

Working Paper

Sources of Analyst Expertise

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Sources of Analyst Expertise

Abstract

Financial analysts' source of information can theoretically arise both from private access to information and/or a superior ability to process public information. The first source is established by studies on private analyst-management interactions. Establishing the second source requires measuring analyst reactions immediately after the release of public information. We measure each analyst's comment tone when she engages management in earnings conference calls right after their presentation. Each analyst's tone predicts her future calls on the company. Stock price responds to analyst tone almost immediately, during the Q&A period. Analysts thus appear to have superior ability to process public information.

Keywords: analysts, conference calls, belief revisions

Sources of Analyst Expertise

1. Introduction

Grossman and Stiglitz (1980) argue that equilibrium in financial markets exists only when information is costly to obtain. In this equilibrium, only a subset of capital markets participants chooses to obtain information. Finance research has therefore extensively examined a particular type of informed capital market participant, namely sell-side financial analysts. The expertise of sell-side analysts in financial markets is well-established by researchers, who have documented significant market reactions to analyst outputs (e.g., Brav and Lehavy, 2003; Bradley et al., 2014). These findings have led to calls for understanding the sources of analyst expertise – the so-called “opening the black box of analysts” (Bradshaw 2014). Theory suggests two broad sources of analyst expertise: (1) analysts can have access to private information about firm value not available to other traders (Grossman and Stiglitz, 1980); and, (2) this private information and/or some other forms of innate insight and experience make analysts better than other traders at processing the firm’s public disclosures and updating their beliefs about firm value (Kim and Verrecchia, 1994).¹ Differentiating between these two modes of information acquisition is important not just to better understand how analysts operate, but also to better understand the far deeper capital markets question of whether public disclosures increase or decrease the value of sophisticated capital market information intermediaries such as analysts (Healy and Palepu 2001, Section 6.2c; Beyer et al., 2010, Section 5.2.1).

Prior research has shown evidence of (1), i.e., that analysts have private access to valuable information in settings such as private conferences (Bushee, Jung, and Miller, 2011; Green et al.,

¹ Public disclosure is therefore a substitute to Grossman and Stiglitz’s (1980) informed traders’ advantage, and a complement to Kim and Verrecchia’s (1994) informed traders’ advantage.

2014).² However, it is precisely this access to private information that makes it hard to document the second source of analyst expertise, namely analysts' superior ability to process public information and update their beliefs about firm value. Standard analyst outputs such as analyst reports and forecasts typically arrive after private meetings with management (Green et al., 2014; Soltes 2014), so it is hard to say whether the information content of these reports arises from analysts' superior processing of public information or access to private information or both. This study therefore looks to a setting where an analyst output occurs immediately after public information release, thereby removing the possibility of an intervening private information event.

Specifically, we measure analyst output through the tone of the comments and questions that analysts pose to management immediately after management presentations in quarterly earnings conference calls, and show that this tone has a significant short-run intraday stock price reaction. Conference calls with management and analysts are a significant firm-specific information disclosure event (Brochet et al., 2013, Frankel et al., 1999). These calls, which happen very soon after the earnings release, are usually the first time after the earnings announcement that select analysts get to question management. The conference call is not a side-show, but a highly public and critical event, where the language and tone employed by the conference participants carry significant value-relevant information (Mayew and Venkatachalam, 2012; Matsumoto et al., 2011). While the ostensible goal of analysts on the call is to get more information and clarification from management, we conjecture that the tone of analysts' questions, comments, and responses to management replies also end up revealing in real time how analysts process information and revise their beliefs about firm value. For

² Such meetings are legal in the post Reg-FD era, as long as management refrains from *illegally* disclosing material non-public information. Nonetheless, analysts can observe valuable cues such as management's language and voice and extract *economically* material information about the firm's future prospects (Solomon and Soltes, 2013; Green et al., 2014). In fact, research shows that significant economic information appears in management's voice inflections (Mayew and Venkatachalam, 2012), use of language (Larcker and Zakolyukina, 2012), and other biological cues. While such information may not be new material information from a legal perspective, it nonetheless is an economically significant one. Bushee, Jung, and Miller (2012) refer to this phenomenon as the disclosure milieu. In addition, there is always the possibility that in a less-than-perfect enforcement regime, management provides legally material information to analysts in private meetings.

example, if an analyst raises concerns on a topic the management did not discuss, we view it as analyst processing management disclosure, i.e., this analyst was concerned that management would evade a topic she thought was important.

We identify analyst questions and comments using conference call transcripts in 101,627 conference calls from 2002 to 2013 (post Reg FD era) for 4,861 firms in all 12 of the Fama-French two-digit industries. To measure analyst tone, we use the Loughran and McDonald (2011) linguistic tone dictionary, and identify the number of positive (i.e., optimistic) versus negative (i.e., pessimistic) words in each analyst question and comment. For example, if an analyst says “that is great news”, we conjecture that the analyst has developed a more positive belief about firm value, and vice versa for a negative comment (see Appendix A for an example). By contrast, if no such statement is made, we conjecture no change to analyst beliefs. We measure analyst tone as the difference of positive to negative words scaled by the sum of positive and negative words.³

Our setting thus comports well with Kim and Verrecchia’s (1994) notion of expert traders as those having superior skills at processing public disclosures and revising their beliefs about firm value. Of course, we cannot *directly* test Kim and Verrecchia’s idea that public disclosure triggers an additional signal to the analyst. This is in part because information exchange in conference calls is not a one dimensional signal of firm value, but instead an ongoing conversation. While it is human nature to have sequential conversations where each speaker feeds off the previous one (and this is the sense in which we read Kim and Verrecchia, 1994), it is hard to prove directly that one piece of conversation reflects a private signal triggered by a prior piece of conversation, or that certain conversations were unwarranted or masked the true opinion of the speaker (e.g., an analyst

³ We motivate the use of this dictionary in Section 2. The idea that linguistic analysis of informed participants’ communication is informative is by no means new (e.g., Tetlock et al., 2008; Li 2010). However, what is important to note is that, depending on its purpose, linguistic analysis of speech can take different forms: some analyses measure the occurrence of financial words (Matsumoto et al., 2011), while others look for self-attribution and other psychological traits of the speaker (Larcker and Zakolyukina, 2012). Our innovation is to use linguistic analysis not to measure information content of management’s disclosures, but to measure in real time the beliefs of capital market participants in response to the earnings disclosure.

lowballing management to curry favors). Neither can we directly test the causes (innate capacities and experience, prior private information, etc.) that give an analyst this advantage. What we can show is that our analyst tone measure a) has construct validity, as measured by future analyst revisions of recommendations and forecasts, which are known to be highly-value relevant, and b) the market incrementally reacts in the short-run to analyst tone. In this sense, we rely crucially on an efficient market to validate our hypothesis (see Section 2 for more details on this point).

Any test using our conference call setting must address the process by which analysts get selected to participate in the call. For example, analysts on the call are known to be better forecasters and more optimistic in their recommendations than nonparticipating analysts (Mayew 2008).⁴ In addition, despite evidence by Groysberg et al. (2011) that analysts are rewarded for accuracy, analysts may have strong incentives to lowball management. To account for such cross-sectional analyst effects, we first run analyst-firm fixed-effect regressions and show that analyst tone translates to future revisions in individual analysts' earnings forecasts, price targets, and stock recommendations, analyst outputs that are known to be value-relevant, and ones which analysts on the call are known to produce with high levels of accuracy (Brav and Lehavy, 2003; Bradley et al., 2014; Mayew et al., 2013).

At the individual analyst level (with analyst-firm fixed effects), we find that a one standard deviation increase in analyst tone is significantly associated with a 0.22 cent increase in their EPS forecast for the subsequent quarter. We then consider the change in the analyst's target price and stock recommendation from the end of the call date to the end of day +20: a one standard deviation increase in analyst tone is significantly associated with a 0.36% increase in their price target and a 3.8% increase in the probability of a stock recommendation upgrade (conditional on a recommendation revision). These results suggest that individual analyst tone is indeed a meaningful

⁴ Mayew (2008, Section 6) notes that participating analysts' relative optimism is not necessarily a bias; the other nonparticipating analysts could be in error. Also note that Mayew (2008) does not measure the value-relevance of analyst comments, like we do.

measure of analyst belief revisions; analyst tone is thus unlikely to exclusively result from analysts masking their true opinions for strategic reasons or to cultivate social cohesion and management goodwill.

Having thus validated our tone measure at the individual analyst level, we aggregate this measure for all analysts on the call, and then test whether this measure is informative or value-relevant. There are many ways to test this, such as linguistically comparing the words used by management and analysts (e.g., Huang et al., 2014). We, however, exploit the fact that our conversation setting is public, and use the stock market reaction to analyst tone to calculate value-relevance.

