Implications of Buy-Side Analyst Participation in Public Earnings Conference Calls

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October 2017

Abstract

The Q&A session of public earnings conference calls represents a unique opportunity for stakeholders to interact with senior management. We examine buy-side analysts' participation on these calls and the associated capital-market implications. Using 81,000 transcripts for 3,300 companies from 2007 to 2016, we find that buy-side analysts ask questions on approximately 18% of calls. Management prioritizes buy-side analysts, but discriminates against analysts from hedge funds when short interest is high. Relative to sell-side analysts, buy-side analysts' interactions with management are shorter and less favorable. Buy-side appearances are also associated with increases in information asymmetry and reductions in sell-side activity.

We thank Larry Brown, Brian Clark, Gus De Franco, Diane Denis, Mei Feng, Woojin Kim, Dawn Matsumoto, Li Zhang, and participants at the 2014 Financial Management Association Annual Meeting, the 2015 American Accounting Association (AAA) Annual Meeting, the 2016 Northeast Region AAA Meeting, the 2017 AAA FARS Midyear Meeting, as well as seminar participants at Rensselaer Polytechnic Institute, the University of Arkansas, the University of California at Davis, St. Bonaventure University, T. Rowe Price, and Citadel Global Equities for helpful comments and suggestions. We also thank Howard Bernheim of S&P Capital IQ, Wenyao Hu, Michael Kanneth, Rachele Putnick, Akin Sayrak, and James Trout for help in collecting conference call transcripts. Finally, we thank Jesse Ellis for sharing hedge fund data, which facilitated the development of our taxonomy.

1. Introduction

In spite of their importance in the capital markets, buy-side analysts are not well understood because their research is not disseminated to the public and therefore not subject to examination on a large scale. Recent studies have attempted to overcome these hurdles in various ways, including analyzing small samples of proprietary buy-side data (Groysberg, Healy, and Chapman, 2008; Groysberg, Healy, Serafeim, and Shanthikumar, 2013; Rebello and Wei, 2014), administering surveys to buy-side analysts (Brown, Call, Clement, and Sharp, 2016), and obtaining data through online social networks of buy-side analysts (Crawford, Gray, Johnson, and Price, 2014). We extract information from earnings conference call transcripts to address several related research questions. First, we examine the frequency, determinants, length, and tone of buy-side analysts' interactions with management during the question and answer (Q&A) portion of public earnings conference calls, both in general and relative to sell-side analysts. Given the likelihood that buy-side analysts represent the institutional owners of the company, we also investigate whether company management prioritizes buy-side analysts on earnings conference calls. Finally, we provide evidence on the market implications for buy-side analyst participation. Specifically, we examine the impact of buy-side analyst conference call participation on information asymmetry (equity bid-ask spread, implied volatility, and short interest) and abnormal returns.

Conference calls transcripts are a useful setting for improving our understanding of buy-side institutions for several reasons. First, as a practical matter, because we are able to obtain over 81,000 conference call transcripts for more than 3,300 public firms, we can examine of both buy-side and sell-side analysts' activity (asking questions on public earnings conference calls) on a large scale and across a broad range of firms. Second, public earnings conference calls

represent a particularly important news event, not just because of the information disseminated in the earnings announcement that precedes the call, but also because the conference call provides investors and analysts with the opportunity to interact directly with company management as they process the earnings news and its implications for the firm. Third, this setting allows us to compare buy-side analysts and sell-side analysts on several interesting dimensions, such as length and tone of their interactions, and to examine the influence of buy-side conference call participation on subsequent sell-side coverage.

We collect earnings conference call transcripts from 2007 to 2016 through Capital IQ and employ phonetic algorithms to analyze text transcribed from speech during the Q&A portion of each call. We introduce a comprehensive taxonomy to identify the individual asking each question on the conference call as either a buy-side analyst, a sell-side analyst, or a member of the media. Our taxonomy identifies 1,814 unique institutions, and allows us to further distinguish between buy-side analysts employed by hedge funds, mutual funds, or registered investment advisors (RIAs).

While sell-side analysts are by far the most regular conference call participants, buy-side analysts participate on 18.5% of all earnings conference calls in our sample. Among buy-side analysts, those employed by hedge funds are the most frequent conference call participants, appearing on 9.6% of all conference calls, with analysts employed by mutual funds (registered investment advisors) appearing on 4.5% (6.1%) of all calls. In contrast, at least one sell-side analyst appears on almost every (97.4%) conference call over the sample period.

We predict and find that buy-side analysts are more likely to participate on earnings conference calls when reliable information about the company from other sources is more scarce. Specifically, we find that buy-side analysts, particularly those working for a hedge fund, are

more likely to participate on conference calls hosted by smaller companies and those covered by relatively few sell-side analysts. Further, buy-side analyst participation reached a high during the financial crisis of 2008 (31.7% of all calls that year), but has since fallen steadily (11.6% in 2016).

Because buy-side analysts are employed by institutional shareholders who are likely to own the company's stock, we predict and find evidence that management prioritizes buy-side analysts during conference calls. For example, management is 23% more likely to grant a buy-side analyst a follow-up question than to do so for other participants on the call. Interestingly, when short interest is high, management does not prioritize buy-side analysts employed by hedge funds, consistent with management being careful to avoid inviting potentially difficult or damaging questions from participants who are more likely to hold short positions in the company's stock.

We also examine the length and the tone of buy-side analysts' interactions with company management during the call. We find that management's interactions with buy-side analysts are significantly shorter than their interactions with sell-side analysts, perhaps due to buy-side analysts' incentives to avoid revealing private information in a public setting. We employ the Loughran and McDonald (2011) tone dictionaries and find that buy-side tone is significantly less favorable than the tone of sell-side analysts' interactions, consistent with buy-side analysts having fewer incentives than sell-side analysts to curry favor with company management. Further, as the tone of buy-side analysts' interactions with management becomes more positive, excess returns surrounding the call and changes in sell-side analyst price targets following the call increase.

Because buy-side analysts employed by institutional investors are considered relatively informed market participants, we also investigate the capital market consequences of buy-side analysts' participation on earnings conference calls. We observe increases in bid-ask spreads, implied volatility, and short interest following buy-side analyst participation in public conference calls, consistent with an increase in information asymmetries when buy-side analysts publicly reveal their interest in a stock. We further find that buy-side analyst appearances are associated with significantly lower equity returns around conference calls and that buy-side analyst tone is reflected in returns beyond the effects of sell-side tone.

Because sell-side analysts are motivated to cover companies based on demand from buy-side clients (Brown, Call, Clement, and Sharp, 2015), we also consider the impact of buy-side analyst conference call participation on subsequent sell-side coverage. We argue that greater buy-side analyst participation may increase (research demand hypothesis) or decrease (research competition hypothesis) subsequent sell-side analyst coverage. Consistent with the research competition hypothesis, we find that both the number of covering analysts and the number of forecasts issued per analyst decline following buy-side analyst participation on public earnings conference calls.

Our study makes several contributions to the literature. First, our findings provide insight into the activities of buy-side analysts, an important segment of Wall Street that has been the subject of relatively little academic research to date. While it has generally been understood that buy-side investors *listen* to public earnings conference calls, the conventional wisdom has been that buy-side investors do not ask questions on calls because doing so would "tip their hand." We document that buy-side analysts, particularly those from hedge funds and RIAs with less private access to management, regularly ask questions during the Q&A portion of public conference

calls. This finding suggests that buy-side analysts believe the gains from participation are often greater than the risks of disclosing private information during the call.

Second, we provide new evidence that sell-side analysts respond to information production from their buy-side counterparts. In doing so, we refine the findings of Brown, Hillegeist, and Lo (2004) by showing that buy-side participation increases, rather than decreases, information asymmetry during earnings conference calls, as evidenced by increases in bid-ask spreads and implied volatility. Additionally, our analyses of priority on conference calls, as well as the tone and length of the interactions during the call, further our understanding of the dynamics between company management and both buy-side and sell-side analysts.

Our study is related to a concurrent paper by Jung et al. (2017), who also examine buy-side analyst participation on public earnings conference calls. However, we note several important differences. First, our study examines questions that Jung et al. (2017) do not address, including the priority of participants in the Q&A session and the impact of buy-side appearances on subsequent sell-side research activity. Second, our taxonomy allows us to separately identify buy-side analysts employed by hedge funds and those employed by mutual funds. This distinction is important given the different incentives to ask a question on a public conference call that may exist for hedge fund analysts relative to (long only) mutual fund analysts. Third, whereas Jung et al. (2017) examine conference call transcripts from 2002 to 2009, we use conference call transcripts from 2007 to 2016.

Our study also introduces meaningful methodological improvements that yield distinct and more reliable conclusions. For example, while both studies attempt to identify buy-side and sell-side analysts participating on the calls, our taxonomy reduces errors in the identification of buy-side analysts. In addition, correctly identifying the employer of each conference call

participant (e.g., buy-side institution vs. sell-side institution) is critical to the reliability of any study in this literature, and we demonstrate the superiority of our phonetic algorithm in identifying proper names that are heterogeneously transcribed in many different conference call transcripts. This distinction is important because, unlike 10-K filings, conference call transcripts are generated from speech; therefore, institution and analyst names are commonly spelled differently across various transcripts (e.g., J.P. Morgan, JP Morgan, J P Morgan). Our phonetic matching algorithm reduces the likelihood that we misidentify the employer or misclassify the affiliation (buy-side vs. sell-side) of a conference call participant, and we demonstrate potential misspecification in the Jung et al. (2017) sample.

Lastly, while both studies measure the tone of interactions with management on conference calls, Jung et al. (2017) use the Harvard IV-4 tone dictionary and fail to detect a difference in the tone of buy-side and sell-side analysts' questions. However, the Loughran and McDonald (2011) tone dictionary has been shown to exhibit significant advantages when analyzing the tone of financial content. We document that only the Loughran and McDonald (2011) dictionary yields the predicted result that buy-side analysts exhibit less favorable tone than sell-side analysts when communicating with management on public calls. Similar to Jung et al. (2017), we find no difference in tone between buy-side and sell-side analysts when using the Harvard IV-4 dictionary, further underscoring the superiority of the Loughran and McDonald (2011) dictionary and the importance of employing it when analyzing financial text. Therefore, we add to the literature by documenting that interactions between buy-side analysts and company management on public earnings conference calls exhibit less favorable tone than do interactions between sell-side analysts and company management, and that these differences in tone have capital market implications. We elaborate on these issues in Section 6.

2. Background

Buy-Side Analysts

Although buy-side analysts' stock recommendations are not disseminated publicly, their research is important to understand because it provides the basis for institutional investors' trading, which represents the majority of equity trading in the United States (Blume and Keim, 2012). Academic researchers have relied primarily on proprietary archival data or survey data to examine buy-side analysts, and a growing literature in this area provides evidence that buy-side analysts play an important role in capital markets. For example, Rebello and Wei (2014) use proprietary data from a global fund and find that fund managers trade on buy-side analysts' stock recommendation changes. Likewise, Frey and Herbst (2014) find that fund managers trade on buy-side recommendation revisions, and that these trades are associated with positive abnormal returns that exceed the returns from trades based on sell-side recommendations. Cheng, Liu, Qian (2006) find that portfolio managers rely more on information from their fund's buy-side analysts than on information provided by sell-side analysts, especially when relatively few sell-side analysts cover the stock, sell-side analysts' earnings forecasts exhibit significant dispersion, or sell-side analysts' earnings forecast errors for other stocks in the institution's portfolio are relatively large. Crawford et al. (2014) find that buy-side analysts' stock recommendations generate significant returns, particularly when their buy recommendations are contrary to the consensus sell-side stock recommendation

Other research on the performance of buy-side analysts' stock recommendations has provided evidence that is more mixed. For example, using proprietary data from a large money management firm, Groysberg et al. (2008) find that buy-side earnings forecasts are more optimistic and less accurate than those of sell-side analysts. Groysberg et al. (2013) also find that

buy-side analysts' stock recommendations generally underperform those of sell-side analysts; however, they attribute this finding to the fact that buy-side analysts tend to cover larger, more liquid stocks with lower expected returns.

