-stat = 1.83) when positive tone is dispersed, but this relationship becomes insignificant when we use Fama-French returns. These results suggest that more dispersed positive (negative) tone is perceived more positively (negatively) by market participants. Similar to the results on analyst net optimism, the magnitude of the coefficients on *pos_arf* (*neg_arf*) relative to the coefficients on *poscount* (*negcount*) suggest that a 1% increase in *pos_arf* (*neg_arf*) has approximately the same effect on investors as a 1% increase in *poscount* (*negcount*). We note that the coefficient in the fixed effect regression excludes the between-firm variation, so the total effect may be larger, but the results in both statistical and economic terms are modest. We also find that market returns

[6] Because management response in the Q&A is largely extemporaneous, we do not anticipate that their answers are structured as in the prepared remarks section.

TABLE 4

Tone Dispersion and Analyst Q&A Net Optimism

	analystnetopt		*analystnetopt*	
Dependent Variable	Coeff	*t*-stat	Coeff	*t*-stat
Tone Dispersion Variables:				
pos_arf	0.142	3.41***	—	—
neg_arf	−0.079	−3.33***	—	—
adj_pos_arf	—	—	0.134	3.16***
adj_neg_arf	—	—	–0.060	–2.37**
Prior Model Variables:				
disagg_perf	−0.001	−0.18	−0.001	−0.12
loss	0.010	1.29	0.010	1.28
ibes_miss	−0.057	−11.49***	−0.057	−11.52***
%Δibeseps	−0.002	−0.94	−0.002	−0.95
poscount	0.076	9.19***	0.075	9.00***
negcount	−0.070	−13.98***	−0.067	−13.89***
roa	−0.093	−1.41	−0.093	−1.40
%specialitems	−0.024	−0.83	−0.025	−0.87
pfcount	0.000	0.04	0.000	0.04
pos_earn_guide	0.023	2.34**	0.023	2.35**
neg_earn_guide	−0.050	−5.57***	−0.050	−5.59***
preann_adjret	0.036	0.30	0.036	0.30
linguistic_bath	0.003	0.26	0.002	0.24
ratchet_down	0.031	3.86***	0.031	3.85***
nontrading	−0.003	−0.30	−0.003	−0.29
fog	−0.004	−1.99**	−0.004	−1.99**
totalcount	−0.031	−2.23**	−0.033	−2.32**
late	−0.023	−2.03**	−0.023	−2.03**
sizemktvl	0.029	5.00***	0.029	5.09***
btom	−0.004	−2.89***	−0.004	−2.89***
lev	−0.005	−0.19	−0.005	−0.18
stdfcasteps	−0.064	−1.67*	−0.065	−1.71*
an_following	−0.011	−1.37	−0.011	−1.40
participantcount	−0.002	−0.88	−0.002	−0.88
Q&A Variables:				
analysttotalcount	0.006	0.82	0.006	0.83
mgrqatotalcount	−0.026	−2.19**	−0.026	−2.18**
mgrqaposcount	0.160	21.99***	0.160	22.00***
mgrqanegcount	−0.138	−27.24***	−0.139	−27.32***
Firm Fixed Effects	Included		Included	
Year Fixed Effects	Included		Included	
Qtr Fixed Effects	Included		Included	
Adj. R^2	25.85%		25.83%	
n	33,428		33,428	

The dependent variable in the fixed effects regression models estimated above is analyst net optimism in the Q&A session of the conference call. See the appendix for variable descriptions. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively (two-tailed). We test for statistical significance of the parameter estimates by using heteroskedasticity robust standard errors clustered by firm in our regressions. *%Δibeseps*, *%specialitems*, and *stdfcasteps* are winsorized at the 1st and 99th percentile due to concerns with outliers.