To keep the focus on analysts' comments, we examine intra-day stock price reactions during and immediately after the Q&A. Our reasoning for these tight return windows is two-fold: first, we believe that markets are efficient, i.e., if astute traders are listening to the call (irrespective of whether they are the analysts' clients or not), they should take advantage of the call. Second, as Figure 1 shows, much of the additional analyst output such as forecasts and recommendations are released on the same day as the earnings call. Crucially, Soltes (2014, p. 266) shows that analysts on the conference call have private phone calls with management immediately after the earnings call, and the private information gleaned by managements' tone, inflexion, etc., in these calls can contaminate analyst outputs such as forecasts and recommendations. Longer return windows such as daily returns will incorporate all these additional analyst outputs, which we have shown are correlated with analyst tone. If an analyst's subsequent private information collection is correlated with analyst tone, but not controlled for in the long-window returns regression, it would improperly boost the significance to the analyst tone measure. Our tight returns window eliminates this possibility, because the earnings call is ongoing in our time period.

Our tight window returns tests include a rich set of quantitative and qualitative conference call information disclosure controls such as indicators of whether the firm's reported earnings met

various benchmarks, the level of earnings surprise, and management's tone in the discussion and presentation sections of the conference call. We also recognize that there could be across-firm variation in tone due to various unobservable and intangible factors. We conjecture that these factors are relatively stable over time, and use firm fixed effects to proxy for them. Any time-period effects are controlled through year-quarter fixed effects of the call date.

Our main result is that prices adjust to the direction and strength of analyst tone during and after the conference call. We find that tone predicts returns most strongly during the Q&A portion of the call (which is when the analysts are speaking) and in the 30 minutes following the call. For a one standard deviation increase in analyst tone, abnormal returns increase by 0.031 percent during the Q&A portion of the call (1% level) and 0.036 percent (1% level) from Q&A End to +30 minutes.⁵ From an efficient market perspective, these findings imply that analysts' assessment of public disclosures are incrementally informative, attesting to analysts' superior information processing abilities.⁶

Our analyst tone effect obtains separately and in addition to the information disclosure effect, as evidenced by the significance of our management disclosure controls. For example, we find that management tone, both in the presentation and the discussion, is also a statistically significant predictor of returns, consistent with the information disclosure aspect of the conference call setting. Likewise, our financial information disclosure controls (such as various measures of earnings surprise) are also significant. The controls above provide assurance that analysts' assessments provide to the market information that is not contained in the disclosures themselves, thus attesting to analysts' expertise at processing public information.

⁵ To put the magnitude of these results in perspective, Matsumoto et al. (2011, Table 3) find *unsigned* abnormal returns on average of 0.2 percent for the presentation portion and 0.2 percent for the discussion portion of the call. Section 3 discusses the magnitudes in detail.

⁶ In Section 4, we test and reject the behavioral argument that the immediate price reaction could be due to speculators front-running their trades on the (higher-order) belief that analyst' clients such as institutional investors will later trade in the direction of the analyst tone.

In their review of the analyst and disclosure literature, Beyer et al. (2010, Section 5.2.1) note that an important empirical finding deserving more study is that a firm's analyst following and disclosure practices are complements, not substitutes. Our study provides an answer, by showing that analysts' advantage in part arises from their ability to better process public disclosures. Our study thus extends Price et al. (2012), who find a 3-day price reaction to the tone of the entire Q&A conference call session, but do not distinguish between analysts and management. Brockman et al. (2014) extend that analysis further by separating analysts and management.⁷ However, they only use a two-day return window, which we have argued has information contamination problems because other correlated analyst outputs are released in that time period. We document this contamination concern in Figure 1, which shows that analysts systematically revise their EPS forecasts, target prices, and stock recommendations on the day of the call. In addition, Soltes (2014, p. 266) shows that analysts on the conference call have private phone calls with management immediately after the earnings call, a potentially important source of private information. Likewise, Huang et al. (2014) use linguistic analysis to show that analyst reports issued right after conference calls contain discussion on topics not referred to in the conference calls, a fact consistent with Soltes (2014, p. 265), who argues that manager-analyst private conversations often occur on topics not discussed in the call. All of these factors, which are not controlled for in long-return window of Brockman et al. (2014), can lead to correlated omitted variables especially if an analyst's subsequent private information collection activities after the call (e.g., Soltes 2014) are correlated with her tone.

Brockman et al. (2014) also show that their long-returns effects are stronger for firms with more institutional investors. This result does not obtain in our tight window tests, an expected outcome because the entire market can observe analysts' comments, not just institutional investors. Institutional investors' effects of two-day returns could occur in part due to analysts privately

⁷ We were recently made aware of Brockman et al. (2014). Our working paper appeared publicly before theirs, but they were not aware of it, and had been considering the idea independently at the same time.

contacting the management by phone after the earnings calls (Soltes 2014), and incorporating that additional information into private recommendations delivered via phone to preferred clients.⁸ Finally, Brockman et al. (2014) do not conduct our individual analyst-level analysis, and their stated motivations for their analyses are different than ours.

Section 2 describes our conceptual framework for analyzing conference calls. Section 3 describes the data and the variables. Section 4 describes the results. Section 5 concludes.

2. A Conceptual Framework for Analyzing Conference Calls

Virtually all key aspects of the conference call are endogenous choices that involve tradeoffs. Management may want pliant analysts on the call, but may also find it advantageous to have independent but influential analysts, who can attract a larger investor base. On the call, an analyst may wish not to reveal her hand by asking a crucial question, but will then miss out the chance to get information from management (especially if that information is legally material and non-public and cannot be obtained privately from management under Reg-FD laws). The analyst may also choose to lowball management to curry favors, but may then lose out career-wise to a more independent and accurate analyst who uses that opportunity to gain valuable insight about management (see Groysberg et al. (2011) on the nature of analyst compensation incentives).

Further complicating the above issues is the fact that information exchanged in the conference call is not a theoretical one-dimensional signal of firm value, but an open-ended back-and-forth conversation. It is therefore hard to directly map theoretical models such as Kim and Verrecchia (1994) onto real-world information exchange. For example, if an analyst asks a question on a topic that the management did not allude to in its presentation, one can interpret it as an analyst just taking advantage of the conference call venue to satisfy her own information needs, irrespective

⁸ For evidence on analysts' private phone calls to preferred clients, see the Consent Order by the Massachusetts Securities Division re: Citigroup Global Markets, Inc., Docket no. 2013-0014 (<http://www.sec.state.ma.us/sct/current/sctcitigroup/citigroup-consent-order.pdf>).

of what management said. But our interpretation is that this is evidence of the analyst processing management disclosures – she believes management should have spoken on that topic, but did not.

In addition, any such conversation will have subtle group dynamics. There could be disagreements and shifting alliances, where analysts may change their minds based on the comments of other analysts, or may hesitate to openly take a contrarian questioning stance. These factors create additional obstacles to precisely mapping a natural sequential human conversation to Kim and Verrecchia's model. Despite these obstacles, a common-sense observation is that human conversations typically take the form where each speaker processes and responds to the points made by the previous speaker. It is in this sense that we read Kim and Verrecchia (1994).

The above obstacles are faced by all studies that examine text or speech (e.g., Mayew and Venkatachalam 2012). A common approach therefore is to assume an efficient market, and link the relevant textual construct to stock prices. We follow a similar approach. We assume that the positive or negative tone of the analyst comments is in response to what management or others said or failed to say (i.e., the analyst is negative because a topic she thought was important was not brought up.). We first show that our analyst tone measure at the individual analyst level has construct validity, as measured by the tone's ability to predict that individual analyst's future revisions of recommendations and forecasts, which are a) known to be highly-value relevant (Brav and Lehavy, 2003, Bradley et al., 2014), and b) activities at which analysts on the call are especially accurate (Mayew et al., 2013). We then show that the market incrementally reacts in the short-run to the aggregate analyst tone on the call, and that this reaction cannot be explained by other factors such as information disclosed by management in the call, or by strategic traders front-running the institutional traders.

We acknowledge that our approach misses some of the subtle intergroup and individual dynamics on the call, but we have no hypotheses on how the market prices subtle group dynamics, nor do we have a hypothesis on whether the market prices the identity of the individual analyst over

the insight of a comment that an analyst is making. We therefore believe that our empirical design serves our main purpose well. We motivate our measures and our empirical approach in more detail next.

3. Sample, Variable Definitions, and Descriptive Statistics

3.1 Sample

We obtain a sample of 101,627 U.S. public company quarterly earnings conference call transcripts produced by Thomson Reuters from 2002 to 2013 (post Reg FD era) for which accompanying Compustat, CRSP, TAQ, and I/B/E/S data is also available. Table 1, Panel A provides the sample sizes for our empirical tests based on data availability.

Thomson Reuters quarterly earnings conference call transcripts have XML-friendly headers containing the date and starting time of the call, firm identifiers, and whether the call was related to an earnings announcement. XML tags also identify different segments of the call (e.g., presentation and discussion) and individuals like analysts and managers. We parse the text using a Perl script and require at least one manager and one analyst to be present in each call. We also match each individual analyst on the call to his or her earnings forecasts, target prices, and stock recommendations on I/B/E/S for the years 2002-2007.⁹

3.2 Measures

The variables used in this study, along with their sources, are tabulated in Appendix B. Table 1, Panels B and C provide a full set of descriptive statistics, univariate statistics, winsorizing details (our results are not sensitive to winsorizing), and the correlation matrix.