Brown et al. (2016) survey buy-side analysts from 181 investment firms and examine the incentives and inputs that shape their stock recommendations. In general, their results suggest that buy-side analysts value the raw inputs sell-side analysts provide (e.g., in-depth industry knowledge and access to company management) more than the summary outputs they provide (e.g., earnings estimates and stock recommendations). The buy-side analysts they survey also indicate that quarterly earnings conference calls are less useful than primary research (e.g., company or plant visits, channel checks) when determining their stock recommendations, but that quarterly earnings conference calls are more useful than management earnings guidance or information provided by sell-side analysts. In follow-up interviews with buy-side analysts, some analysts indicated they are reluctant to ask a question on a public earnings conference call because they do not want to reveal their thinking to others listening to the call.

Earnings Conference Calls

Public earnings conference calls held in conjunction with an earnings announcement have become increasingly common in recent years, and prior research has examined various questions relating to these calls. Early studies focused on companies' motivations for hosting conference calls. For example, Brown et al. (2004) find that information asymmetry among equity investors is reduced by conference call frequency. In terms of the consequences of conference calls, Hollander, Pronk, and Roelofsen (2010) document that when management chooses not to answer an analyst's question during the Q&A session, the market appears to assume the silence represents bad news and reacts negatively. Matsumoto, Pronk, and Roelofsen (2011) examine the

information content of management's presentation and the Q&A session of earnings conference calls. They find that both portions of conference calls contain incremental information beyond that which is contained in the earnings press release, but the Q&A session appears to contain a greater amount of incremental information.

Some studies have focused on sell-side analysts' participation in the Q&A session of earnings conference calls. Mayew (2008) finds that sell-side analysts with more favorable ratings and higher profiles are more likely to be allowed to participate in earnings conference calls. Mayew, Sharp, and Venkatachalam (2013) find that sell-side analysts who participate on conference calls subsequently issue more accurate and timely earnings estimates than analysts who do not participate. The authors suggest that conference call participation can help identify sell-side analysts with superior private information. Although buy-side analyst participation could also signal the possession of superior private information, buy-side analysts may deliberately avoid participation on conference calls in an effort to protect this information. Accurately decomposing the content of earnings conference calls and classifying analysts participating on these calls offers a glimpse into the public information production of buy-side institutions.

3. Hypotheses

As discussed previously, anecdotal evidence and conventional beliefs about the incentives of buy-side analysts suggest they do not commonly participate on public earnings conference calls. Consistent with these beliefs, Solomon and Soltes (2015) find that, despite the introduction of Regulation FD, some investors continue to meet privately with executives. Thus, our first objective is to identify whether buy-side analysts actually appear on conference calls

with any regularity. We also explore several hypotheses related to the nature and consequences of buy-side analyst participation in public earnings conference calls.

Buy-Side Analyst Participation and the Firm's Information Environment

Although buy-side analysts have clear incentives to avoid "tipping their hand," they may choose to participate on the conference calls of companies in their portfolio in order to influence the outcome of the call or the market's response to it. They also may choose to participate on public conference calls in an effort to gather information they deem relevant to their institution's investment decision. The need to gather information in a public venue, such as a quarterly earnings conference call, is likely a function of uncertainty about the firm's future prospects, the buy-side analyst's access to management, and availability of alternative sources of information about the firm. As a result, we predict that buy-side analysts are more likely to ask questions on public earnings conference calls hosted by neglected firms (Merton, 1987) and for which information is scare (Barry and Brown, 1984). Stated formally, our first hypothesis is as follows:

H1: Buy-side analysts are more likely to ask questions on public earnings conference calls of neglected firms.

Management makes important decisions when managing the conference call queue, and decisions about whom to allow to ask a question during the conference call are non-random (Mayew, 2008; Mayew et al., 2013). Management is likely to prioritize certain conference call participants deemed particularly important to the firm. One form of prioritization is to allow certain participants to ask the first question during the Q&A session (Cen, Chen, Dasgupta, and Ragunathan, 2016). Because time constraints are likely to limit the number of individuals who are able to participate in the Q&A session of the call, analysts are likely to prefer asking their question early in the call. Relatedly, management can prioritize certain conference call participants by giving them the opportunity to follow-up with management in additional

interactions later in the call. Because buy-side analysts represent the institutional owners of the company, management is likely to prioritize buy-side analysts in the conference call queue.

On the other hand, management has the ability to postpone or avoid questions from participants with whom they do not desire to interact in a public setting by pushing those participants to the back of the conference call queue or delaying their interaction until the private "call-backs" that occur following the public call (Brown, Call, Clement, and Sharp, 2017). Further, if management is concerned that a buy-side analyst from a hedge fund might attempt to drive the company's stock price down to support his portfolio manager's short position in the stock, management may be reluctant to allow the analyst to ask direct questions in such a visible, public forum. Based on this discussion, we predict that management will prioritize buy-side analysts over sell-side analysts on public earnings conference calls, recognizing that this is less likely to be the case for buy-side analysts who work for a hedge fund when there are higher numbers of short sellers (i.e. short interest on firm stock is high).

H2: Buy-side analysts are more likely than sell-side analysts to ask the first question and to be granted follow-up interactions on public earnings conference calls.

Length of Interactions on Conference Calls

We also examine the length of time conference call participants interact with management during the Q&A session. The total time a given analyst participates with management is a function of the total number of participants on the call, the length of the analyst's question, the length of management's response to the question, and any follow-up questions and responses. Relative to sell-side analysts, buy-side analysts may favor shorter, more succinct interactions with company management due to concerns about revealing private information in a public setting. Conversely, sell-side analysts would seem to prefer longer interactions with management because sell-side analysts benefit from the appearance that they

are prominent and/or have a good relationship with company management (Brown et al., 2015; Brown et al., 2016; Chen and Matsumoto, 2006). Consistent with this motivation, one buy-side analyst interviewed in Brown et al. (2016, p. 151) stated, "Sell-side analysts ask the questions [so] if you Google them, it comes up with them in the transcript, and they want to have their name out there as much as possible." This reasoning suggests sell-side analysts will have longer interactions, on average, than buy-side analysts.

H3: Interactions between buy-side analysts and company management during public earnings conference calls are shorter than interactions between sell-side analysts and company management.

Tone of Interactions

We also examine the tone of conference call participants' interactions with management during the Q&A session of earnings conference calls. Sell-side analysts have strong incentives to maintain positive relations with company management because negative interactions could result in a loss of access to management (Mayew, 2008; Mayew et al., 2013; Brown et al., 2015), and access to management is one of the sell-side services that buy-side clients value most (Brown et al., 2016). In contrast, buy-side analysts do not have the same strong incentives to maintain positive relations with management (Brown et al., 2016). Further, while sell-side analysts have incentives to use positive language in an effort to curry favor with company management, buy-side analysts have incentives to guard their private information and use neutral language that does not convey information to other investors. Buy-side analysts who work for hedge funds that trade frequently and/or take short positions may also deliberately ask questions with negative tone in order to drive the stock price down. Therefore, we state our next hypothesis as follows:

H4: The tone of buy-side analysts' interactions with management on public earnings conference calls is more negative than the tone of sell-side analysts' interactions with management.

Capital Market Consequences of Buy-Side Participation in Conference Calls

Our next hypothesis examines potential post-call consequences of buy-side analyst participation. Boehmer and Kelley (2009) link institutional trading activity to more efficient stock prices, while Sarin, Shastri, and Shastri (1999) show that higher institutional ownership increases bid-ask spreads. Engelberg, Reed, and Riggenberg (2012) provide evidence that short sellers have superior information processing ability around public news events. Brown et al. (2004) find that public earnings conference calls reduce information asymmetry in the marketplace. Conference call participation, however, is not homogenous. If buy-side analyst conference call participation signals greater adverse selection due to informed institutional interest in a stock, we predict an increase in equity bid-ask spreads, implied volatility, and short interest following the conference call. Similarly, if the appearance and/or tone of buy-side analysts' interactions with company management on the call reveals information about institutional owners' views of the stock, we expect to observe abnormal returns around the earnings call. Stated formally:

H5: Buy-side analyst participation and tone on public earnings conference calls are associated with abnormal stock returns, changes in equity bid-ask spreads, changes in implied volatility, and changes in short interest.

Sell-Side Coverage Following Buy-Side Participation in Conference Calls

Buy-side analysts are one of the principal consumers of sell-side research, and client demand is the most important determinant of sell-side coverage decisions (Brown et al., 2015). If sell-side analysts view the buy-side analyst appearance as an indication of increased demand for research on the firm, more analysts are likely to cover the firm. Alternatively, sell-side analysts may view buy-side analysts that appear on conference calls as competitors in information acquisition, and buy-side participation on a public conference call may suggest to sell-side

analysts that institutional investors do not need or demand their services for the firm in question. In this case, sell-side analysts may drop coverage if they perceive their specialized services to be less valuable to buy-side clients. We articulate these opposing predictions with the following hypothesis:

H6: Sell-side analysts change coverage of the covered firm in response to buy-side analyst conference call participation.

4. Analyst Taxonomy of Conference Call Data

We begin by collecting all earnings conference call transcripts available through Capital IQ for Standard & Poor's 500 Index members from 2007 to 2016. We also collect transcripts for a large random sample of over 2,700 additional companies within the CRSP database but not in the S&P 500 at some point during the time period. In total, our sample includes 81,652 quarterly earnings conference call transcripts for 3,346 publicly traded companies. From each transcript, we extract the call date, call time, analyst affiliation, and analyst question sequence.[1]

We employ several steps to identify the affiliation of each conference call participant. We first identify sell-side institutions by matching the name of the analyst's affiliation in the conference call transcripts with a contributing brokerage in I/B/E/S. For all institutions not in I/B/E/S, we manually search company websites to identify additional sell-side institutions.[2] We classify all conference call participants employed by a sell-side institution (either in I/B/E/S or confirmed by our manual search of company websites) as sell-side analysts.[3] Figure 1 provides an overview of this taxonomy.

[1] Call-level data is provided in the online appendix.
[2] Our sample includes over 19,000 sell-side analyst appearances from 193 institutions that are not present in I/B/E/S.
[3] Many investment banks employ both buy-side and sell-side analysts. Since sell-side analysts dominate conference call appearances and no I/B/E/S-equivalent buy-side analyst database exists, unless explicitly stated otherwise on the conference call through a subsidiary name or analyst role identification, we assume that a participating analyst who works for an institution with a sell-side research department is a sell-side analyst. In this respect, the number of buy-side analysts we identify may be understated.