TABLE 5
Tone Dispersion and Market Returns

	adjret		*adjret_ff3pm*	
Dependent Variable	Coeff	*t*-stat	Coeff	*t*-stat
Tone Dispersion Variables:				
adj_pos_arf	0.021	1.83*	0.018	1.57
adj_neg_arf	−0.015	−2.16**	−0.015	−2.15**
Analyst Net Optimism:				
analystnetopt	0.024	13.48***	0.024	13.11***
Prior Model Variables:				
disagg_perf	0.008	4.20***	0.007	4.16***
loss	0.001	0.30	0.001	0.35
ibes_miss	−0.029	−20.13***	−0.030	−20.40***
%Δibeseps	0.003	3.04***	0.002	2.65***
poscount	0.009	4.03***	0.011	4.55***
negcount	−0.006	−4.51***	−0.005	−3.89***
roa	0.055	2.23**	0.049	1.91*
%specialitems	0.003	0.31	0.005	0.47
pfcount	0.000	−0.23	0.000	−0.13
pos_earn_guide	0.035	11.98***	0.034	11.58***
neg_earn_guide	−0.038	−14.38***	−0.037	−14.27***
preann_adjret	−0.174	−5.00***	−0.181	−5.05***
linguistic_bath	−0.005	−1.52	−0.006	−1.74*
ratchet_down	0.021	7.59***	0.022	7.77***
nontrading	−0.001	−0.22	0.002	0.73
fog	−0.001	−1.63	−0.001	−1.13
totalcount	−0.006	−1.51	−0.009	−2.19**
late	−0.004	−1.15	−0.003	−0.96
sizemktvl	−0.009	−4.14***	−0.011	−5.14***
btom	−0.002	−2.33**	−0.001	−1.09
lev	0.014	1.77*	0.010	1.35
stdfcasteps	0.052	3.78***	0.046	3.39***
an_following	−0.012	−4.85***	−0.010	−4.15***
participantcount	0.000	−0.02	0.000	−0.06
analysttotalcount	−0.001	−0.53	−0.001	−0.39
mgrqatotalcount	−0.006	−1.92*	−0.006	−1.97**
mgrqaposcount	0.008	4.21***	0.008	4.43***
mgrqanegcount	−0.005	−3.92***	−0.006	−4.52***
Firm Fixed Effects	Included		Included	
Year Fixed Effects	Included		Included	
Qtr Fixed Effects	Included		Included	
Adj. R^2	11.87%		11.73%	
n	33,428		33,252	

The dependent variables in the fixed effects regression models estimated above are listed as column headers. See the appendix for variable descriptions. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively (two-tailed). We test for statistical significance of the parameter estimates by using heteroskedasticity robust standard errors clustered by firm in our regressions. *%Δibeseps, %specialitems,* and *stdfcasteps* are winsorized at the 1st and 99th percentile due to concerns with outliers.

TABLE 6
Combined Tone Dispersion

Panel A: Variables	Mean	Median	Std	Q1	Q3
Combined Tone Dispersion Variables:					
pos_arf – neg_arf	0.007***	0.012***	0.098	–0.046	0.067
adj_pos_arf – adj_neg_arf	0.016***	0.017***	0.091	–0.039	0.073
pos_arf / neg_arf	1.035	1.021	0.182	0.922	1.129

Panel B: Results

	analystnetopt		*analystnetopt*		*adjret*		*adjret*		*adjret_ff3pm*		*adjret_ff3pm*	
Dependent Variable	Coeff	*t*-stat	Coeff	*t*-stat	Coeff	*t*-stat	Coeff	*t*-stat	Coeff	*t*-stat	Coeff	*t*-stat
Tone Dispersion Variables:												
adj_pos_arf – adj_neg_arf	0.081	3.65***	—	—	0.012	2.50**	—	—	0.016	2.65***	—	—
pos_arf / neg_arf	—	—	0.042	3.74***	—	—	0.009	2.96***	—	—	0.009	2.79***
Analyst Net Optimism:												
analystnetopt	—	—	—	—	0.024	13.48***	0.024	13.48***	0.024	13.11***	0.024	13.11***
Additional Model Variables	Included		Included		Included		Included		Included		Included	
Firm Fixed Effects	Included		Included		Included		Included		Included		Included	
Year Fixed Effects	Included		Included		Included		Included		Included		Included	
Qtr Fixed Effects	Included		Included		Included		Included		Included		Included	
Adj. R^2	25.84%		25.84%		11.88%		11.88%		11.73%		11.73%	
n	33,428		33,428		33,428		33,428		33,252		33,252	