3.2.1 Analyst Tone Measure

⁹ In 2008 I/B/E/S stopped providing their matching table for analyst names, banks, and their I/B/E/S identifiers. We therefore limit our individual analyst tests to the years 2002-2007. Also, because our matching process relies on analyst and broker names from the conference call transcripts, and because these names do not always perfectly align with the I/B/E/S matching database (due to misspellings, etc.), we cannot match every analyst to I/B/E/S.

To recap, our aim is to show that analysts are superior to other market participants at processing public information and revising their beliefs about firm value. The setting we use is quarterly earnings conference calls, where analysts question management immediately after the management’s presentation of the quarterly results. Given the gravity and value relevance of the language employed in earnings conference calls (Mayew and Venkatachalam, 2012; Matsumoto et al., 2011), we measure analysts’ belief revisions using the analyst tone in the Q&A portion of the conference call.

We use the Loughran and McDonald (2011) positive and negative word dictionaries to calculate tone.¹⁰ There are many dictionaries that can be used to measure textual tone (e.g., Harvard IV-4 TagNeg H4N). Our motive for using the Loughran and McDonald (2011) dictionaries is that it is designed specifically to measure the optimism/pessimism tone of financial communications, which is exactly our setting. Other studies such as Matsumoto et al. (2011) have developed different dictionaries for financial communications, but for different goals such as identifying the information content of financially-oriented and forward-looking words. We show later that these information-based measures are substantially different than our tone-based belief measure.

On average, analysts speak a total of 1,181 words during the discussion portion in the sample of calls. In order to alleviate concerns about conference call length and scaling issues, we create one scaled measure for tone, using a measure similar to those employed in other studies (e.g., Tetlock et al. 2008; Li 2010). We call this aggregate measure ANALYST TONE:

$$\text{ANALYST TONE}_{it} = \frac{\text{ANALYST POSITIVE}_{it} - \text{ANALYST NEGATIVE}_{it}}{\text{ANALYST POSITIVE}_{it} + \text{ANALYST NEGATIVE}_{it}} \quad (1)$$

For each firm i ’s conference call at time t , ANALYST POSITIVE_{it} equals the number of positive words (according to our dictionary) spoken by all the analysts on the call and

¹⁰ http://www.nd.edu/~mcdonald/Word_Lists.html.

$\text{ANALYST NEGATIVE}_{it}$ equals the number of negative words (according to our dictionary) spoken by all analysts on the call.¹¹ Appendix A provides examples of our tone measure.

We compute analyst tone at both the individual analyst level for each call and at an aggregate level over all analysts on the call. We use the aggregate measure for our returns tests, the reason for which is three-fold. First, analysts on the call are likely to be superior and thus comprise a homogenous subset of all the analysts following the firm (Mayew et al., 2013). The market therefore is likely to react to all these analysts.¹² Second, we explicitly show that individual analyst tone measures predict subsequent changes in individual analyst outputs such as recommendations, suggesting that tone measures can be aggregated in the same way that other analyst outputs such as forecasts are aggregated in the literature.¹³ Third, as we show next, we estimate various call lengths based on the words spoken in the call; this method works much better at the call level than the individual-analyst-on-the-call level.

As stated in Section 2, we recognize the drawbacks of our aggregation choice. For example, we are unable capture subtle inter-analyst dynamics, or second-by-second market reaction to analyst words. We are also unable to conduct comparative statics on whether the market reacts more to some analysts than others. But this is not as severe an omission as it seems, for we do not have a clear hypothesis on the kinds of subtle inter-analyst dynamics the market is looking for, or the extent to which the market favors the importance of the analyst over what she says. Consequently, we believe that our procedure is a step forward in understanding analysts' superiority at processing public disclosures.

¹¹ All calls have at least one positive and one negative word. We also count different tenses of the positive and negative words (e.g., "concerned" would count negative for "concern").

¹² Mayew (2008, p.632) argues that although management would like to favor pliant analysts on the call, capital market pressures can force management to give airtime to good analysts. In addition, Groysberg et al. (2011) document that analysts have strong incentives to be competent and accurate. These considerations further justify our decision to aggregate all analysts on the call.

¹³ We thus do not build an explicit empirical model of aggregate analyst tone; instead, our approach is to show that its variation is consistent with variation in analysts' belief revisions.

3.2.2 Intraday Abnormal Returns

If analyst tone on the conference call does reflect the beliefs of informed market participant upon receiving new public information, efficient markets should experience an immediate price revision. Our first set of return windows includes the following intraday times: the presentation portion of the call, the Q&A portion of the call, the 30 minutes after the call, and an additional 30 minutes after that. We obtain the conference call start time from the conference call transcript, and estimate the duration of various components of the call (e.g., presentation end time and Q&A end time) using the words-per-minute analysis from Matsumoto et al. (2011). Specifically, based on their sample (which is similar to ours), Matsumoto et al. (2011, p. 1392) compute duration assuming that 160 words are spoken per minute during the presentation, and 157 words are spoken per minute during the discussion. They also assume that (1) the start of the presentation occurs 116 seconds after the scheduled start time of the conference call, and (2) the beginning of the discussion starts 28 seconds after the end of the presentation. For return windows constructed in such a manner, we calculate intraday returns using the last traded price just before the beginning of the intraday return window and the last traded price just before the end of the intraday return window. All intraday returns are net of the value weighted market return for the same window.

3.2.3 Other Analyst Outputs

We substantiate our individual analyst tone measure by showing that it translates to future revisions in individual analyst outputs such as earnings forecasts, price targets, and stock recommendations. We assume that 20 days provides enough time for analysts to make such revisions, and accordingly use day +20 as our date to measure future analyst outputs (e.g., Lys and Sohn, 1990; Kasznik and McNichols, 2002). We obtain EPS forecasts, stock recommendations, and price targets from I/B/E/S. We arrange the data at the analyst-level by matching analysts on the call

to I/B/E/S using their name and brokerage house from the conference call transcript.¹⁴ The three future outputs we measure are:

Individual Analyst EPS Forecasts: We calculate the percentage change in the analyst EPS forecast by comparing the analyst EPS forecast for the next quarter at the end of day +20 to the analyst EPS forecast for the current quarter at the end of day 0 (conference call day). This procedure thus yields a conservative analyst revision measure, because a significant portion of analysts make revisions on the call date (see Figure 1).

Individual Analyst Price Targets: We calculate the percentage change in the analyst price target by comparing the analyst price target for a firm's stock at the end of day +20 to the end of day 0. This procedure thus also yields a conservative analyst revision measure.

Individual Analyst Recommendation Level: We identify analyst upgrades and downgrades by comparing the analyst recommendation level for a firm's stock at the end of day +20 to the end of day 0. As with the previous two revision measures, this measure is also conservative.

3.2.4 Control Variables

We employ several control variables, all of which are described in Appendix B. We have taken care to ensure that our descriptive statistics in Table 1, Panel B match prior studies.

Our first set of control variables pertains to information released by the firm. Our logic is that trading beneficiaries of analyst beliefs are not the only vehicle through which information enters prices; other traders may directly interpret and trade on the firm's disclosures. We control for this possibility using both qualitative and quantitative measures of the conference call disclosures and several measures of firm characteristics:

Concurrent Management Tone Measures: We use management presentation and discussion tone to proxy for management's views, which may also be highly informative to investors. We

¹⁴ As noted before, this sample only includes calls through 2007. I/B/E/S stopped providing the analyst name to the I/B/E/S ID matching file after this point in time.

calculate presentation tone using only words from the scripted presentation portion of the call, and similarly for the management discussion part. On average, and similar to Matsumoto et al. (2011), managers speak 2,408 words in the discussion portion of the call and 2,334 words in the presentation portion. Our management measure for firm i in quarter t is:

$$\text{MANAGER TONE}_{it} = \frac{(\text{CEO POSITIVE}_{it} + \text{CFO POSITIVE}_{it}) - (\text{CEO NEGATIVE}_{it} + \text{CFO NEGATIVE}_{it})}{(\text{CEO POSITIVE}_{it} + \text{CFO POSITIVE}_{it}) + (\text{CEO NEGATIVE}_{it} + \text{CFO NEGATIVE}_{it})} \quad (2)$$

Call Characteristics: Matsumoto et al. (2011) find that call length and management communication patterns are associated with firm performance and firm value. We therefore control for the length of the presentation and the discussion.

Prior Firm Performance: We control for financial disclosures by including indicators for whether the firm met the zero, prior quarter, and analyst consensus EPS benchmark. We also include the magnitude of any earnings surprise scaled by price and indicator variables for earnings surprises in the sample's top and bottom two scaled earning surprise deciles.¹⁵

Institutional Investor Shareholdings: We obtain institutional investor shareholdings data from the Thomson Reuters 13F filing database. The SEC requires investment managers with portfolios worth \$100 million or more to file a quarterly summary of their equity positions in a 13F filing. Our measure for institutional investor shareholdings is the percentage of a firm's shares held by institutional investors; the average institutional ownership for a firm in our sample is 60%.