After manually identifying sell-side institutions, we identify buy-side institutions using the following steps. First, we verify hedge fund inclusion on a large, proprietary database of hedge funds.[4] Second, if a previously unidentified institution matches to the Thomson-Reuters institutional holdings (13-F, S34) or mutual fund (S12) databases, we classify the institution as a mutual fund. If an institution matches only to a 13-F record, we manually classify the entry using the institution's website, which generally contains descriptions of the institution's operations. If an institution's website is not available, we use a variety of data sources, including Google searches, Capital IQ, and Bloomberg, to classify the institution. Whenever possible we control for changes in institutional type over time.[5] We categorize the vast majority of buy-side institutions as hedge funds, mutual funds, or registered investment advisors (RIAs).[6]

If we cannot classify an institution as a sell-side or buy-side institution, we categorize it as either a media outlet or "other." We manually identify media organizations in the conference call transcripts.[7] The "other" category includes institutions we cannot identify as a buy-side institution, a sell-side institution, or a media outlet, and executives of the firm improperly listed on the transcript as a participating analyst, as well as other professionals who are unidentifiable.[8] Figure 2 provides an example of a conference call transcript and the outcome of our taxonomy to identify conference call participants. Our taxonomy successfully identifies 93.77% of the 559,268 conference call participants as either a buy-side analyst, a sell-side analyst, or a member

[4] We thank Jesse Ellis for sharing the hedge fund names from his database.
[5] For example, we classify Prudential as a sell-side institution until June 7, 2007, after which we categorize it as a buy-side institution. See http://www.businessweek.com/stories/2007-06-08/equity-research-whats-next-businessweek-business-news-stock-market-and-financial-advice.
[6] Other types of buy-side institutions we identify include governments, pension funds, and insurance firms.
[7] Media outlets include newspapers, magazines, and financial blogs.
[8] For example, transcripts list "Unidentified Analyst" or "Inaudible" for analyst institutions and/or names that are unknown or that cannot be transcribed. Some conference call participants intentionally conceal their identity, making it impossible to identify their employer. An example is Robert Jordan on this conference call: http://seekingalpha.com/article/66925-bluegreen-corp-q4-2007-earnings-call-transcript?part=qanda

of the media, representing 1,814 unique organizations. In Table 1 we report the most common buy-side and sell-side institutions with participating analysts in our sample, separately for each subcategory (i.e., hedge fund, mutual fund, etc.).[9]

Because conference call transcripts are derived from audio files, transcription of proper names of financial institutions and participants produce text patterns with substantial heterogeneity. As a result, the potential to misidentify institutions, and therefore to misclassify conference call participants (buy-side vs. sell-side), is high. Figure 3 describes this heterogeneity in transcribed text patterns. Panel A shows that 92.9% (77.6%) of buy-side institution appearances have at least two (three) distinct text patterns, and that 12.4% of buy-side institutions appear with *ten* or more different text patterns. Panel B exhibits even more heterogeneity in institution text strings for sell-side institutions. Specifically, nearly 75% of sell-side appearances are from institutions associated with more than *twenty* distinct text patterns in the sample call transcripts.

To address heterogeneity of transcribed institution names, we use the phonetic algorithm Soundex to determine the number of unique conference call appearances from a given institution. Proper names are not part of a standard dictionary; therefore, they are prone to phonetic-based misspelling, which Soundex is designed to resolve. Snae (2007) finds that character distance (i.e. Levenshtein) matching methods underperform Soundex by 9%.[10] We convert the raw text string of each appearance (when available in the transcript) into an equivalent Soundex string. We choose the institution name with the longest match (no less the first 3-digits of the string) from

[9] We manually verify all text variants of any institution whose name appears at least five times in our sample. An online appendix provides the full list of all 1,814 institutions, along with their classification, total number of appearances in our sample, number of unique analysts, and number of distinct matched text patterns.
[10] Snae (2007) finds that Phonex, NYSIIS, and LIG algorithms use phonetic components and offer further incremental accuracy improvements. We employ Soundex because it is more widely available via SAS, Stata, MySQL, and other data storage and analysis platforms. More information about the Soundex indexing system can be found at: http://www.archives.gov/research/census/soundex.html.

the beginning of the Soundex string. An example of 6-digit Soundex strings are provided in the conference call example of Figure 2.

5. Empirical Findings

Summary of Analyst Appearances

Conference call participation rates are presented in Panel A of Table 2. Columns (1) through (4) describe conference call participation among the various types of buy-side analysts, with Column (5) showing the total for all buy-side analysts. Columns (6) and (7) pertain to sell-side analysts and members of the media, respectively. Column (8) aggregates the participants across all types.

For each group of participants, we first report the mean participation rate per conference call. The mean of 6.85 for all conference call participants for the full sample period (Column 8) suggests that nearly 7 individuals ask a question during the Q&A portion of the average conference call in our sample. The vast majority of these participants (on average 6.169) are sell-side analysts. The mean participation rate for buy-side analysts is 0.246.

We also report (i) the maximum number of participants on a single conference call, (ii) the percentage of conference calls with at least one participant, and (iii) the percentage of conference calls with multiple participants. At least one buy-side analyst appears on 18.45% of all conference calls, with one call having as many as nine buy-side participants. An analysis across years suggests that buy-side analyst participation was highest during the 2007-2009 financial crisis (peaking at 31.7% in 2008), but buy-side analysts have become less likely to ask questions on conference calls in recent years.

The mean participation rate for hedge fund (mutual fund) analysts is 0.115 (0.047), suggesting that hedge fund analysts are more active than mutual fund analysts on public earnings

conference calls. In Panel B of Table 2, we assess the statistical difference between conference call participation among the various types of buy-side analysts we identify, and we find that analysts employed by hedge funds are more likely to participate in conference calls than are analysts employed by mutual funds or RIAs, consistent with their more frequent trading behavior (Griffin and Xu, 2009). Analysts from mutual funds are generally less likely to participate in conference calls than RIAs.

Determinants of Conference Call Participation

H1 predicts that when information about a company's future prospects is uncertain, buy-side analysts will be more likely to ask questions on earnings conference calls. In addition to firm size, we employ several proxies to identify a relatively uncertain information environment. First, we measure the number of sell-side analysts following the firm. Sell-side analysts are an important source of information for buy-side analysts because they typically possess a significant amount of industry knowledge, and industry knowledge is an extremely useful input into buy-side analysts' stock recommendations (Brown et al., 2016). With fewer sell-side analysts covering a stock and in a position to assess the implications of industry-wide information for a given company, buy-side analysts are less able to rely on sell-side analysts to provide valuable information as inputs to their stock recommendations. Second, we measure equity bid-ask spreads, which capture the extent to which information asymmetries exist between market makers and informed traders (such as institutional investors). Third, we include an indicator variable equal to one for firms in the S&P 1500 index, as prior research finds the addition of a stock to an index increases liquidity and investor recognition (Chen, Noronha, and Singal, 2004; Becker-Blease and Paul, 2010). Controlling for changes in index membership also addresses

passive index investing that is unlikely to be associated with active management buy-side analyst participation.[11] To test H1, we estimate the following generalized logit model:

$$\begin{aligned} Prob\ (Buy\text{-}Side) = {} & \alpha + \beta_1 \times Ln(Market\ Value) + \beta_2 \times Ln(Number\ of\ Covering\ Analysts+1) \\ & + \beta_3 \times Equity\ Bid\text{-}Ask\ Spread + \beta_4 \times S\&P\ 1500\ Index\ Member + \beta_5 \times Institutional \\ & Ownership + \beta_6 \times Ln(Number\ of\ Forecasts\ per\ Analyst+1) + \beta_7 \times Leverage + \beta_8 \times M/B \\ & Ratio + \beta_9 \times Return\ on\ Assets + \beta_{10} \times Dividend\ Yield + \beta_{11} \times Short\ Interest + \beta_{12} \times \\ & Forecast\ Error + \beta_{13} \times Forecast\ Error^2 + \beta_{14} \times Runup(-42,-1)\ CAR + \beta_{15} \times Realized \\ & Volatility + Year\text{-}Quarter\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon \end{aligned} \quad (1)$$

The dependent variable is an indicator variable equal to one if the conference call includes at least one buy-side participant, and equal to zero otherwise. Beyond the proxies for information uncertainty described above, we include several control variables, such as the percentage of institutional ownership in the firm, leverage, the market-to-book ratio, return on assets, dividend yield, short interest, forecast error, and realized trailing volatility. We also control for the 2-month (42-day) CAR in the period immediately preceding the conference call. We obtain firm-level data from a variety of sources including CRSP, Compustat, and I/B/E/S. We include year-quarter fixed effects to control for differences in conference call participation that may exist over our sample period or across time within a given year (i.e., Q4 conference calls in 2008 may attract more attention than Q1 conference calls in 2013), and industry fixed effects based on three-digit SIC codes.[12] All variables are defined in Appendix 1.

We present descriptive statistics for the variables included in Equation (1) in Panel A of Table 3. Approximately 19% (51%) of firm observations are from members of the S&P 500 (S&P 1500) indices. Other descriptive data are as expected.

[11] Note that Jung et al. (2017) do not incorporate any control for bid-ask spread or index membership, which is time-variant for many firms. Therefore, buy-side analyst participation and changes in aggregate or institution-level ownership may be driven by idiosyncratic liquidity shocks or index addition/removal.

[12] Our results are qualitatively similar if we include firm-level (call-level) fixed effects in call-level (analyst-level) analyses. We include the inverse mills ratio from a probit specification otherwise identical to Column (4) of Panel B in Table 3 throughout the participant-level analyses in Panel B of Table 5 and 6, respectively.

In Panel B of Table 3, we present the results of estimating Equation (1). We find that buy-side analyst participation on earnings conference calls is more likely for firms with relatively few sell-side analysts covering the firm. This finding holds for analysts working for a hedge fund, mutual fund, or RIA.[13] We also find some evidence that buy-side analysts are more likely to participate when the bid-ask spread is high and that buy-side analysts—particularly hedge fund analysts—are more likely to participate on conference calls for firms that are not in the S&P 1500 index.

The frequency of buy-side participation on conference calls is highest in 2008 and 2009, periods of tremendous uncertainty, and lower in subsequent years (see Table 2, Panel A). Relatedly, sell-side participation is lower during 2008 and 2009 than in any other years in our sample. Untabulated tests reveal that buy-side (sell-side) participation is significantly higher (lower) in 2008 and 2009 compared to 2010 through 2016 (p-value < 0.01). These observations are consistent with buy-side analysts playing a more prominent role in conference calls during periods of abnormally high uncertainty. In general, our evidence is consistent with H1 and suggests buy-side analysts are more likely to ask a question on public earnings conference calls when uncertainty is high and alternative sources of information are scarce.

Participant Prioritization on Conference Calls

In Panel A of Table 4, we present evidence on conference call prioritization, using (i) the ability to ask the first question during the Q&A session and (ii) the number of unique interactions with management during the call as proxies for prioritization. In Column (1) and Column (2), we report the number and percentage of unique conference calls in our sample with at least one

[13] We note that when few sell-side analysts follow the firm, there may be fewer sell-side analysts in the conference call queue, increasing the likelihood that buy-side analysts are allowed to ask a question during the conference call for reasons unrelated to uncertainty about the firm.

participant of each type. Buy-side analysts appear on 15,069 (18.45%) unique conference calls that include a Q&A session, with a total of 20,065 unique appearances.[14] Consistent with what we observe in Panel A of Table 2, hedge fund analysts are the most frequent participants among all buy-side analysts, as hedge funds represent 46.9% of all buy-side analyst appearances, compared to just 19.3% for mutual funds and 27.2% for RIAs. These results are the first to show that, among buy-side participants, hedge funds are the most common participants on public earnings conference calls.

Because buy-side analysts are less likely than sell-side analysts to ask a question on a conference call, only 3.59% of all conference call appearances are from buy-side analysts. However, as reported in Column (5), buy-side analysts ask the first question on 4,621 conference calls, or 5.66% of all conference calls in our sample. Thus, while buy-side analysts are responsible for only 3.59% of all appearances, they ask the first question on 5.66% of all calls, which is 57.74% higher than would be expected if first-question priority were determined by chance. Our finding that buy-side analysts disproportionately ask the first question on conference calls extends to all types of buy-side analysts, with hedge fund (mutual fund) analysts exhibiting a differential of 48.34% (49.73%). These initial findings are consistent with H2.

Management may also show favor toward specific analysts by permitting follow-up interactions on the call. For example, after an analyst has an opportunity to interaction with management, he or she may decide to stay in the queue for an opportunity to ask another round of questions. We record the number of non-continuous analyst-management interactions and present the results in Column (8).[15] Buy-side analysts average 1.41 interactions with

[14] Our sample includes 4,995 earnings conference call transcripts that do not contain a Q&A session.
[15] For purposes of this test, a continuous series of back-and-forth comments between a conference call participant and management is considered one interaction. A different conference call participant (or the operator) must speak on the call before a participant is eligible for an additional interaction.

management per conference call, compared to 1.19 for sell-side analysts. This difference between buy-side and sell-side analysts is statistically significant across all of the buy-side analyst sub-categories.