The dependent variables in the fixed effects regression models estimated above in panel B are listed as column headers. See the appendix for variable descriptions. ***, **, and * in panel A indicate mean and median differences from zero with significance at the 1%, 5%, and 10% levels, respectively (two-tailed). ***, **, and * in panel B indicate significance of the *t*-statistics at the 1%, 5%, and 10% levels, respectively (two-tailed). We test for statistical significance of the parameter estimates by using heteroskedasticity robust standard errors clustered by firm in our regressions. *%Δibeseps*, *%specialitems*, and *stdfcasteps* are winsorized at the 1st and 99th percentile due to concerns with outliers.

are positively associated with analyst net optimism. Since analysts ask more optimistic questions when positive (negative) tone is dispersed (condensed), this evidence suggests that the effect of tone dispersion on analysts' perceptions of firm value has market implications.

We also consider whether a measure combining positive and negative tone dispersion is associated with analysts' net optimism in the Q&A section of the conference call and the market response to the earnings announcement. We investigate this additional measure because we do not expect that managers will structure positive or negative tone in isolation. Rather, we expect that managers simultaneously disperse positive tone and condense negative tone to achieve a desired response. We also perform this analysis because discussions on numerous websites and management handbooks prescribe "best" practices for giving news that are intuitively appealing but largely anecdotal (Lickerman [2013], Bies [2012], Sun [2011]). For instance, some recommend a method of softening negative news by delivering the poor performance encased within a "bad news sandwich," or following a good-bad-good pattern (Buron and McDonald-Mann [2007], Dohrenwend [2002], Kay and Meyer [1965]). On the other hand, recent research finds that, although recipients may be pleased to end on a high note, they are "unlikely to enjoy anxiously waiting for the other shoe to drop during the initial good news" (Legg and Sweeny [2014]). Since these strategies relate to the placement of news within disclosure narratives, tone dispersion provides some insight into their effectiveness.

We construct two joint measures of the degree to which managers disperse positive tone and condense negative tone simultaneously: *pos_arf* minus *neg_arf* and *pos_arf* divided by *neg_arf*. We also construct a measure using the adjusted ARF measures by subtracting *adj_neg_arf* from *adj_pos_arf*.[7] Table 6, panel A reports univariate statistics for these measures. We find a statistically significant, but practically small, difference between the degree to which managers disperse positive and negative tone. Table 6, panel B reports that the combined measure is highly significantly associated (p-value less than 0.01 for five out of six specifications, less than 0.05 for the sixth) with analyst and market reactions to the conference call. These results are stronger than our findings in tables 4 and 5, indicating that a combined measure of tone dispersion better captures the effect of tone dispersion on users. This suggests that considering the joint strategies managers use to report good and bad news has more explanatory power than considering these strategies in isolation.

5. *Conclusion*

We develop and use a measure of tone dispersion to investigate the role of narrative structure in firm communications. We find evidence

[7] We do not include a measure of *adj_pos_arf* divided by *adj_neg_arf* because *adj_neg_arf* can be positive or negative, which could affect the inferences based on this measure.

suggesting that tone dispersion reflects underlying performance news, managers' financial reporting choices, and managers' incentives and actions to manage perceptions. We also find that analysts and investors respond more negatively to firm disclosures when negative tone is more dispersed and more positively when positive tone is more dispersed.

We acknowledge several limitations. First, our results depend on the "bag-of-words" approach accurately measuring tone. Second, the dispersion of tone within disclosure narratives does not directly identify positive or negative news items a firm discusses. Third, while a parsimonious measure of tone structure, ARF does not capture other characteristics of narrative structure, such as the order in which managers discuss good and bad news. Finally, we do not fully explore the extent to which narrative structure is exogenously determined by the nature and the magnitude of underlying economic news and the extent to which it is due to managerial discretion.

This study makes several contributions. First, it sheds light on managers' use of language to convey information about firm performance. Second, we identify associations between managers' financial reporting choices and tone dispersion that should prove useful for future disclosure research. Third, we provide insight into disclosure behaviors that suggest whether managers are being informative or opportunistic. Finally, we identify a characteristic of disclosure narratives that is associated with analysts' and investors' response to firm disclosures.