Past Returns Measures: We include past returns to control for factors such as momentum.¹⁶ We include prior abnormal returns from [-2, -1 day], as well as prior abnormal intraday returns to control for this momentum effect. In our individual analyst tests we also control for [-90, -1 day] abnormal returns.

¹⁵ The focus on earnings as the metric of financial information is standard in the empirical information literature for two reasons: first, more disaggregated financial items (such as provisions) may vary in importance across firms; earnings by contrast represent a common and important aggregate performance measure for all firms. Second, there exist well-studied measures of analysts' expected earnings, thus allowing one to compute earnings news.

¹⁶ For example, Altinkilic and Hansen (2009) argue that such momentum effects could arise from pre-event news releases.

Abnormal Institutional Investor Trading: Astute traders may react to analyst tone in real time not because tone is fundamentally informative, but because it could predict analyst recommendations to institutional clients. To control for such front-running possibilities, we include abnormal institutional investor trading over days [0, +1] as a control. We obtain daily institutional trading data from Ancerno, and construct a daily measure of abnormal institutional investor net buying in a manner similar to Irvine et al. (2006, Table 4), which is also similar to the measure used in Griffin et al. (2003).¹⁷ We calculate abnormal institutional investor net buying for each firm i , AIB_{it} , at the conference call-firm level as follows: first, we take the net trading imbalance scaled by shares outstanding for the given day t :

$$R_{it} = \frac{\text{Total Institutional Buys}_{it} - \text{Total Institutional Sells}_{it}}{\text{Shares Outstanding (in 1,000s)}_{it}} \quad (3)$$

We then subtract the average daily net trading imbalance for that firm over a control period of [-60, -20 days] and [+20, +60 days]. As an example, the calculation for day zero *Abnormal Institutional Trading* for a given firm i is as follows:

$$AIB_{i,0} = R_{i,0} - \frac{1}{\text{Number of trading days in } [-20, -60] \text{ and } [+20, +60]} \left(\sum_{t=-60}^{-20} R_{it} + \sum_{t=20}^{60} R_{it} \right) \quad (4)$$

Information Measures: Since the ostensible goal of the analyst Q&A is to gain information from the management, we control for several information measures from the call using the Matsumoto et al. (2011) dictionaries for financial words and forward looking statements, which they find are associated with absolute excess returns. Our controls include the log of management and analyst financial words and forward looking words from the discussion and Q&A portions of the call. And, as mentioned before, we also include controls for presentation and Q&A length.

Fixed Effects: In the returns regressions, we use firm fixed effects and year-quarter of the call date fixed effects to control for firm and time effects (for example, any trends). In the individual

¹⁷ The data set is the focus of several studies, including Irvine et al. (2006), who provide a detailed description of the data.

analyst regressions, we control for analyst-firm fixed effects. All standard errors are appropriately clustered.

4. Empirical Results

4.1 Individual Analyst Tone Analysis

Given the high visibility of conference calls and the value relevance of the information exchanged in these calls (e.g., Mayew and Venkatachalam, 2012), analysts will ask pertinent questions and not simply engage in idle banter. As a result, we conjecture that the tone of analysts' questions, comments, and responses to management replies reveals their beliefs. However, since information in our setting does not literally take its analytical representation "firm value + noise" with known mean and variance, no theoretical model can validate that our analyst tone measure reflects beliefs. We must validate our measure empirically, which we do next.

First, the mean analyst discussion tone in Table 1, Panel B is -0.04, suggesting that analysts voice about 1 positive word for each negative word in a conference. This 1:1 mean ratio is consistent with the idea that firms in large and deep capital markets have to get good analysts on the call, as a result of which the average beliefs over many information events are neutral.¹⁸

By comparison, the mean manager discussion tone is 0.11, and the mean manager presentation tone is 0.21. The higher mean relative to the analyst tone suggests, as expected, that management is systematically more bullish or positive about the firm's prospects.

The correlations between analyst tone and management presentation tone and management discussion tone are significant at 0.23 and 0.28 (Table 1, Panel C), respectively, raising the possibility that analysts mimic management tone to some extent (to curry favors, for example).

¹⁸ Mayew (2008) finds that analysts participating in the conference call are more optimistic about the firm's prospects than nonparticipating analysts, but this relative comparison is not what we are portraying. We are portraying the mean level of participating analysts' belief changes. In fact, Mayew (2008, Section 6) acknowledges that it could be the nonparticipating analysts who are being irrational about the firm's prospects.

Although we control for the baseline analyst-management relationship via firm fixed effects, this correlation underscores the importance of controlling for management tone, which we do as well.

We next link our analyst tone measure at the analyst-level to that analyst's future forecasts, price targets, and stock recommendation revisions. As described in Section 3.2.3, our future analyst revision measures are conservative, because a significant portion of analysts make revisions on the conference call date (see Figure 1), and we measure future revisions from the end of the call date. Our measurement strategy should bias against finding significance.

Table 2 documents how an individual analyst's tone predicts his or her respective revisions to the EPS forecast, price target, and stock recommendation level, all from the end of the conference call day to the end of day +20. We estimate our regressions with a rich set of controls, including analyst-firm fixed effects. These fixed effects should account for any analyst-firm pair heterogeneity or bias.

We expect and find that the coefficient on analyst tone is positive and significant for EPS forecasts (5% level) and price targets (1% level; 0.004 and 0.658, respectively). A one standard deviation increase in analyst tone increases the EPS forecast for the next quarter by 0.22 cents and the price target by 0.36% (compared to respective on average increases of 1 cent and 1%).¹⁹ For analyst recommendations, we use an indicator for the dependent variable that equals 1 if the analyst upgraded the stock by the end of day +20, and 0 otherwise. The sign on analyst tone for a stock upgrade is positive and significant at the 10% level (0.004), as expected, and a one standard deviation increase in analyst tone increases the probability of a stock upgrade by 0.22%.²⁰ The above results

¹⁹ To allow us to better interpret the economic significance of our results, we use level changes in EPS forecasts; however, our results are similar in sign and statistical significance when we scale EPS by stock price at the quarter's fiscal end date.

²⁰ Because analysts revise stock recommendations less often than earnings forecasts and price targets, we perform a separate test that excludes instances where analysts simply reiterate their recommendation (Abarbanell and Lehavy 2003). Our results in Table 2 for this sample are much stronger: a one standard deviation increase in analyst tone increases the probability of a stock upgrade by 3.8% (10% level) compared to 0.22% from the full sample.

give us confidence that our analyst tone measure captures analyst belief revisions about firm value, especially in light of our conservative measurement of future analyst output revisions.

More important, given the strong value-relevance of analyst outputs such as targets and recommendations (Brav and Lehavy, 2003; Bradley et al., 2014), the above result alleviates concerns that analyst tone on the call is a sideshow. The variation in the analyst tone is indeed an economically meaningful one. We therefore have some confidence in employing analyst tone in returns tests, even though we do not have an explicit empirical model of this variable.

4.2 Analyst Tone and Future Stock Returns

We next establish the value-relevance of analyst tone. Specifically, we show that analyst tone aggregated at the call level is associated with intraday returns. We conduct this analysis at the call-level, by aggregating all analysts on a given call. This aggregation approach, justified in Section 3.2.2, elides over much of the interpersonal group dynamics and individual analyst variation in the call, but as we noted in Section 2, we have no particular hypotheses on how the market prices these phenomena, and our measurement approach cannot analyze returns accurately over very small time intervals.

Intraday returns during the conference call are the market reaction to all information sources in the call, such as management disclosures, etc. Since analyst tone is correlated to this information, we must control for this information release in our returns tests. Table 4 describes the results of our regressions of intraday abnormal returns on analyst tone and control variables (including firm and year-quarter fixed effects).²¹

Before we look to Table 4, it is instructive to take a brief look at Table 3, where we regress aggregate analyst tone on other covariates in Table 4. Analyst tone is indeed significantly positively correlated with variables such as earnings news and management tone in the conference call, as one

²¹ We exclude calls that begin during after and pre market hours for these tests.

would expect if analyst tone indeed partly reflects the news released in the call. Because the disclosure itself is priced, these positive associations also necessitate the inclusion of the disclosure measures in Table 4. Table 3 also shows that there is considerable left-over variation (77%) in the analyst tone, and this variation will drive the analyst tone results in Table 4.

For a one standard deviation increase in analyst tone in Table 4, abnormal returns increase by 0.031 percent during the Q&A portion of the call (1% level). Analyst tone also predicts abnormal returns for the window of [Q&A End, +30 minutes]: for a one standard deviation increase in analyst tone, abnormal returns increase by 0.036 percent (1% level). To put the magnitude of the results in perspective, Matsumoto et al. (2011, Table 3) find that the average *unsigned* abnormal return for both the presentation and the discussion part of the conference call is 0.2 percent. A standard deviation in analyst tone can, over the [Q&A Beginning, Q&A End +30 minutes] period, explain about 1/3rd of the total unsigned return for the discussion period. But our result is still much smaller in magnitude compared to other analyst outputs such as recommendations: Bradley et al. (2014) find a 2 percent return to recommendation changes.