In Panel B of Table 4, we further explore the issue of prioritization among buy-side analysts by estimating the following generalized logit model:

$$Prob\ (First\ Question_j) = \alpha + \beta_1 \times Buy\text{-}Side\ Analyst + \beta_3 \times Analyst\ Recommendation + \beta_3 \times Ln(Number\ of\ Analysts\ on\ Call) + \beta_4 \times Ln(Number\ of\ Words\ in\ Q\&A) + Controls + Year\text{-}Quarter\ Fixed\ Effects + Firm\ Fixed\ Effects + \varepsilon \quad (2)$$

In this regression, we include all conference call participants at the individual level (526,153 conference call participants on calls for firms with available data). The dependent variable is an indicator variable equal to one if the participant asked the first question on the conference call in question, and equal to zero otherwise. We include an indicator variable identifying buy-side participants, and in subsequent regressions (also reported in Panel B) we instead include separate indicator variables for hedge fund, mutual fund, and RIA analysts. We also control for the number of participants on the call, as well as the length of the Q&A session, as proxied by the number of total words used in the session. To control for variation in sell-side analysts' stock recommendations, we also include analysts' consensus stock recommendation prior to the call (on an integer scale from -2 to 2 representing strong sell to strong buy). For buy-side analysts or other participants not in I/B/E/S, we set this variable equal to 0. In addition, we control for the same firm-level characteristics outlined in Equation (1). We continue to employ year-quarter fixed effects and also include firm fixed effects in all specifications.

Unlike the results of our univariate results, once we control for firm and call characteristics, the logit specification in Column (1) reveals no difference in the likelihood of buy-side analysts being granted the first question on conference calls. Consistent with

expectations, we find that sell-side analysts with more positive recommendations are more likely to ask the first question (Mayew, 2008). We use separate indicator variables for specific types of buy-side analysts in Column (2) and find weak evidence of discrimination against hedge fund analysts, consistent with their ability to short the firm's stock and the potential that they might open the Q&A session by asking management a difficult question. In Column (3), we add an interaction between hedge fund analyst and the firm's short interest, and find that managers are less likely to grant the first question on a call to hedge fund analysts when their firm's short interest is high.[16]

Columns (4) through (6) of Table 4 use Poisson regressions to analyze the number of non-continuous analyst-management interactions. In addition to the controls used in the logit specifications, we also incorporate the initial question position of each analyst since analysts whose first question is at the beginning (end) of the call are more (less) likely to have a follow-up interaction with management. Our findings are consistent with the univariate results reported in Panel A, and suggest that buy-side analysts receive preferential treatment from management during conference calls. In Column (6), we again interact short interest with hedge fund analyst and find similar results, namely, that hedge fund analysts are less likely to be granted a follow-up interaction with management when short interest is high. In summary, our findings suggest that management prioritizes buy-side analysts during the Q&A session of conference calls, but discriminates against hedge fund analysts when more of the firm's shares are sold short.

[16] In unreported results, we find no significance in interactions between short interest and mutual fund or RIA indicator variables.

Length of Interaction on Conference Calls

We measure the length of the interaction between company management and conference call participants by counting the number of words from the beginning of the participant's question to the end of management's response.[17] We begin measuring each participant's interaction when the operator introduces the participant in question, and end when the operator introduces the next participant. In Panel A of Table 5, we report mean interaction lengths for each type of conference call participant. We also calculate abnormal interaction length for each participant type, measured as the standardized difference between the participant's actual length of interactions and the average interaction length for the call. This measure controls for systematic differences in the length of interactions across conference calls that may be driven by the overall length of the call, number of participants in the conference call queue, etc. Specifically, abnormal interaction length is calculated as:

$$Abnormal\ Interaction\ Length = \frac{Words\ in\ Interaction(s)}{\left(\frac{Total\ Words\ in\ Q\&A\ Session}{Number\ of\ Participants\ on\ Call}\right)} - 1 \qquad (3)$$

The average interaction between sell-side analysts and company management is 683.81 words, with abnormal length of 0.45%. Conference call interactions with members of the media are also relatively short, averaging only 356.82 words (-2.95%). Interactions between buy-side analysts and company management, on the other hand, average 786.19 words, which is actually longer than what we observe for any other type of conference call participant. However, abnormal length for buy-side analysts is slightly negative (-0.03%), suggesting that the length of their interactions may also be a function of attributes of the call (i.e. number of participants) and

[17] The entire Q&A session of the conference calls in our sample is an average of 4,625 words in length. For context, the presentation portion averages 3,062 words in length.

the firm. As a result, further analysis is warranted. In Panel B of Table 5, we estimate the following OLS model:

$$\textit{Abnormal Interaction Length} = \alpha + \beta_1 \times \textit{Buy-Side Analyst} + \beta_2 \times \textit{Analyst Recommendation} + \beta_3 \times \textit{Ln(Number of Analysts on Call)} + \textit{Controls} + \textit{Year-Quarter Fixed Effects} + \textit{Firm Fixed Effects} + \varepsilon \quad (4)$$

As reported in Columns (1) and (2) of Panel B, we find strong evidence that management's interactions with all types of buy-side analysts are shorter than their interactions with sell-side analysts. These findings are consistent with H3, and with the notion that buy-side analysts engage in shorter, more succinct interactions on public earnings conference calls (perhaps to avoid "tipping their hand"), while sell-side analysts take more time on these calls.

Tone of Interaction on Conference Calls

H4 predicts the tone of buy-side analysts' interactions with company management is less favorable than the tone of sell-side analysts' interactions with company management. Using the Loughran and McDonald (2011) dictionary, we separately measure both positive and negative tone as the number of positive (negative) words divided by the total number of words in the interaction.

In Panel A of Table 6, we report mean positive, mean negative, and mean "net" tone (positive tone minus negative tone) for each group of conference call participants. We find that while 1.11% of sell-side analysts' interactions convey positive tone, only 0.92% of buy-side analysts' interactions are consistent with a positive tone. Similarly, sell-side analysts exhibit less negative tone than do buy-side analysts (0.97% vs. 1.08%). These statistics are fairly consistent across all types of buy-side analysts. Net tone turns negative for all analysts during the financial crisis (2008 and 2009).

To further address differences in tone between buy-side and sell-side interactions with company management, we report the results of an OLS model using individual analyst net tone as the dependent variable (similar to Equation 3) in Panel B. In Columns (1) and (2), we continue to find that management's interactions with buy-side analysts employed by hedge funds, mutual funds, or RIAs exhibit less positive and more negative tone, relative to management's interactions with sell-side analysts. These findings are consistent with hypothesis H4 and with sell-side analysts' incentives to curry favor with management. When we interact hedge fund analyst with the firm's short interest in Column (3), we find incrementally negative net tone.

Market Implications of Buy-Side Participation

We first test H5 using a simple univariate analysis of value-weighted four-factor Fama and French (1996) excess returns over the 3-day event window around the conference call, as well as changes in equity bid-ask spreads, changes in implied volatility, and changes in short interest to examine information asymmetry. In Panel A of Table 7, we report univariate results for various subsamples. In Row (i), we report averages for all conference calls in our sample. In Rows (ii) and (iii), we report averages for all conference calls without and with buy-side analyst participation, respectively, and in Rows (iv) through (vii), we report averages for subsamples based on the average tone (positive tone minus negative tone) of the interactions between company management and conference call participants. At the bottom of Panel A, we provide results of various tests based on buy-side analyst appearances and analyst tone.

As reported in significance tests at the bottom of Panel A, short-window abnormal returns in Column (1) are weakly significantly lower when buy-side analysts participate on the conference call. Further, abnormal returns surrounding conference calls are predictably associated with both sell-side and buy-side tone on the call.

Columns (2), (3), and (4) show that bid-ask spreads, implied volatility, and short interest are higher following conference calls in which buy-side analysts participate than following conference calls without buy-side participation. We further analyze these changes in a multiple-regression framework by estimating the following model for all conference calls in our sample:

$$Consequence = \alpha + \beta_1 \times Buy\text{-}Side\ Appearance + \beta_2 \times Buy\text{-}Side\ Tone + \beta_3 \times Sell\text{-}Side\ Tone + Controls + Year\text{-}Quarter\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon. \quad (5)$$

Independent variables include an indicator variable equal to one for conference calls with buy-side analyst participation and equal to zero otherwise (Buy-Side Appearance), and the average tone (positive tone minus negative tone) of buy-side analysts' interactions with company management (Buy-Side Tone).[18] We employ OLS regression models in the general form of Equation 5 to further analyze these market consequences. The dependent variables are, alternatively, (i) the 3-day abnormal return around the conference call, (ii) changes in mean equity bid-ask spread, (iii) changes in implied volatility, and (iv) changes in short interest surrounding the conference call. We control for the average sell-side tone on the call, as well as several additional control variables discussed previously.[19] If buy-side analysts' participation (or tone) on public earnings conference calls conveys information to other market participants, the market should reflect this information accordingly.

After controlling for other determinants of the market response to earnings conference calls in Panel B of Table 7, we find that CARs are lower when buy-side analysts appear on the call (Column 1), but also that CARs are systematically associated with the tone exhibited by buy-side analysts on the call (Column 2). We also find that buy-side analysts' participation on

[18] We set Buy-Side Tone equal to zero for conference calls without buy-side participation.
[19] When the dependent variable is change in equity bid-ask spread, implied volatility, or short interest, Buy-Side Tone is defined as the absolute value of buy-side tone, because extreme tone of either sign (positive or negative) is more likely to be associated with subsequent information asymmetry.

earnings conference calls is associated with increases in equity bid-ask spreads, implied volatility, and short interest (Columns 3, 5, and 7 respectively). These findings suggest markets increase their spreads to reflect greater information asymmetries when buy-side analysts participate on calls. In aggregate, the results of Table 7 indicate that financial markets respond to buy-side analysts' earnings conference call participation.

Sell-Side Response to Buy-Side Participation

In Table 8, we examine sell-side analysts' responses to buy-side analyst conference call participation. We examine changes in the consensus target price forecast (Column 1 of Panel A), the number of analysts covering the firm's stock (Column 2), and changes in the average number of earnings forecast revisions per analyst (Column 3). Column (1) shows that buy-side analyst appearances are associated with lower sell-side price targets (t-statistic = -7.2716). However, sell-side target prices (Column 2) increase with more favorable buy-side tone and more favorable sell-side tone. Changes in sell-side analyst coverage in Column (2) exhibit no significant univariate differences based on buy-side analyst participation or tone, but sell-side analysts issue earnings forecasts less frequently when buy-side analysts participate in conference calls (Column 3).

In our multivariate analyses in Panel B, we find that sell-side price targets increase when tone is favorable (Column 2). Also, consistent with the research competition hypothesis (H6), we find a reduction in sell-side coverage (Column 3) and in analyst activity (Column 4) (i.e., the number of forecasts issued per sell-side analyst) following buy-side analyst appearances. In summary, these results suggest that sell-side analysts' activities are influenced by buy-side analyst earnings conference call participation.

6. Contrast with Contemporaneous Work

Our work is related to a contemporaneous study by Jung, Wong, and Zhang (2017, JWZ hereafter), which also examines the determinants and consequences of buy-side analyst participation on public earnings conference calls. They find that buy-side analysts are more likely to participate on the calls of companies with a relatively poor information environment, and that institutional investors are more likely to trade a company's stock after their buy-side analysts participate in the company's conference call (a finding first introduced by Shohfi 2014). Our study differs from JWZ in that we examine additional research questions not examined by JWZ, including the prioritization of participants in the Q&A session, the impact of buy-side appearances on subsequent sell-side research activity, and the impact of conference call tone on capital market outcomes. In addition, our study separately identifies buy-side analysts employed by hedge funds from those employed by mutual funds, which yields important insights given the different incentives to ask a question on a public conference call that exist for hedge fund analysts relative to mutual fund analysts. Our sample is also larger and more recent, which is an important distinction given that buy-side analysts have become less likely to participate in public earnings conference calls in recent years. Appendix 2 shows that of the 50 largest buy-side institutions in the JWZ sample, the vast majority are much less likely to ask questions on conference calls during our sample period (2007-2016) than during the JWZ sample period (2002-2009), suggesting that our more recent sample yields insights that are more reflective of today's environment.