Future research can build on these results by examining the properties of tone dispersion in other voluntary disclosures, such as the letter to shareholders, or mandatory disclosures, such as the Management's Discussion and Analysis section of the annual report. A difference in tone dispersion between these two sets of reports could provide insight into the extent to which tone dispersion reflects strategic behavior by managers. Another potential area of research would be to examine manager-specific tone dispersion measures and the extent to which individual managers vary their dispersion of tone. Potentially most interesting, future research can examine other applications for linguistic dispersion (i.e., besides tone) and whether other elements of structure in conference call narratives (i.e., scenarios, thesis statements, attribution of results, repetition of the text, topic order, and/or word placement) have implications for voluntary disclosure and accounting information.

APPENDIX

Variable Definitions

Variable	Definition
Dependent Variables	
pos_arf (neg_arf)	The dispersion of positive (negative) words in the prepared remarks section of conference calls.
adj_pos_arf (adj_neg_arf)	The adjusted dispersion of positive (negative) words calculated as *pos_arf* (*neg_arf*) less the expected tone dispersion measure based on the simulation described in section 3.3.
Unexpected_ CoreEarnings	Unexpected core earnings as calculated in Fan et al. [2010] by regressing core earnings on its determinants by industry quarter-year, excluding the firm year-quarter of interest, and subtracting the actual value of core earnings from the fitted values of that regression.
analystnetopt	The total number of positive words less total number of negative words divided by total number of positive and negative words in analysts' Q&A.
adjret (adjret_ff3pm)	The three-day market-adjusted (Fama-French three factor plus momentum adjusted) holding period returns surrounding the conference call date [–1,0,1].
Independent and Additional Variables of Interest	
disagg_perf	The logarithm of the number of items on the income statement that represent increases in income increasing items (e.g., sales) or decreases in income decreasing items (e.g., expenses) using all items reported in the Compustat quarterly database. The measure is calculated by common sizing all items (except sales) by sales and comparing the margins to the same quarter last year.
loss	One if actual EPS is less than zero, zero otherwise.
ibes_miss	One if actual EPS is less than I/B/E/S consensus expectations, zero otherwise.
%Δibeseps	Percent difference in actual EPS relative to I/B/E/S consensus expectations, calculated as actual EPS less than I/B/E/S consensus expectations divided by the absolute value of median I/B/E/S consensus expectations. If median I/B/E/S consensus expectations equal zero, mean I/B/E/S consensus expectations are utilized.
poscount (negcount)	Logarithm of total number of positive (negative) words in the prepared remarks section of the conference call.
roa	Return on assets calculated as quarterly net income divided by average total assets (lagged quarterly).
pos_earn_guide (neg_earn_guide)	One if the conference call contains positive (negative) EPS guidance, zero otherwise.
%specialitems	Negative special items as a percentage of sales, where positive special items are set equal to zero and negative special items are multiplied by –1.

Variable	Definition
preann_adjret	Equal to the three-day market-adjusted holding period returns surrounding the earnings preannouncement date (–1,0,1), zero if no preannouncement was made.
pfcount	Logarithm of the total number of pro forma words in the prepared remarks section of the conference call. We use the word list from Christensen et al. [2011].
fog	The Fog Index of the prepared remarks section of the conference call.
linguistic_bath	One if the difference between actual EPS and I/B/E/S consensus expectations is in the lowest decile of all observations, zero otherwise.
ratchet_down	One if the difference between actual EPS and I/B/E/S consensus expectations is in the highest decile of all observations, zero otherwise.
nontrading	One if the conference call occurs after 5 PM EST or on a weekend, zero otherwise.
totalcount	Logarithm of total words in the prepared remarks section of the conference call.
late	One if the conference call occurs after 4 PM EST, zero otherwise.
sizemktvl	Logged market capitalization.
btom	Book-to-market ratio calculated as total current equity divided by *sizemktvl*.
lev	Total liabilities to assets ratio.
stdfcasteps	Standard deviation of analysts' forecasts.
an_following	Number of analysts forecasting EPS estimates for the earnings announcement.
participantcount	Number of managers speaking in the prepared remarks section of the conference call.
analysttotalcount	Logarithm of total word count in analysts' questions in the Q&A of the conference call.
mgrqatotalcount	Logarithm of total word count used by managers in the Q&A of the conference call.
mgrqaposcount (*mgrqanegcount*)	Logarithm of total number of positive (negative) words used by managers in the Q&A of the conference call.

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