The above difference in magnitudes illustrates the costs and benefits of using analyst tone to capture analyst beliefs: it is a timely measure of analyst beliefs that yields a clean short-run returns test that is not confounded by private information acquisition considerations. By contrast, analyst output such as a recommendation is a product of both the analyst's processing of public disclosures and analyst's private access to management; but analyst recommendation is a far more complete measure of analyst belief than analyst tone on the call. Nonetheless, Table 2 shows that analyst tone is correlated with future analyst recommendations. To the extent an analyst uses her initial impression to guide her future information acquisition activities to generate her recommendation, the true value of analyst tone to the market is greater than the immediate market reaction we document in the previous paragraph.

An interesting result in Table 4, Column 5, is that the abnormal return in the presentation period is significantly associated with analyst tone, even though analysts have not spoken yet. This result suggests that active market participants form similar beliefs as analysts when listening to the management's presentation, and trade accordingly. This result further validates the analyst tone construct. More interestingly, analyst tone still adds value to the market once it is public, attesting to analysts' superiority as public information processors. But the market appears to be efficient: there is no reaction to analyst tone for the [Q&A End +30 minutes, Q&A End +60 minutes] period, as Table 4, Column 4 shows. Finally, the presence and the significance of institutional abnormal trading over the days [0, +1] indicates that the significance of analyst tone cannot be solely attributed to smart investors front-running institutional investors.

Management presentation tone is also statistically significant, as is the earnings surprise. In conjunction with Table 2, these findings suggest that the market is reacting not just to analysts' resulting belief revisions (as proxied by their tone), but also to the information released by management (both in content and in tone). This result establishes analyst tone to be a different source of information to the market than content and tone disclosures by management. In sum, the results in Table 4 are consistent with markets conceiving of analysts as superior processors of management disclosures.

4.3 Robustness Checks and Additional Tests

We first test whether analyst EPS, target price, and recommendation revisions occurring during or around the conference call time are driving our intraday return results. Figure 1 indicates that a majority of analyst outputs occur on the day of the conference call. In addition, Table 5 shows that some of these outputs occur during the call.²² We therefore eliminate calls that have concurrent

²² We acknowledge that some intraday timestamps in I/B/E/S may be inaccurate. Bradley et al. (2014) find that recommendation timestamps cannot be corrected without manually checking each analyst report, and therefore we do not attempt to adjust the times. However, they find that in their limited sample timestamps are delayed on average by 2.4 hours. We thus use three-hour windows when eliminating calls with concurrent analyst revisions.

analyst revisions in the hour windows of [-8 hours, -5 hours], [-4 hours, -1 hours], [0 hour, +3 hours], [+4 hours, +7 hours], where hour 0 is the conference call start time. Table 6 reports the results after these eliminations. Analyst tone retains similar levels of economic and statistical significance even after removing the calls with concurrent revisions. These results provide assurance that our intraday return tests measure the analyst tone effect, and not the effect of a correlated concurrent revision.

Our final tests are comparative statics tests. First, we consider firms with more institutional investors, the natural clients of analysts. Second, we consider the amount of new information released in the call, as proxied by the magnitude of the earnings surprise. We test if the analyst tone effect is more pronounced in firms with more institutional investors and when there is more new information to interpret. We add the appropriate interaction terms to Table 4, but find no intraday results for either case, in contrast to Brockman et al. (2014) long-run window tests.²³ These differences further attest to the importance of choosing returns windows that minimize the possibility of contamination through other information sources.

5. Conclusion

In his survey of the sell-side financial analyst literature, Bradshaw (2014) notes that the superiority of analyst earnings forecasts over other forecasting methods is beyond doubt, but then points out that repeated surveys of investors indicate that they do not view earnings forecasts as the key source of analyst expertise – instead they view analysts’ expertise as source of their value. Consequently, Bradshaw, among others, calls for more studies establishing the sources of analyst expertise. Several studies show that analysts have private access to management (e.g., Bushee, Jung, and Miller, 2013; Green et al., 2014; Soltes 2014), which allows them to glean significant value-relevant information. Our study shows using intra-day returns that markets respond immediately to the tone of analyst comments in the conference calls. In efficient markets, this result is consistent

²³ We, however, can replicate Brockman et al. (2014) findings when we use the conference call-day daily abnormal returns as the dependent variable.

with Kim and Verrecchia (1994), who theorize that expert capital market participants such as analysts have superior skill at processing public information released by management.

As Section 2 of the paper notes, there are several unmet challenges to testing models such as Grossman and Stiglitz (1980) and Kim and Verrecchia (1994) in an analyst conference call context. For example, future studies could further explore the proximate cause of analyst expertise in processing public disclosures, i.e., whether it is due to innate insight, past experience, or an additional advantage conferred by private access to management. Establishing this fact is useful not just to gain further understanding of analysts, but also to answer deeper capital market questions on whether public disclosures increase or decrease the value of sophisticated capital market information intermediaries such as analysts (Healy and Palepu 2001, Section 6.2c; Beyer et al., 2010, Section 5.2.1).

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APPENDIX A

Sample of Analyst Comments from Earnings Conference Calls from 2002 to 2013

Analyst Comment	Call	Positive Words	Negative Words
<i>"...the inside the regional mall stores were the ones that were <u>problematic</u>. Can you break out the average weekly sales or confirm that and sort of give us a sense of that differential?"</i>	California Pizza Kitchen, Oct. 23, 2003	0	1
<i>"Al, you've done a <u>great</u> job of positioning the company to the future in terms of external changes...Take us through your growth parameters, growth focus; what do you think you can do?"</i>	H.B. Fuller Company, Sept. 24, 2003	1	0
<i>"...in September of last year Citigroup <u>successfully</u> tapped the yen market with the largest ever Samurai offering, issuing bonds in 5, 7, 10, 15, 20 and 30...Would Citigroup ever consider a 40-year yen issue?"</i>	Citigroup, Feb. 10, 2006	1	0
<i>"We're all <u>concerned</u> about a price war out here. If I do the math on the full year revenue guidance it sounds like you guys are expecting about 15% sequential growth in Q3 and Q4."</i>	Intel, April 19, 2006	0	1

The bolded/underlined words represent words in the Loughran and McDonald (2011) positive and negative tone dictionaries.

APPENDIX B
Variable Definitions

Variable	Definition	Data Source
Tone Measures		
Analyst Q&A Tone _{it}	$(\text{Analyst Positive Words}_{it} - \text{Analyst Negative Words}_{it}) / (\text{Analyst Positive Words}_{it} + \text{Analyst Negative Words}_{it})$	Thomson Reuters Call Transcript
Management Presentation Tone _{it}	$(\text{CEO \& CFO Positive Words}_{it} - \text{CEO \& CFO Negative Words}_{it}) / (\text{CEO \& CFO Positive Words}_{it} + \text{CEO \& CFO Negative Words}_{it})$	Thomson Reuters Call Transcript
Management Q&A Tone _{it}	$(\text{CEO \& CFO Positive Words}_{it} - \text{CEO \& CFO Negative Words}_{it}) / (\text{CEO \& CFO Positive Words}_{it} + \text{CEO \& CFO Negative Words}_{it})$	Thomson Reuters Call Transcript
TAQ Abnormal Returns _{it}	Holding period return from the start to the end of the time interval being measured, net of the value weighted market return over the same time	Trade and Quote (TAQ) Database
Individual Analyst Outputs for Analysts Matched from Conference Call Transcript		
Individual Δ EPS Forecast _{ita}	(Analyst EPS forecast for quarter t+1 measured at end of day +20 - Analyst EPS forecast for quarter t+1 measured at end of day 0)	I/B/E/S
Individual Δ Price Target _{ita}	(Stock price target at end of day +20 - Stock price target at end of day 0) / Stock price target at end of day 0	I/B/E/S
Individual Δ Recommendation _{ita}	Indicator variable that equals 1 if analyst upgrades stock from end of day 0 to end of day +20	I/B/E/S
Time-Varying Firm Variables*		
Earnings Surprise _{it}	$(\text{Actual EPS}_{it} - \text{Analyst consensus mean forecast EPS}_{it}) / \text{Stock price at fiscal quarter end date}_{it}$	I/B/E/S
Large Positive Surprise _{it}	Indicator that equals 1 if earnings surprise is in top 20% of sample earnings surprises _{it}	I/B/E/S
Large Negative Surprise _{it}	Indicator that equals 1 if earnings surprise is in bottom 20% of sample earnings surprises _{it}	I/B/E/S
Meet/Beat Analyst Forecast _{it}	Indicator that equals 1 if actual EPS equals or exceeds analyst consensus mean forecast EPS _{it}	I/B/E/S
Size _{it}	Log of Total Assets _{it}	Compustat
Market to Book _{it}	Market Value _{it} / Book Value of Assets _{it}	Compustat, CRSP
ROA _{it}	Income Before Extraordinary Items _{it} / Total Assets _{it}	Compustat
Log of Analyst Following _{it}	Log of outstanding analyst EPS forecasts at conference call date _{it}	I/B/E/S
S.D. of Analyst EPS Forecasts _{it}	Standard deviation of analyst EPS forecasts scaled by stock price on conference call date _{it}	I/B/E/S
Institutional Ownership _{it}	Percentage of common stock held by institutional 13F filers at fiscal quarter end date _{it}	Thomson Reuters 13F Holdings Database
Cumulative Abnormal Returns (CAR) _{it}	Firm returns from CRSP net of the value weighted market return	CRSP
Abnormal Institutional Trading _{it}	Abnormal daily institutional trading imbalance (net of control period; see section 2.2.4 for precise equations)	Ancerno
Conference Call Attribute Variables		
Log of Total Words _{it}	Log of total words spoken by CEO & CFO and analysts _{it}	Thomson Reuters Call Transcript
Log of Pres. Words _{it}	Log of total words spoken by CEO & CFO during presentation portion of call _{it}	Thomson Reuters Call Transcript
Log of Mgmt. Q&A Words _{it}	Log of total words spoken by CEO & CFO during Q&A portion of call _{it}	Thomson Reuters Call Transcript
Log of Analyst Q&A Words _{it}	Log of total words spoken by analysts during Q&A portion of call _{it}	Thomson Reuters Call Transcript
Log of Mgmt. Pres. Fin. Words _{it}	Log of total financially oriented words (Matsumoto et al., 2011) spoken by CEO & CFO during presentation portion of call _{it}	Thomson Reuters Call Transcript
Log of Mgmt. Q&A Fin. Words _{it}	Log of total financially oriented words (Matsumoto et al., 2011) spoken by CEO & CFO during Q&A portion of call _{it}	Thomson Reuters Call Transcript
Log of Analyst Q&A Fin. Words _{it}	Log of total financially oriented words (Matsumoto et al., 2011) spoken by analysts during Q&A portion of call _{it}	Thomson Reuters Call Transcript
Log of Mgmt. Pres. FLS _{it}	Log of total forward looking words (Matsumoto et al., 2011) spoken by CEO & CFO during presentation portion of call _{it}	Thomson Reuters Call Transcript
Log of Mgmt. Q&A FLS _{it}	Log of total forward looking words (Matsumoto et al., 2011) spoken by CEO & CFO during Q&A portion of call _{it}	Thomson Reuters Call Transcript
Log of Analyst Q&A FLS _{it}	Log of total forward looking words (Matsumoto et al., 2011) spoken by analysts during Q&A portion of call _{it}	Thomson Reuters Call Transcript
Morning Call _{it}	Indicator variable that equals 1 if call starts before noon EST, 0 otherwise _{it}	Thomson Reuters Call Transcript