In this section, we focus on several important methodological differences between the two studies as well as their impact on the conclusions a reader would reach. First, JWZ classify a conference call participant as a buy-side analyst only if his/her institution (a) includes one of

several key words in its name (i.e., capital, asset, fund, investment, management, advisors, partners, or investors), and (b) files a Form 13F. Any participant employed by an institution that does not file a Form 13F is classified as a sell-side analyst. In contrast, when we identify buy-side analysts, we take the additional step of identifying institutions using a large proprietary database of hedge funds and a separate database on mutual funds (S12). This distinction is important because not all buy-side institutions file a Form 13F, and these databases allow us to identify buy-side institutions not subject to Form 13F filing requirements. For example, we identify more than 400 buy-side institutions that do *not* make Form 13F filings, and their conference call participants would be incorrectly classified as sell-side analysts using the JWZ taxonomy. In addition, most hedge funds have less than $100 million of assets under management and will therefore not be subject to 13F filing requirements. To illustrate, the median (75^{th} percentile) assets under management for hedge funds in Agarwal, Daniel, and Naik (2011) is $29.1 million ($100.0 million). Given that buy-side analysts at smaller institutions may be more likely to follow small firms, and given our findings that buy-side analysts are more likely to participate on conference calls for small firms, ignoring these buy-side analysts (and classifying them as sell-side analysts) is a non-trivial issue.

Second, JWZ's description of their taxonomy raises important questions about the soundness of their method for identifying buy-side institutions. For example, JWZ take efforts to identify sell-side institutions not included in I/B/E/S. This is an important step because many sell-side institutions choose not to disseminate their analysts' research through I/B/E/S. They identify a total of 9 sell-side institutions in their sample that do not contribute to I/B/E/S, whereas we identify 193 sell-side institutions that do not submit earnings estimates to I/B/E/S. This difference leads JWZ to misclassify sell-side analysts in their sample as buy-side analysts.

To approximate the impact of this issue, we note that analysts from these 193 sell-side institutions (that are not in I/B/E/S) are responsible for 19,883 appearances during our sample period, compared to the 20,065 total buy-side appearances in our sample. Misclassifying these sell-side analysts (employed by institutions not in I/B/E/S) as buy-side analysts would have had a material impact on our sample of buy-side analysts and would have made it difficult to draw reliable inferences from our analyses.[20]

Third, as we discuss in Footnote 9, conference call transcripts commonly list a participant's employer as "Unidentified" or "Inaudible" (e.g., when the transcriber does not understand the conference call operator). However, JWZ do not address this issue, leaving as an open question how they classified these conference call participants. We also note that the JWZ taxonomy does not identify any members of the media, even though our efforts led to our identifying 693 questions from members of the business press. In sum, it is unclear how JWZ classify such conference call participants (i.e., those with "unidentified" affiliation and members of the media).

Fourth, JWZ do not address the issue or explain how they handle the fact that a given institution's name is recorded in conference call transcripts in many different ways. This issue is unique to text transcribed from speech—particularly proper names (e.g., institution names) transcribed from speech—because different conference call operators record and spell the institution's name differently. Panel A of Appendix 3 illustrates how one prominent buy-side institution in our sample, Lord, Abbett & Co. LLC, is recorded 18 different ways in our

[20] We also note that the 9 sell-side institutions JWZ identify as not being in I/B/E/S are actually in I/B/E/S (see their footnote 15), raising the questions of why these institutions were not already identified as sell-side institutions from their initial screen through I/B/E/S, and whether other sell-side institutions could have been similarly misclassified.

conference call transcripts, with many of these alternative spellings used repeatedly throughout the transcripts.[21] This issue is particularly important for institution-level analyses, such as JWZ's analysis of institution-level changes in ownership following conference calls (their Table 3 and Table 5), which was originally presented in an earlier version of this study using our same taxonomy (see Shohfi, 2014). For example, if the buy-side analysts employed by Lord, Abbett & Co. LLC were considered to be employed by multiple different institutions, it would call into question the soundness of any test that examines changes in this institution's holdings following conference call participation by the analysts it employs.

In our study, we use phonetic algorithms to address this issue, and we again use Lord, Abbett & Co. LLC to demonstrate. Panel A of Appendix 3 reports the Soundex string associated with each version of this institution's name. Because each version of the institution's name sounds almost identical (regardless of how it is spelled in the transcripts), the 6-digit Soundex string is very similar across each version of the name, with each version (except for the final entry in Panel A) having a Soundex string that begins with "L631." In contrast, if one analyzed the institution names as written by the operators in the conference call transcripts (rather than analyzing their sound when spoken by the conference call operators), a common technique would be to use Levenshtein distances. This approach compares the number of letters that need to be changed in order to convert a given piece of text into an original (or focal) word or phrase. The Levenshtein algorithm is appropriate when analyzing written text, where incorrect spelling is infrequent (e.g., Engelberg, Gao, and Parsons, 2013; Mann, 2017), but much less appropriate

[21] Figure 3 provides more comprehensive evidence on the importance of correctly handling this issue. Specifically, 92.9% (77.6%) of buy-side institution appearances have at least two (three) distinct text patterns, and 12.4% of buy-side institutions appear with *ten* or more different text patterns. Further, almost 75% of sell-side appearances are from institutions associated with more than *twenty* distinct text patterns in the sample call transcripts.

when analyzing proper names that are transcribed from speech. For example, if we use "Lord Abbett" as the focal name for this institution, the Levenshtein distance for "Lord Abbott" is only 1, while the Levenshtein distance for "Lord, Abbett & Co. LLC" is 11. We find Levenshtein distances ranging from 1 to 13 for the various versions of this institution's name.

To further illustrate, in Panel B of Appendix 3, we report the Levenshtein distances (relative to "Lord Abbett") for several prominent buy-side institutions in the JWZ sample (and in our sample).[22] Each of these institutions is among the 50 largest buy-side institutions in their sample, and each has a Levenshtein distance (relative to "Lord Abbett") less than or equal to 12. As outlined in this table, when using Levenshtein distances, conference call participants employed by these buy-side institutions would be just as likely to be identified as being employed by "Lord Abbett" as would a conference call participant actually employed by "Lord, Abbett and Co. LLC" (Levenshtein distance = 11), "Lord, Abbett & Company" (Levenshtein distance = 10), "Lord, Abbett and Company" (Levenshtein distance = 13), "Lord, Abbett & Company" (Levenshtein distance = 11), "Lord Abbett & Co. LLC" (Levenshtein distance = 10), or "Lord, Abbott & Company" (Levenshtein distance = 12). Importantly, each of these other institutions has a Soundex string that bears no relation to the Soundex string for Lord Abbett.

In summary, although JWZ do not indicate if (or how) they address this issue, we can say with confidence that (a) this is a non-trivial issue when identifying institutions (and analyst affiliations) from conference call transcripts, and (b) our use of Soundex is far less prone to misidentification of institutions (and therefore institution types, such as buy-side vs. sell-side) than is any other conventional method available. More generally, we note the importance of using Soundex to identify proper names derived from speech.

[22] We use "Lord Abbett" because this is the spelling of the institution reported by JWZ.

Fifth, while both studies examine the tone of buy-side and sell-side interactions with company management during conference calls, JWZ employ the Harvard IV-4 dictionary, while we employ the Loughran and McDonald (2011) dictionary. Although Loughran and McDonald (2011) demonstrate the superiority of their dictionary when analyzing financial content, JWZ justify their decision to rely on the Harvard IV-4 dictionary on the grounds that they are analyzing conference call transcripts that were originally spoken, as opposed to the earnings reports Loughran and McDonald (2011) examined, which are written.[23] Nevertheless, using the Harvard IV-4 dictionary, JWZ find no difference in tone between buy-side and sell-side analysts. Panel A of Appendix 4 confirms the lack of tone difference using Harvard IV-4 in our sample.

However, as reported in Table 6, when we use the Loughran and McDonald (2011) dictionary, we find that buy-side analysts' interactions with company management exhibit significantly less favorable tone than do sell-side analysts' interactions with company management, which is consistent with intuition. Similarly, while JWZ find that buy-side tone offers no incremental explanatory power for capital market outcomes following conference calls (e.g., absolute returns, changes in turnover, changes in institutional ownership), we find that buy-side tone is positively and significantly associated with short-window stock returns surrounding conference calls, suggesting that when buy-side analysts exhibit favorable (unfavorable) tone, stock returns tend to be higher (lower). We attribute these differences in results to our use of the Loughran and McDonald (2011) tone dictionary, which has been shown to be more suitable for measuring tone in a financial context.

[23] We do not believe this justification is compelling because Loughran and McDonald (2011) point out that many words are classified as negative by the Harvard IV-4 dictionary that are not actually negative in a financial context (e.g., tax, cost, capital, board, liability, foreign, vice), which is true whether the financial information is communicated in text (i.e., an earnings report) or in speech (i.e., a conference call).

To further demonstrate the implications of using an appropriate tone dictionary to understand the tone of analysts' interactions with management on conference calls, we sort observations in our sample into separate quintiles based on both the Harvard IV-4 and Loughran and McDonald (2011) measures of buy-side tone, and calculate four-factor excess returns (-1,+1) following conference calls for each tone quintile. As reported in Panel B of Appendix 4, when using the Harvard IV-4 dictionary, the difference in excess returns between the highest and lowest quintiles of buy-side tone is actually negative (-0.064%), and statistically indistinguishable from zero. However, when we use the Loughran and McDonald (2011) tone dictionary, excess returns increase monotonically through the tone quintiles, and the difference in excess returns between the highest and lowest quintiles of buy-side tone is 1.159%, which is both statistically and economically significant.

In summary, the JWZ taxonomy likely misclassifies a non-trivial number of conference call participants, with some participants incorrectly being classified as sell-side analysts and other incorrectly being classified as buy-side analysts. Further, while JWZ suggest that buy-side and sell-side analysts exhibit similar tone on conference calls and that there are no capital market implications to buy-side tone, our findings reveal that (a) buy-side analysts' interactions with management are significantly less favorable in tone than are sell-side interactions with management, and (b) buy-side tone is associated with the excess returns around the conference call. Both of these findings are consistent with intuition and our predictions, and underscore the importance of using the Loughran and McDonald (2011) tone dictionary when evaluating financial content.

7. Conclusion

Buy-side analysts represent an important segment of Wall Street, yet because of the private nature of their research, we know relatively little about their research activities. Quarterly earnings conference calls present a unique opportunity to observe buy-side analysts' behavior because the call transcripts are publicly available and because earnings conference calls are an important news event for market participants.

We examine more than 81,000 conference call transcripts from 2007 through 2016 and identify the frequency and nature of buy-side (and sell-side) analysts' interactions with company management during public earnings conference calls. We find that buy-side analysts ask questions on approximately 18% of all conference calls, and that buy-side analysts employed by hedge funds are more likely to participate on conference calls than are those employed by mutual funds. Buy-side analysts are more likely to appear on calls of small firms with limited sell-side coverage. During conference calls, management prioritizes buy-side analysts over sell-side analysts by allowing buy-side analysts to ask more follow-up questions. However, management discriminates *against* hedge fund analysts when short interest is high.

We also find that relative to sell-side analysts, buy-side analysts' interactions with management on conference calls are shorter and their exchanges with management exhibit less favorable tone. Importantly, buy-side appearances on public earnings conference calls are associated with subsequent stock returns, increases in bid-ask spreads, increases in implied volatility, and increases in short interest, consistent with increases in information asymmetry among capital market participants when buy-side analysts publicly reveal their interest in a stock by asking a question on the conference call. We also find that following buy-side participation on conference calls, sell-side coverage of the firm drops and the remaining analysts issue fewer

forecasts for the covered firm. In general, our findings suggest buy-side analysts actively participate in public conference calls to gather information and that their participation has meaningful consequences for equity markets and the hosting firms. We also highlight important differences between our study and contemporaneous work in this area, and specifically how the advances we offer yield different inferences.