* Balance sheet and income statement data are for the fiscal quarter that precedes the call date. Index it represents firm i 's conference call for year-quarter t . Index a represents the individual analyst.

TABLE 1

Panel A: Sample Selection for Earnings Conference Calls from 2002 to 2013

<i>Sample Selection for Individual Analyst Tests</i>	
Earnings conference call transcripts extracted from Thomson from 2002 through 2013	186,069
Less foreign firms and calls missing Compustat, CRSP, and I/B/E/S data	(84,442)
Less calls we cannot match to analysts because they occur after 2007	(58,597)
Total calls for individual analyst tests	43,030
Number of analysts we successfully match to I/B/E/S based on name and bank from call transcript*	94,249
<i>Sample Selection for Intraday Abnormal Return Tests</i>	
Earnings conference call transcripts extracted from Thomson from 2002 through 2013	186,069
Less foreign firms and calls missing Compustat, CRSP, and I/B/E/S data	(84,442)
Less calls without TAQ data	(5,630)
Less calls occurring outside market hours	(49,556)
Less 6 observations for outliers in TAQ returns	(6)
Total calls for intraday TAQ analysis†	46,435

* The number of observations for the individual analyst tests in Table 3 vary based on whether the analyst issues an EPS forecast, price target, and stock recommendation. Analysts do not always provide all three of these.

† We follow Matsumoto et al. (2011) and: 1) define trading hours to be from 9:30 AM EST to 2:30 PM EST; 2) define the call start time to be 116 seconds after the scheduled start time, which we obtain from the call transcript XML header; 3) estimate the length of the presentation assuming that 160 words are spoken per minute; 4) define the discussion start time to be 28 seconds after the end of the presentation; 5) estimate the length of the discussion assuming that 157 words are spoken per minute. All word counts come from the XML transcripts. Consistent with Matsumoto et al. (2011), who find that 39.6% of their sample firms always hold calls during trading hours, we find that 45.7% of our sample conference calls occur during trading hours.

TABLE 1

Panel B: Descriptive Statistics for Earnings Conference Calls from 2002-2013

#	Variable	n	Mean	S.D.	Min	25th %	Median	75th %	Max
Aggregate Call Tone Measures									
[1]	Analyst Q&A Tone _{it}	46,983	-0.04	0.27	-1.00	-0.22	-0.04	0.13	1.00
[2]	Management Presentation Tone _{it}	46,983	0.21	0.27	-1.00	0.04	0.23	0.40	1.00
[3]	Management Q&A Tone _{it}	46,983	0.11	0.27	-1.00	-0.06	0.12	0.29	1.00
Individual Call Tone Measures									
[4]	Individual Analyst Q&A Tone _{ita}	99,665	-0.05	0.55	-1.00	-0.40	0.00	0.33	1.00
Individual Analyst Output Measures									
[5]	Individual Δ EPS Forecast _{ita}	82,309	0.01	0.23	-0.96	-0.04	0.01	0.07	1.06
[6]	Individual % Δ Price Target _{ita}	87,841	0.01	0.11	-0.50	0.00	0.00	0.03	0.30
[7]	Individual Δ Recommendation _{ita}	80,101	0.04	0.20	0.00	0.00	0.00	0.00	1.00
Intraday Abnormal Holding Period Returns (as a %)									
[8]	TAQ Abnormal Return [0, Presentation End] _{it}	46,435	0.01	1.30	-99.87	-0.31	0.00	0.32	22.38
[9]	TAQ Abnormal Return [Pres. End, Q&A End] _{it}	46,337	-0.01	1.41	-22.09	-0.39	0.00	0.37	23.54
[10]	TAQ Abnormal Return [Q&A End, +30 min.] _{it}	45,891	-0.01	1.44	-26.11	-0.45	-0.01	0.44	73.44
[11]	TAQ Abnormal Return [Q&A End +30, +60 min.] _{it}	45,233	-0.01	1.77	-30.94	-0.39	-0.01	0.37	27.28
Control Variables from Intraday Tests									
[12]	Earnings Surprise _{it} *	46,883	0.00	0.01	-0.11	0.00	0.00	0.00	0.05
[13]	Large Positive Surprise _{it}	46,883	0.18	0.38	0.00	0.00	0.00	0.00	1.00
[14]	Large Negative Surprise _{it}	46,883	0.20	0.40	0.00	0.00	0.00	0.00	1.00
[15]	Meet/Beat Analyst Forecast _{it}	46,883	0.67	0.47	0.00	0.00	1.00	1.00	1.00
[16]	Size _{it}	46,864	7.17	1.84	0.50	5.96	7.18	8.33	14.67
[17]	Market to Book _{it}	46,806	1.16	1.36	0.00	0.44	0.81	1.42	69.10
[18]	ROA _{it}	46,829	0.00	0.04	-0.26	0.00	0.01	0.02	0.09
[19]	Log of Analyst Following _{it}	46,883	1.42	0.96	0.00	0.69	1.61	2.20	3.66
[20]	Institutional Ownership _{it}	46,883	0.60	0.31	0.00	0.39	0.68	0.85	1.00
[21]	[-2, -1] Abnormal Returns _{it}	46,879	0.00	0.04	-0.61	-0.01	0.00	0.02	1.55
[22]	[0, +1] Abnormal Institutional Trading _{it}	46,450	-0.02	3.15	-11.72	-0.49	0.00	0.58	10.89
[23]	Log of Total Words _{it}	46,883	8.57	0.45	5.48	8.31	8.63	8.90	9.94
[24]	Log of Pres. Words _{it}	46,883	7.61	0.55	1.79	7.32	7.67	7.98	9.34
[25]	Log of Mgmt. Q&A Words _{it}	46,883	7.50	0.82	0.69	7.11	7.65	8.06	9.64
[26]	Log of Analyst Q&A Words _{it}	46,883	6.91	0.67	0.69	6.58	7.04	7.37	8.82
[27]	Log of Mgmt. Pres. Fin. Words _{it}	46,883	4.51	0.65	0.00	4.20	4.60	4.93	6.48
[28]	Log of Mgmt. Q&A Fin. Words _{it}	46,883	3.49	0.88	0.00	3.04	3.64	4.09	5.97
[29]	Log of Analyst Q&A Fin. Words _{it}	46,883	3.04	0.78	0.00	2.64	3.18	3.58	5.46
[30]	Log of Mgmt. Pres. FLS _{it}	46,883	3.30	0.62	0.00	2.94	3.37	3.71	5.07
[31]	Log of Mgmt. Q&A FLS _{it}	46,883	3.21	0.77	0.00	2.83	3.33	3.74	5.40
[32]	Log of Analyst Q&A FLS _{it}	46,883	2.67	0.63	0.00	2.30	2.77	3.09	4.37
[33]	Morning Call _{it}	46,883	0.82	0.38	0.00	1.00	1.00	1.00	1.00
Additional Control Variables Used in Individual Analyst Tests									
[34]	S.D. of Analyst EPS Forecasts _{it}	99,665	0.00	0.01	0.00	0.00	0.00	0.00	0.32
[35]	[-90, -1] Abnormal Returns _{it}	99,665	0.00	0.16	-0.87	-0.08	0.00	0.08	3.40

The index it represents firm i 's conference call for year-quarter t . Index a represents the individual analyst. See Appendix B for variable definitions and Table 1, Panel A for TAQ timing definitions and sample selection criteria.