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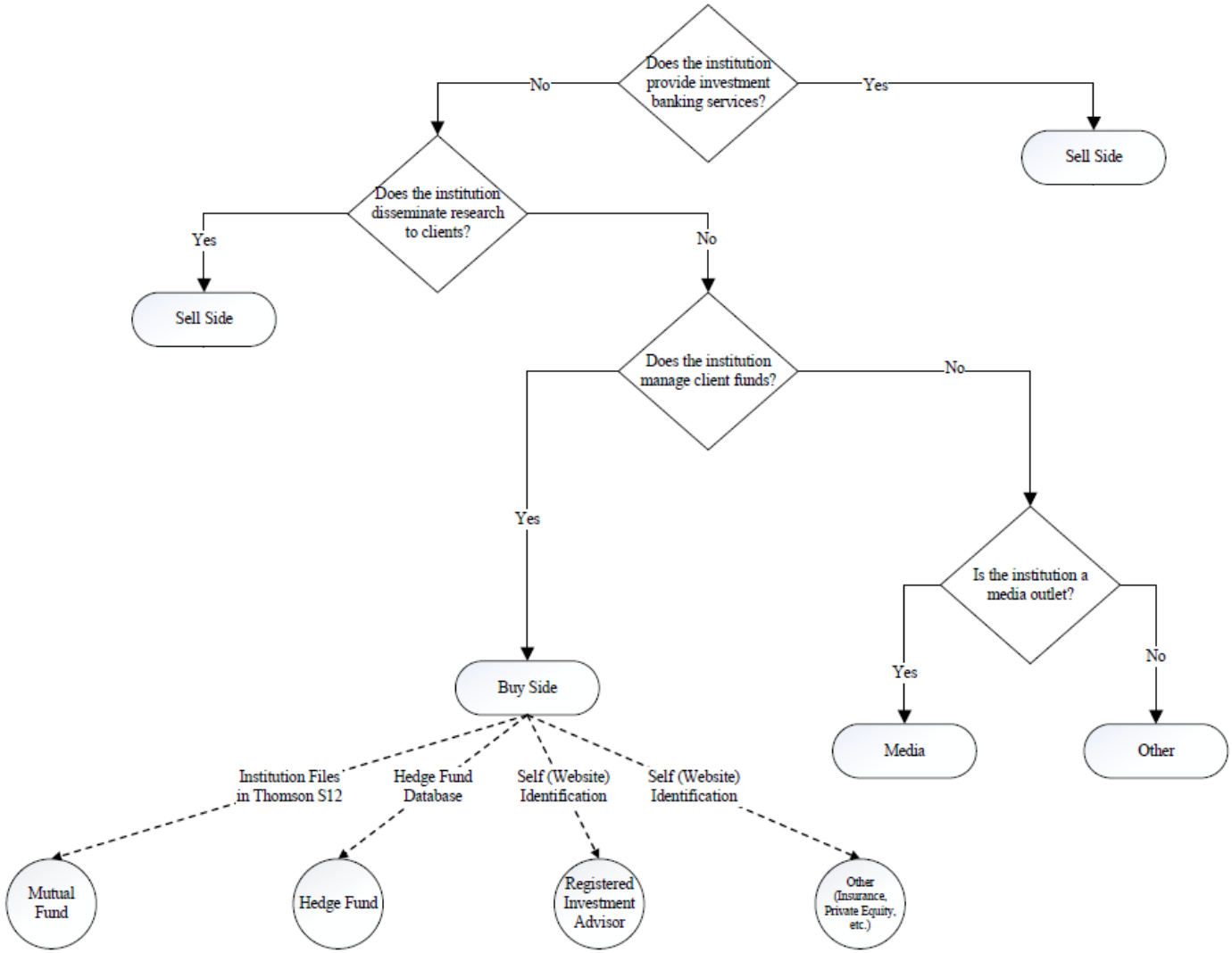
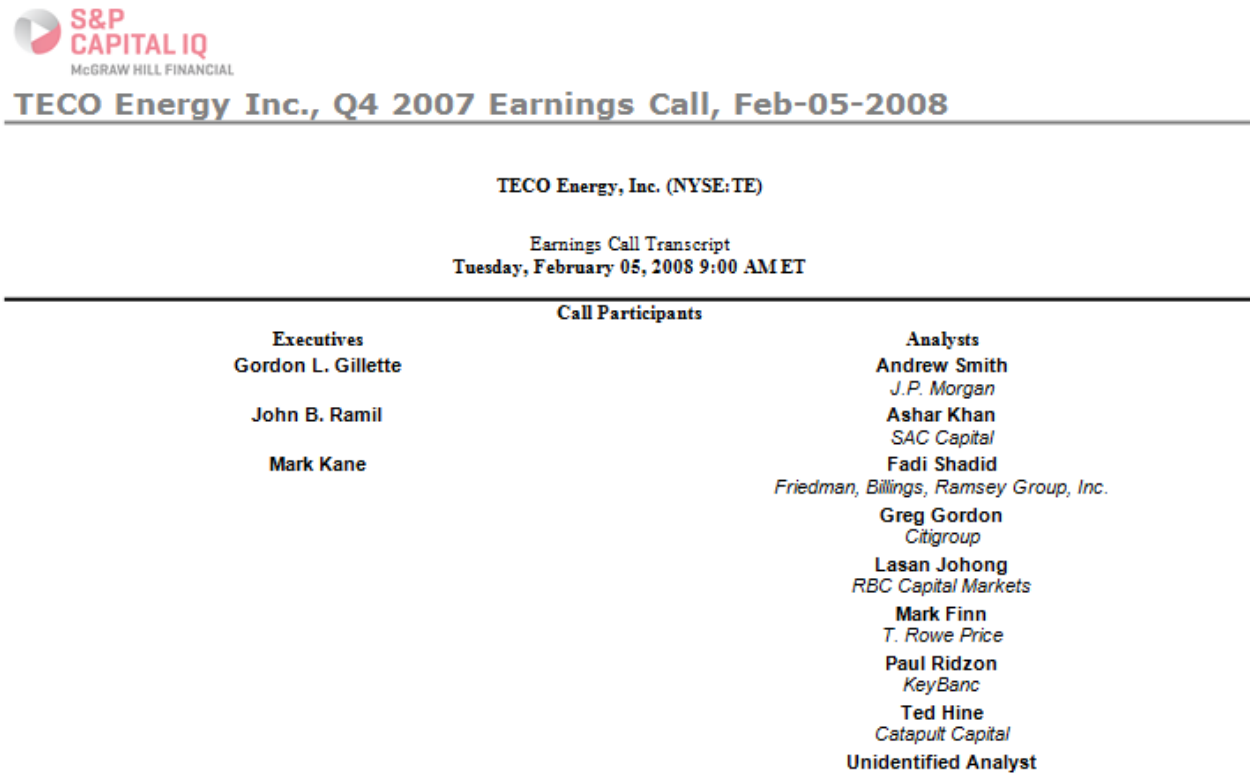
Figure 1 – Institution Taxonomy Process



This figure describes the taxonomy we use to classify institutions. Rounded rectangles (circles) are primary (secondary) classifications.

Figure 2 – Conference Call Taxonomy Example



S&P CAPITAL IQ
McGRAW HILL FINANCIAL

TECO Energy Inc., Q4 2007 Earnings Call, Feb-05-2008

TECO Energy, Inc. (NYSE:TE)

Earnings Call Transcript
Tuesday, February 05, 2008 9:00 AM ET

Call Participants

Executives
Gordon L. Gillette

John B. Ramil

Mark Kane

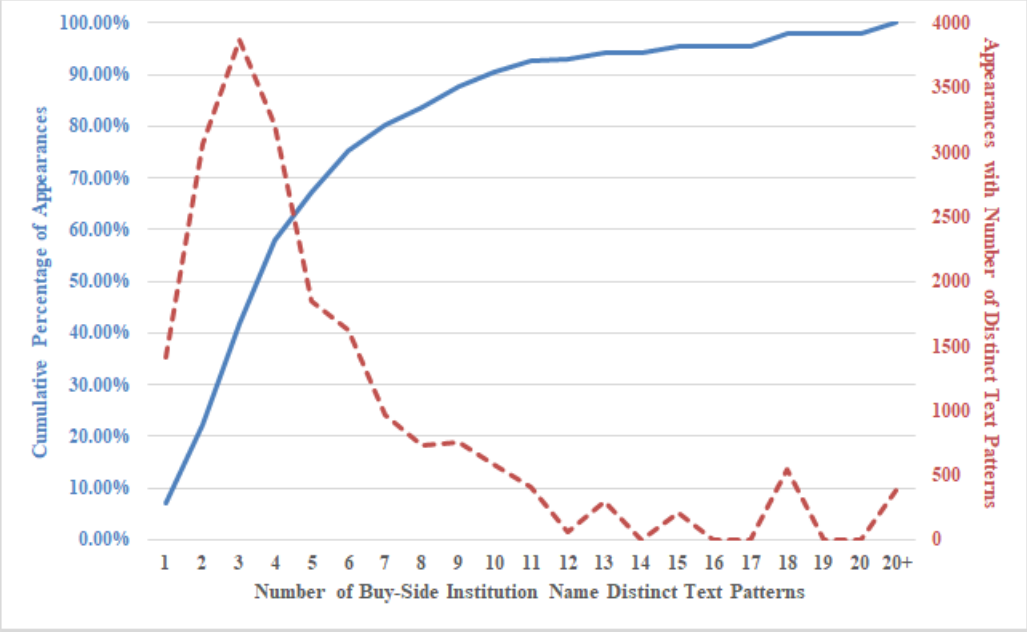
Analysts
Andrew Smith
J.P. Morgan
Ashar Khan
SAC Capital
Fadi Shadid
Friedman, Billings, Ramsey Group, Inc.
Greg Gordon
Citigroup
Lasan Johong
RBC Capital Markets
Mark Finn
T. Rowe Price
Paul Ridzon
KeyBanc
Ted Hine
Catapult Capital
Unidentified Analyst

# in Call	Analyst Name	Institution Text	Institution Soundex(6)	Primary Classification	Secondary Classification
1	Andrew Smith	J.P. Morgan	J15625	Sell Side	
4	Ashar Kahn	SAC Capital	S22134	Buy Side	Hedge Fund
7	Fadi Shadid	Friedman, Billings, Ramsey Group, Inc.	F63551	Sell Side	
3	Greg Gordon	Citigroup	C32610	Sell Side	
2	Lasan Johong	RBC Capital Markets	R12213	Sell Side	
9	Mark Finn	T. Rowe Price	T61620	Buy Side	Mutual Fund
5	Paul Ridzon	KeyBanc	K15200	Sell Side	
8	Ted Hine	Catapult Capital	C31432	Buy Side	Hedge Fund
6	Unidentified Analyst			Other/Unknown	

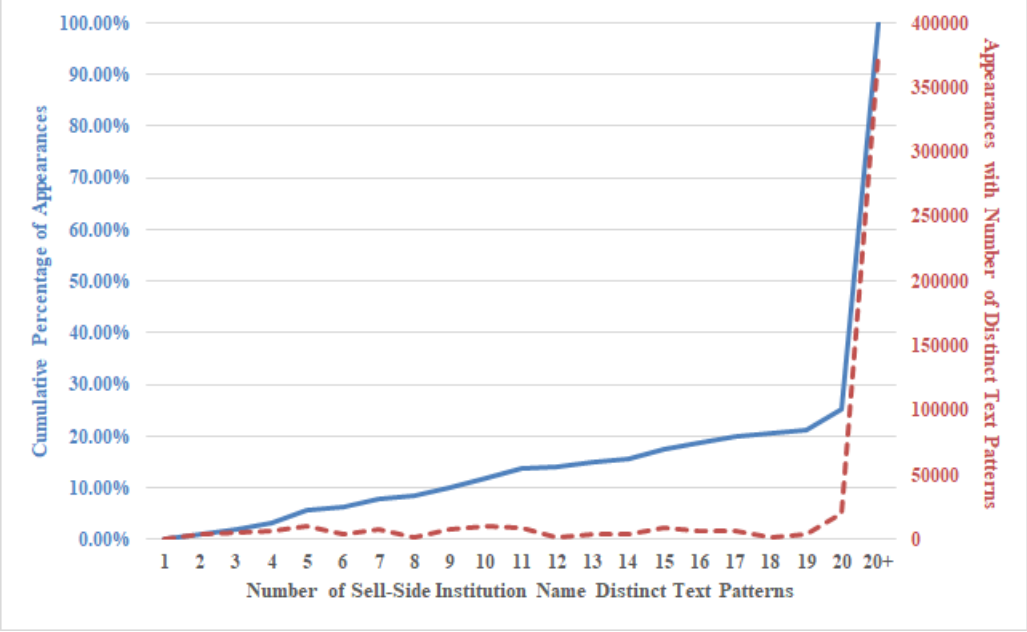
This figure provides an example of a participant list from an earnings conference call transcript and how the text for each participant's name and institution is translated into a Soundex string, along with the classification of each participant's institution.