* Variable winsorized at the 1% and 99% level.

TABLE 1

Panel C: Subset of Pearson Correlations for Earnings Conference Calls from 2002-2013

Var. # from Table 1	[1]	[2]	[3]	[8]	[9]	[10]
[1] Analyst Q&A Tone _{it}	1.00					
[2] Management Presentation Tone _{it}	0.23***	1.00				
[3] Management Q&A Tone _{it}	0.28***	0.36***	1.00			
[8] TAQ Return [0, Presentation End] _{it}	0.02***	0.02***	0.01**	1.00		
[9] TAQ Return [Pres. End, Q&A End] _{it}	0.03***	0.01	0.01	0.02***	1.00	
[10] TAQ Return [Q&A End, +30 min.] _{it}	0.02***	0.00	0.01	0.00	0.01	1.00

*** p<0.01, ** p<0.05, * p<0.1. The index *it* represents firm *i*'s conference call for year-quarter *t*. See Appendix B for variable definitions and Table 1, Panel A for TAQ timing definitions and sample selection criteria.

TABLE 2

Regressions of Future Individual Analyst Output Revisions on Individual Analyst Tone for Earnings Conference Calls from 2002 to 2007

Variable	Δ EPS Forecast Level _{ita}		% Δ Price Target _{ita}		Rec. Upgrade Indicator _{ita}		Rec. Upgrade w/o Reiterations _{ita}	
	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat
Analyst Q&A Tone _{ita}	0.004**	(2.18)	0.658***	(8.12)	0.004*	(1.85)	0.069*	(1.96)
Management Presentation Tone _{ita}	0.012	(1.07)	3.544***	(8.65)	0.005	(0.98)	0.147	(1.34)
Management Q&A Tone _{ita}	0.018*	(1.75)	1.959***	(5.45)	0.002	(0.45)	0.087	(0.84)
Earnings Disclosure Controls								
Earnings Surprise _{it}	2.870***	(5.41)	109.548***	(8.21)	0.139	(0.36)	-0.289	(-0.05)
Large Positive Surprise _{it}	0.000	(0.04)	1.327***	(9.14)	0.012***	(3.16)	0.101*	(1.83)
Large Negative Surprise _{it}	-0.010	(-1.10)	-1.377***	(-6.04)	-0.001	(-0.19)	-0.151	(-1.37)
Meet/Beat Analyst Forecast _{it}	0.014**	(2.61)	1.519***	(8.78)	-0.001	(-0.37)	-0.033	(-0.32)
Time-Varying Firm Controls								
Size _{it}	-0.028**	(-2.26)	-0.898	(-1.45)	-0.014**	(-2.63)	-0.068	(-0.50)
Market to Book _{it}	0.011**	(2.77)	-0.012	(-0.07)	-0.002	(-1.06)	-0.038	(-0.96)
ROA _{it}	-2.106***	(-9.82)	-10.095**	(-2.72)	-0.036	(-0.57)	-0.238	(-0.17)
Log of Analyst Following _{it}	0.005	(0.60)	-0.044	(-0.29)	-0.003	(-0.94)	-0.005	(-0.11)
S.D. of Analyst EPS Forecasts _{it}	1.394	(1.12)	34.144***	(2.88)	0.011	(0.06)	0.063	(0.02)
Institutional Ownership _{it}	0.023**	(2.26)	-0.017	(-0.03)	-0.019	(-1.64)	-0.244	(-0.99)
[-2, -1] Abnormal Returns _{it}	-0.016	(-0.27)	18.303***	(8.92)	0.005	(0.14)	0.144	(0.26)
[-90, -1] Abnormal Returns _{it}	0.054***	(4.25)	20.434***	(18.72)	-0.018**	(-2.46)	-0.314**	(-2.60)
Conference Call Attribute Controls								
Log of Total Words _{it}	-0.054**	(-2.29)	-3.088***	(-5.05)	0.004	(0.32)	-0.121	(-0.40)
Log of Pres. Words _{it}	0.006	(0.31)	1.398***	(2.92)	-0.014	(-1.64)	0.034	(0.27)
Log of Mgmt. Q&A Words _{it}	0.020*	(1.88)	0.110	(0.35)	-0.000	(-0.09)	0.044	(0.30)
Log of Analyst Q&A Words _{it}	0.016*	(1.89)	-0.340	(-1.00)	0.002	(0.35)	-0.072	(-0.52)
Log of Mgmt. Pres. Fin. Words _{it}	-0.016*	(-1.91)	0.179	(0.89)	0.001	(0.16)	-0.121*	(-1.82)
Log of Mgmt. Q&A Fin. Words _{it}	-0.006	(-0.85)	0.407**	(2.78)	0.001	(0.46)	0.044	(0.77)
Log of Analyst Q&A Fin. Words _{it}	-0.006	(-0.97)	-0.369**	(-2.78)	-0.004	(-0.97)	-0.036	(-0.41)
Log of Mgmt. Pres. FLS _{it}	-0.007	(-0.72)	-0.790***	(-4.38)	0.006	(1.07)	0.053	(0.53)
Log of Mgmt. Q&A FLS _{it}	0.001	(0.17)	0.216	(1.04)	0.002	(0.48)	-0.049	(-0.53)
Log of Analyst Q&A FLS _{it}	-0.003	(-0.27)	0.479*	(1.80)	0.001	(0.32)	0.077	(0.65)
Morning Call _{it}	0.010	(1.12)	0.106	(0.41)	0.001	(0.12)	0.069	(0.75)
Year-Quarter of the Call Date FE	Y		Y		Y		Y	
Analyst-Firm Fixed Effects	Y		Y		Y		Y	
Observations	82,309		87,841		80,101		6,674	
R-Squared	0.282		0.430		0.280		0.750	

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by calendar year-quarter of the call date. The index *it* represents firm *i*'s conference call for year-quarter *t*. Index *a* represents the individual analyst. See Appendix B for variable definitions and Table 1, Panel A for sample selection criteria.

TABLE 3
 Regression of Aggregate Analyst Tone on Call Characteristics for Earnings
 Conference Calls from 2002 to 2013

Variable	Analyst Q&A Tone	
	<i>coefficient</i>	<i>t-stat</i>
<i>Tone Covariates</i>		
Management Presentation Tone _{it}	0.141***	(19.64)
Management Q&A Tone _{it}	0.213***	(30.42)
<i>Earnings Disclosure Covariates</i>		
Earnings Surprise _{it}	0.173	(1.34)
Large Positive Surprise _{it}	0.015***	(3.89)
Large Negative Surprise _{it}	-0.011**	(-2.31)
Meet/Beat Analyst Forecast _{it}	0.021***	(5.67)
<i>Time-Varying Firm Covariates</i>		
Size _{it}	-0.009	(-1.53)
Market to Book _{it}	0.002	(1.06)
ROA _{it}	0.014	(0.25)
Log of Analyst Following _{it}	0.006*	(1.89)
Institutional Ownership _{it}	0.002	(0.13)
[-2, -1] Abnormal Returns _{it}	0.095***	(2.91)
[0, +1] Abnormal Institutional Trading _{it}	0.001	(1.58)
<i>Conference Call Attribute Covariates</i>		
Log of Total Words _{it}	-0.005	(-0.30)
Log of Pres. Words _{it}	0.001	(0.05)
Log of Mgmt. Q&A Words _{it}	0.008	(0.93)
Log of Analyst Q&A Words _{it}	-0.054***	(-5.64)
Log of Mgmt. Pres. Fin. Words _{it}	0.014**	(2.50)
Log of Mgmt. Q&A Fin. Words _{it}	-0.006	(-1.39)
Log of Analyst Q&A Fin. Words _{it}	-0.005	(-1.01)
Log of Mgmt. Pres. FLS _{it}	-0.027***	(-4.75)
Log of Mgmt. Q&A FLS _{it}	-0.005	(-0.86)
Log of Analyst Q&A FLS _{it}	0.018***	(3.06)
Morning Call _{it}	0.013**	(2.05)
Year-Quarter of the Call Date FE		Y
Firm Fixed Effects		Y
Observations		46,436
Adjusted R-Squared		0.226

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by firm. The index *it* represents firm *i*'s conference call for year-quarter *t*. See Appendix B for variable definitions and Table 1, Panel A for sample selection criteria.