Figure 3 – Institution Name Distinct Text Pattern Histograms

Panel A: Buy-Side Institutions



Panel B: Sell-Side Institutions



This figure illustrates the distribution of institution name number of distinct text patterns and cumulative percentage of appearances by the number of distinct text patterns. Approximately 93% (99%) of buy-side (sell-side) institutions in the sample have two or more distinct text patterns observed in earnings conference call transcripts.

Table 1 – Examples of Most Frequent Conference Call Participant Types

Panel A: Buy-Side Institutions

Research Institution Name	Secondary Classification	Total Appearances	Number of Analysts	Matched Patterns
Inwood Capital Partners LP	Hedge Fund	247	7	6
Adage Capital Management	Hedge Fund	205	5	4
Capital Returns Management, LLC	Hedge Fund	200	5	4
Catapult Capital Management LLC	Hedge Fund	162	24	7
Millennium Management LLC	Hedge Fund	157	29	10
Lord, Abbett & Co. LLC	Mutual Fund	299	29	18
Heartland Advisors	Mutual Fund	291	12	13
Columbia Management Group LLC	Mutual Fund	211	31	15
Cardinal Capital Management, LLC	Mutual Fund	181	15	9
Emerald Advisers	Mutual Fund	123	9	9
Tieton Capital Management, LLC	Registered Investment Advisor	420	3	4
Thompson Davis & Co.	Registered Investment Advisor	240	8	18
Morgan Dempsey Capital Management, LLC	Registered Investment Advisor	205	2	5
Philadelphia Financial	Registered Investment Advisor	175	7	5
Kennedy Capital Management, Inc.	Registered Investment Advisor	172	21	3

Panel B: Sell-Side Institutions

Research Institution Name	Total Appearances	Number of Analysts	Matched Patterns
J.P. Morgan Chase	22,645	716	79
Bank of America	19,358	592	80
Goldman Sachs	19,279	580	38
Deutsche Bank AG	16,678	486	37
Credit Suisse Group	15,998	547	40
Citigroup Global	15,754	474	53
Morgan Stanley, Inc.	15,147	556	20
UBS AG	14,668	512	51
Stifel, Nicolaus, & Co., Inc.	14,563	325	67
Barclays Bank PLC	14,057	440	27
Jefferies & Company Inc.	14,013	417	53
RBC Capital Markets	13,686	383	40
Wells Fargo Capital Finance	11,692	300	21
Raymond James & Associates, Inc.	10,997	294	33
Robert W. Baird & Co.	10,972	243	67
KeyBanc Capital Markets	10,131	174	54

We report the institutions in each category that appear the most frequently in the conference call transcripts along with the number of unique analysts and distinct text patterns that appear for each institution. An exhaustive list of all 1,814 identified institutions appearing in earnings conference calls in this study is available in the online appendix.

Table 2 – Conference Call Participation by Analyst Type

Panel A: Time series of conference call participation

Year		(1) Hedge Fund	(2) Mutual Fund	(3) RIA	(4) Other	(5) Buy-Side Total	(6) Sell-Side	(7) Media	(8) Aggregate Total
2007-2016	Mean Participants per Call	0.115	0.047	0.067	0.016	0.246	6.169	0.008	6.850
(N = 81,652)	Max Participants per Call	6	3	4	6	9	27	8	28
	% of Calls with at Least One	9.64%	4.45%	6.13%	1.50%	18.45%	97.35%	0.35%	
	% of Calls with Multiple	1.52%	0.27%	0.52%	0.09%	4.49%	90.57%	0.17%	
2007	Mean Participants per Call	0.161	0.081	0.055	0.030	0.328	7.105	0.028	8.052
(N = 1,721)	Max Participants per Call	6	2	2	2	6	23	7	24
	% of Calls with at Least One	11.62%	7.32%	5.29%	2.91%	22.31%	95.41%	0.70%	
	% of Calls with Multiple	3.25%	0.81%	0.23%	0.12%	7.09%	87.62%	0.52%	
2008	Mean Participants per Call	0.222	0.110	0.105	0.040	0.478	5.915	0.007	7.036
(N = 6,942)	Max Participants per Call	6	3	4	3	8	23	7	24
	% of Calls with at Least One	17.10%	9.93%	9.51%	3.56%	31.68%	97.65%	0.29%	
	% of Calls with Multiple	3.87%	0.97%	0.91%	0.36%	10.73%	92.52%	0.12%	
2009	Mean Participants per Call	0.168	0.076	0.090	0.033	0.367	5.873	0.009	6.894
(N = 7,407)	Max Participants per Call	6	3	3	4	9	26	7	28
	% of Calls with at Least One	13.38%	7.02%	8.22%	3.00%	25.72%	97.80%	0.32%	
	% of Calls with Multiple	2.67%	0.51%	0.73%	0.23%	7.52%	91.02%	0.12%	
2010	Mean Participants per Call	0.134	0.059	0.079	0.024	0.295	6.081	0.007	6.845
(N = 8,537)	Max Participants per Call	5	3	3	2	6	24	7	26
	% of Calls with at Least One	11.35%	5.59%	7.17%	2.28%	22.46%	97.06%	0.35%	
	% of Calls with Multiple	1.66%	0.26%	0.66%	0.11%	5.19%	90.44%	0.12%	
2011	Mean Participants per Call	0.123	0.048	0.079	0.023	0.27	6.06	0.006	6.838
(N = 9,843)	Max Participants per Call	5	2	3	6	7	26	6	27
	% of Calls with at Least One	10.42%	4.55%	7.23%	2.02%	20.65%	96.20%	0.25%	
	% of Calls with Multiple	1.62%	0.26%	0.62%	0.18%	5.00%	88.34%	0.12%	
2012	Mean Participants per Call	0.094	0.038	0.060	0.008	0.200	6.136	0.004	6.822
(N = 10,055)	Max Participants per Call	5	3	3	2	6	22	5	23
	% of Calls with at Least One	8.05%	3.57%	5.45%	0.82%	15.74%	97.06%	0.20%	
	% of Calls with Multiple	1.13%	0.21%	0.52%	0.03%	3.37%	89.67%	0.10%	
2013	Mean Participants per Call	0.087	0.030	0.055	0.007	0.180	6.170	0.006	6.781
(N = 10,047)	Max Participants per Call	4	2	3	1	4	27	6	27
	% of Calls with at Least One	7.55%	2.92%	5.17%	0.75%	14.48%	97.28%	0.22%	
	% of Calls with Multiple	1.01%	0.10%	0.35%	0.00%	2.86%	90.27%	0.15%	
2014	Mean Participants per Call	0.083	0.033	0.056	0.007	0.179	6.327	0.011	6.784
(N = 10,105)	Max Participants per Call	4	2	3	1	5	25	8	25
	% of Calls with at Least One	7.46%	3.20%	5.14%	0.70%	14.62%	97.94%	0.36%	
	% of Calls with Multiple	0.78%	0.10%	0.41%	0.00%	2.66%	91.56%	0.24%	
2015	Mean Participants per Call	0.083	0.026	0.046	0.005	0.160	6.352	0.012	6.768
(N = 9,924)	Max Participants per Call	4	2	3	2	6	26	7	26
	% of Calls with at Least One	7.40%	2.57%	4.31%	0.52%	13.05%	98.01%	0.58%	
	% of Calls with Multiple	0.77%	0.06%	0.29%	0.02%	2.51%	91.68%	0.24%	
2016	Mean Participants per Call	0.071	0.021	0.048	0.005	0.146	6.318	0.012	6.700
(N = 7,071)	Max Participants per Call	4	3	3	1	5	23	5	25
	% of Calls with at Least One	6.29%	2.02%	4.37%	0.45%	11.60%	97.69%	0.59%	
	% of Calls with Multiple	0.71%	0.10%	0.45%	0.00%	2.35%	90.96%	0.24%	

We report mean and maximum conference call participation, as well as the percentage of calls with at least one (multiple) appearance(s) for each type of institution.

Table 2 – Conference Call Participation by Analyst Type

Panel B: Significance tests

Year		(1) Hedge Fund vs Mutual Fund	(2) Hedge Fund vs RIA	(3) Mutual Fund vs RIA
2007-2016	t-stat	45.437 ***	30.722 ***	-16.259 ***
	z-stat	43.826 ***	28.498 ***	-15.830 ***
2007	t-stat	5.840 ***	8.004 ***	2.929 ***
	z-stat	4.917 ***	7.342 ***	2.624 ***
2008	t-stat	14.903 ***	15.710 ***	0.925
	z-stat	13.853 ***	14.485 ***	0.644
2009	t-stat	15.125 ***	12.420 ***	-2.998 ***
	z-stat	14.122 ***	11.342 ***	-2.866 ***
2010	t-stat	15.323 ***	10.721 ***	-4.884 ***
	z-stat	14.658 ***	10.162 ***	-4.517 ***
2011	t-stat	17.074 ***	9.429 ***	-8.481 ***
	z-stat	16.443 ***	8.511 ***	-8.256 ***
2012	t-stat	14.641 ***	8.101 ***	-6.911 ***
	z-stat	14.080 ***	7.772 ***	-6.564 ***
2013	t-stat	15.875 ***	8.125 ***	-8.584 ***
	z-stat	15.462 ***	7.401 ***	-8.295 ***
2014	t-stat	14.492 ***	7.292 ***	-7.579 ***
	z-stat	13.968 ***	7.050 ***	-7.106 ***
2015	t-stat	16.668 ***	9.974 ***	-7.306 ***
	z-stat	16.322 ***	9.881 ***	-6.982 ***
2016	t-stat	13.016 ***	5.417 ***	-8.329 ***
	z-stat	13.077 ***	5.306 ***	-8.058 ***

Parametric (t-test statistic) and non-parametric (Wilcoxon signed-rank z-statistic) comparing conference call participation rates across buy-side institutions. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 3 – Determinants of Buy-Side Analyst Conference Call Participation

Panel A: Descriptive statistics for sample firm-quarters

Firm-Transcript Level Observations	(1) N	(2) Mean	(3) Median	(4) Stdev	(5) Min	(6) Max
Market Value ($mm)	76,509	7,175	1,240	24,502	25.2595	736,073
Number of Covering Analysts	81,652	8.4244	6	7.3228	0	32
Equity Bid-Ask Spread (×10)	76,518	0.0247	0.0089	0.0487	0.0012	0.3171
S&P 500 Index Member	81,652	0.1916	0	0.3936	0	1
S&P 1500 Index Member	81,652	0.5104	1	0.4999	0	1
Institutional Ownership	81,652	0.5984	0.6926	0.3432	0	1.2113
Number of Forecasts per Analyst	81,652	4.9665	4.5	3.9451	0	136
Leverage (Market)	76,412	2.7012	1.5738	3.3861	1.0248	23.5648
M/B Ratio	76,423	2.7739	1.8582	4.3693	-13.2396	28.1260
Return on Assets (LTM)	77,016	0.0048	0.0151	0.0981	-0.5409	0.2023
Dividend Yield	81,652	0.0027	0	0.0082	0	0.0439
Short Interest	76,506	0.0532	0.0338	0.0568	0	0.2907
Forecast Error	81,652	0.0330	0	1.6844	-8.0000	8.6000
Runup (-42,-1) CAR	81,652	-0.0057	0.0000	0.1567	-0.5197	0.5347
Return Volatility (Realized)	81,150	0.0249	0.0202	0.0164	0.0066	0.0980

Transcript level descriptive statistics for 81,652 quarterly earnings conference calls. All continuous variables are winsorized at 1% and 99%. Variable definitions are available in Appendix 1.