TABLE 4

Regressions of Intraday Abnormal Returns on Aggregate Analyst Tone for Earnings Conference Calls from 2002 to 2013

Variable	Intraday Abnormal Return Window (as a %)									
	[0, Presentation End] _{it}		[Pres. End, Q&A End] _{it}		[Q&A End, +30 min.] _{it}		[Q&A End +30, +60] _{it}		[0, Presentation End] _{it}	
	<i>coefficient</i>	<i>t-stat</i>	<i>coefficient</i>	<i>t-stat</i>	<i>coefficient</i>	<i>t-stat</i>	<i>coefficient</i>	<i>t-stat</i>	<i>coefficient</i>	<i>t-stat</i>
Analyst Q&A Tone _{it}			0.113***	(4.05)	0.134***	(4.05)	0.040	(1.08)	0.095***	(3.85)
Management Presentation Tone _{it}	0.051*	(1.69)	0.084**	(2.69)	-0.007	(-0.16)	0.087	(1.36)	0.034	(1.19)
Management Q&A Tone _{it}			0.002	(0.06)	0.012	(0.37)	0.072*	(1.84)		
[0, Presentation End] Abnormal Returns _{it}			-0.701***	(-3.85)	-0.100	(-1.19)	-0.031*	(-1.68)		
[Pres. End, Q&A End] Abnormal Returns _{it}					-0.004	(-0.33)	-0.000	(-0.86)		
[Q&A End, +30 min.] Abnormal Returns _{it}							-0.220	(-1.02)		
Earnings Disclosure Controls										
Earnings Surprise _{it}	0.580	(0.54)	2.462***	(3.13)	-0.718	(-0.62)	0.752	(0.62)	0.553	(0.51)
Large Positive Surprise _{it}	0.000	(0.01)	-0.027	(-1.20)	-0.002	(-0.07)	0.057***	(2.91)	-0.001	(-0.06)
Large Negative Surprise _{it}	0.017	(0.86)	0.025	(0.97)	-0.023	(-0.88)	0.006	(0.21)	0.018	(0.91)
Meet/Beat Analyst Forecast _{it}	0.024*	(1.85)	-0.016	(-0.80)	-0.002	(-0.15)	-0.009	(-0.45)	0.022	(1.65)
Time-Varying Firm Controls										
Size _{it}	-0.010	(-0.44)	-0.017	(-0.42)	-0.003	(-0.11)	-0.041	(-1.65)	-0.009	(-0.39)
Market to Book _{it}	-0.007	(-0.64)	-0.006	(-0.49)	-0.040**	(-2.49)	-0.035**	(-2.40)	-0.007	(-0.65)
ROA _{it}	-0.154	(-0.40)	-0.926**	(-2.68)	-0.544	(-0.84)	0.887	(1.09)	-0.156	(-0.40)
Log of Analyst Following _{it}	0.030	(1.63)	-0.003	(-0.13)	0.003	(0.23)	-0.006	(-0.40)	0.029	(1.60)
Institutional Ownership _{it}	-0.067	(-1.35)	-0.046	(-0.63)	-0.036	(-0.67)	0.067	(1.15)	-0.068	(-1.37)
[-2, -1] Abnormal Returns _{it}	-1.007**	(-2.20)	-0.825**	(-2.26)	-0.746***	(-2.79)	-0.480	(-1.67)	-1.016**	(-2.22)
[0, +1] Abnormal Institutional Trading _{it}	0.011***	(4.36)	0.011***	(3.85)	0.014***	(5.10)	0.014***	(3.88)	0.011***	(4.36)
Conference Call Attribute Controls										
Log of Total Words _{it}	-0.097*	(-1.76)	0.026	(0.42)	-0.024	(-0.30)	0.044	(0.59)	-0.096*	(-1.76)
Log of Pres. Words _{it}	0.055	(1.50)	0.042	(0.72)	0.018	(0.32)	0.104	(1.42)	0.055	(1.50)
Log of Mgmt. Q&A Words _{it}	0.030	(0.85)	-0.018	(-0.79)	0.032	(0.98)	-0.003	(-0.11)	0.029	(0.83)
Log of Analyst Q&A Words _{it}	0.008	(0.22)	0.013	(0.38)	0.053	(1.34)	0.009	(0.30)	0.014	(0.38)
Log of Mgmt. Pres. Fin. Words _{it}	0.017	(0.81)	0.001	(0.05)	0.020	(0.54)	-0.061	(-1.25)	0.016	(0.75)
Log of Mgmt. Q&A Fin. Words _{it}	-0.045***	(-2.73)	0.031	(1.57)	-0.019	(-0.93)	0.001	(0.06)	-0.044**	(-2.68)
Log of Analyst Q&A Fin. Words _{it}	0.036	(1.56)	-0.025	(-1.40)	-0.028	(-0.97)	-0.016	(-0.72)	0.037	(1.59)
Log of Mgmt. Pres. FLS _{it}	-0.022	(-1.14)	-0.061*	(-1.91)	-0.030	(-1.36)	0.004	(0.15)	-0.020	(-1.01)
Log of Mgmt. Q&A FLS _{it}	0.039	(1.27)	-0.027	(-1.16)	0.004	(0.15)	-0.048	(-1.03)	0.039	(1.26)
Log of Analyst Q&A FLS _{it}	0.003	(0.12)	0.010	(0.51)	0.013	(0.39)	0.019	(0.58)	0.001	(0.04)
Morning Call _{it}	-0.050	(-1.40)	0.032	(1.66)	0.039	(1.35)	-0.011	(-0.41)	-0.051	(-1.45)
Year-Quarter of the Call Date FE	Y		Y		Y		Y		Y	
Firm Fixed Effects	Y		Y		Y		Y		Y	
Observations	46,435		46,337		45,891		45,233		46,435	
Adjusted R-Squared	0.033		0.035		0.032		0.045		0.034	

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by calendar year-quarter. The index *it* represents firm *i*'s conference call for year-quarter *t*. See Appendix B for variable definitions and Table 1, Panel A for TAQ timing definitions and sample selection criteria.

TABLE 5

Hourly Breakdown of the Timing of Analyst EPS Forecast, Target Price, and
Recommendation Revisions on the Earnings Conference Call Date from 2002 to 2013

This table reports the average percentage of a firm's analysts who revise their EPS forecasts, target prices, and stock recommendations during the hours around the conference call time (time 0).

Hour Relative to Conference Call (T = 0)	Percentage of Firm's Analyst Following		
	EPS Revision	Target Price Revision	Stock Recommendation Revision
-12	0.000%	0.001%	0.000%
-11	0.002%	0.002%	0.012%
-10	0.005%	0.007%	0.010%
-9	0.017%	0.021%	0.033%
-8	0.253%	0.813%	0.026%
-7	0.314%	0.377%	0.061%
-6	0.223%	0.205%	0.046%
-5	0.266%	0.249%	0.090%
-4	0.491%	0.432%	0.566%
-3	1.243%	1.268%	1.168%
-2	2.462%	1.858%	1.147%
-1	3.729%	2.435%	1.229%
0	2.097%	1.148%	1.269%
+1	0.922%	0.519%	0.477%
+2	0.543%	0.297%	0.598%
+3	0.809%	0.507%	0.283%
+4	1.101%	0.736%	0.326%
+5	1.269%	0.912%	0.125%
+6	1.067%	0.772%	0.212%
+7	0.768%	0.498%	0.083%
+8	0.440%	0.296%	0.000%
+9	0.325%	0.216%	0.031%
+10	0.236%	0.161%	0.000%
+11	0.193%	0.120%	0.011%
+12	0.256%	0.216%	0.045%

Bold indicates statistical significance at the 10% level. We obtain the conference call time from the transcript and the analyst revision time from I/B/E/S. See Appendix B for variable definitions and Table 1, Panel A for sample selection criteria.

TABLE 6

Table 4 Regressions of Intraday Abnormal Returns on Aggregate Analyst Tone for Earnings Conference Calls from 2002 to 2013 Excluding Calls with Confounding Analyst Revisions

This table excludes conference calls that have a concurrent EPS forecast, target price, or recommendation revision during the window noted in the first column. We report the coefficient for analyst tone after re-estimating our regressions from Table 4 (including controls).

Hourly Window Relative to Conference Call (Hour 0)	n	[Pres. End, Q&A End] <i>Analyst tone coefficient</i>	[Q&A End, +30 min.] <i>Analyst tone coefficient</i>
Excluding [Hour -8, Hour -5]	45,117	0.1059***	0.0948***
Excluding [Hour -4, Hour -1]	44,686	0.0998***	0.1104***
Excluding [Hour 0, Hour +3]	43,120	0.0993***	0.1035***
Excluding [Hour +4, Hour +7]	44,868	0.1103***	0.1026**

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by calendar year-quarter. Controls from Table 4 are included.

FIGURE 1
 Analyst Earnings Forecast, Target Price, and Stock Recommendation Revisions
 Around Earnings Conference Calls from 2002-2013

This figure shows the on average percentage of a firm's analyst following that revise their EPS forecasts, target prices, and recommendations on the days leading up to and the days following the conference call date.