Table 3 – Determinants of Buy-Side Conference Call Participation

Panel B: Logit models of sample firm quarters Logit models for buy-side analyst conference call participation.

Logit Models - Probability of Buy-Side Analyst Appearance on Call				
	(1)	(2)	(3)	(4)
	Hedge Fund	Mutual Fund	RIA	Any Buy Side
Ln(Market Value)	-0.1874***	-0.1020***	-0.3604***	-0.2277***
	(-6.1273)	(-2.9728)	(-9.1005)	(-8.2798)
Ln(Number of Covering Analysts)	-0.4541***	-0.5000***	-0.4286***	-0.5126***
	(-8.9780)	(-8.6331)	(-6.3696)	(-12.3156)
Equity Bid-Ask Spread	0.2590	-0.2932	0.3379	0.9077*
	(0.4323)	(-0.4623)	(0.5623)	(1.7910)
S&P 1500 Index Member	-0.2413***	-0.0251	0.0394	-0.1043*
	(-3.3309)	(-0.2939)	(0.4357)	(-1.8059)
Institutional Ownership	0.0869	0.4722***	0.1704	0.1385
	(0.7063)	(2.8011)	(1.0981)	(1.3592)
Ln(Number of Forecasts per Analyst)	0.1089**	0.2165***	0.0595	0.1580***
	(2.1757)	(3.7493)	(1.1613)	(4.1858)
Leverage (Market)	0.0001	0.0057	-0.0556***	-0.0113
	(0.0059)	(0.5122)	(-5.0198)	(-1.4141)
M/B Ratio	-0.0095*	-0.0008	0.0039	-0.0019
	(-1.7937)	(-0.1189)	(0.4866)	(-0.4292)
Return on Assets	0.6096**	1.0052***	1.5420***	1.0297***
	(2.3760)	(3.0816)	(4.7132)	(4.7704)
Dividend Yield	0.8309	3.3814	7.7906*	5.3943**
	(0.2762)	(1.0000)	(1.9036)	(2.0630)
Short Interest	0.1732	-1.7206***	-0.0322	-0.5297
	(0.3446)	(-2.9293)	(-0.0463)	(-1.2799)
Forecast Error	-0.0046	0.0042	-0.0191**	-0.0046
	(-0.5390)	(0.4671)	(-2.2041)	(-0.8764)
Forecast Error^2	0.0015	0.0014	0.0000	0.0013
	(1.0017)	(0.7612)	(0.0268)	(1.0137)
Runup (-42,-1) CAR	-0.1245	-0.0056	-0.1275*	-0.1186**
	(-1.4410)	(-0.0578)	(-1.7166)	(-2.1536)
Realized Volatility	-3.2471*	-5.0620*	-0.0944	-3.1343**
	(-1.9322)	(-1.8989)	(-0.0449)	(-2.4958)
Intercept	0.5469	-1.0868	2.5273**	2.1357**
	(0.6633)	(-1.3394)	(2.3140)	(2.1320)
N	76,335	76,335	76,335	76,335
Industry FE (SIC3)	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes
Pseudo R^2	0.0715	0.0266	0.0603	0.1338

Standard errors are clustered at the year-quarter and firm levels and t-statistics in reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are available in Appendix 1.

Table 4 – First-Question Priority and Follow-Ups on Conference Calls

Panel A: Aggregate participation, first-question priority, and number of non-continuous management-analyst interactions by analyst type

	(1) # of Calls with Type	(2) % of Calls with Type	(3) # of Appearances	(4) % of Appearances	(5) # of Calls with 1st Question	(6) % of Calls with 1st Question	(7) Marginal Diff (6 - 4)/4	(8) Mean # of Interactions
Buy Side	15,069	18.45%	20,065	3.59%	4,621	5.66%	57.74% ***	1.4132 ***
Hedge Fund	7,874	9.64%	9,410	1.68%	2,038	2.50%	48.34% ***	1.3944 ***
Mutual Fund	3,633	4.45%	3,870	0.69%	846	1.04%	49.73% ***	1.3571 ***
RIA	5,007	6.13%	5,467	0.98%	1,488	1.82%	86.43% ***	1.4931 ***
Other	1,225	1.50%	1,318	0.24%	249	0.30%	29.40% ***	1.3809 ***
Sell Side	79,485	97.35%	503,665	90.06%	70,417	86.24%	-4.24% ***	1.1882
Media	289	0.35%	693	0.12%	32	0.04%	-68.37% ***	1.0606 ***
Other or Unknown	24,893	30.49%	34,845	6.23%	6,582	8.06%	29.38% ***	1.0011 ***
Total with Analysts	81,652	94.24%	559,268	100.00%	81,652	81,652		1.1844
Overall Total	86,647	100.00%	559,268	100.00%	81,652	81,652		

Columns (1) and (2) report the number and percentage of calls with participation from each analyst type. Column (3) reports the total number of analyst appearances and Column (4) reports the percentage of all appearances for each analyst type. Columns (5) indicates the number of calls for which the analyst type asks the first question during the Q&A session. Column (6) displays the percentage of all calls for which the corresponding analyst type asks the first question. Column (7) reports the unexpected frequency of first-question priority, calculated as the percentage of calls on which a participant of that type asked the first question (column (6)) minus the percentage of calls with any participation from that participant type (column (4)), all scaled by the percentage of calls with any participation from that participant type (column (4)). We also report the results of a difference in proportions test between columns (6) and (4) in Column (7) and significance tests relative to zero. We report the mean number of continuous interactions (i.e. follow-up interactions) with management in column (8) and report significance relative to sell side analyst mean interactions. ***, **, and * indicate statistical significance different at the 1%, 5%, and 10% levels, respectively.

Table 4 – First-Question Priority and Follow-Ups on Conference Calls

Panel B: Logit analysis of first-question priority and number of continuous analyst-management interactions.

	Logit - Analyst Asks First Question			Poisson - Number of Analyst Interactions		
	(1)	(2)	(3)	(4)	(5)	(6)
Buy-Side Analyst	-0.0584			0.1091***		
	(-1.4986)			(20.3669)		
Hedge Fund Analyst		-0.0982*	-0.0085		0.0970***	0.1101***
		(-1.8605)	(-0.1254)		(13.9635)	(11.2121)
Mutual Fund Analyst		-0.0345	-0.0337		0.0983***	0.0984***
		(-0.4682)	(-0.4577)		(11.2426)	(11.2496)
RIA Analyst		0.0449	0.0463		0.1355***	0.1357***
		(0.6549)	(0.6745)		(14.3897)	(14.3931)
Short Interest	0.1761***	0.1793***	0.2106***	0.0192	0.0195	0.0244
	(2.6534)	(2.6974)	(3.0716)	(0.9789)	(0.9934)	(1.2341)
Hedge Fund Analyst × Short Interest			-1.9540**			-0.2540**
			(-2.0985)			(-2.1565)
Analyst Initial Question Position				-0.1402***	-0.1401***	-0.1401***
				(-78.3726)	(-78.4020)	(-78.4008)
Analyst Recommendation	0.1458***	0.1464***	0.1465***	0.0218***	0.0217***	0.0217***
	(14.7272)	(14.7817)	(14.7891)	(20.9706)	(20.8659)	(20.8781)
Ln(Number of Analysts on Call)	-1.7039***	-1.7042***	-1.7039***	-0.1012***	-0.1008***	-0.1007***
	(-74.9455)	(-74.9645)	(-74.9286)	(-23.7998)	(-23.7270)	(-23.7131)
Ln(Number of Words in Call Q&A)	0.0665**	0.0664**	0.0661**	0.0844***	0.0841***	0.0841***
	(2.0125)	(2.0101)	(2.0013)	(16.0840)	(16.0257)	(16.0153)
Intercept	1.8559***	1.8392***	1.8412***	-0.1932***	-0.1949***	-0.1948***
	(6.0863)	(6.0333)	(6.0389)	(-4.2669)	(-4.2996)	(-4.2978)
N	526,153	526,153	526,153	526,153	526,153	526,153
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Additional Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.0864	0.0864	0.0864	0.1109	0.1109	0.1109

Participant level logit and Poisson models predicting the analyst asking the first question on a call. Z-statistics (with standard errors clustered by firm) are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are available in Appendix 1.

Table 5 – Analyst-Executive Question & Answer Interaction Length

Panel A: Interaction length by analyst type

Year	N		(1) Hedge Fund	(2) Mutual Fund	(3) RIA	(4) Other	(5) Buy-Side Total	(6) Sell-Side	(7) Media	(8) Aggregate Total
2007-2016	559,268	Words/Analyst	762.07	761.84	860.58	721.31	786.19	683.81	356.82	644.67
		Abnormal Interaction Length	-0.36%	-0.08%	0.82%	-0.99%	-0.03%	0.45%	-2.95%	
2007	13,851	Abnormal Interaction Length	-2.87%	-2.50%	-2.27%	-4.38%	-2.82%	-0.47%	-1.67%	554.25
2008	48,818	Abnormal Interaction Length	-1.75%	-0.29%	-2.14%	-2.55%	-1.57%	0.62%	-3.24%	623.14
2009	51,058	Abnormal Interaction Length	-1.19%	-1.25%	-0.67%	-0.33%	-1.00%	0.53%	-1.66%	620.38
2010	58,429	Abnormal Interaction Length	-1.16%	0.19%	0.18%	-0.37%	-0.47%	0.21%	-0.75%	630.44
2011	67,298	Abnormal Interaction Length	-0.63%	0.94%	1.76%	0.67%	0.45%	0.38%	-1.33%	638.91
2012	68,598	Abnormal Interaction Length	-0.15%	0.53%	1.72%	-2.48%	0.45%	0.39%	-2.71%	642.55
2013	68,125	Abnormal Interaction Length	1.38%	-0.91%	1.46%	-0.02%	0.96%	0.35%	-2.95%	642.06
2014	68,548	Abnormal Interaction Length	1.22%	1.15%	1.33%	-1.40%	1.14%	0.67%	-2.93%	669.41
2015	67,170	Abnormal Interaction Length	0.96%	0.47%	2.94%	-2.76%	1.32%	0.60%	-4.53%	672.09
2016	47,373	Abnormal Interaction Length	1.62%	-0.09%	3.66%	3.13%	2.09%	0.54%	-5.02%	677.38

Average length of analyst-executive interactions (in words) by analyst type, along with average abnormal % of Q&A, which is the standardized difference between the actual length and the expected length (total Q&A length / number of analysts) of the Q&A interaction or $\left(\frac{analyst\ interaction\ length - average\ interaction\ length}{average\ interaction\ length\ on\ call}\right)$.

Table 5 – Analyst-Executive Question & Answer Interaction Length

Panel B: Multivariate analysis of analyst-executive interaction length

OLS Models - Abnormal Length of Question and Answer Interaction with Analyst			
	(1)	(2)	(3)
Buy-Side Analyst	-0.0633***		
	(-11.3924)		
Hedge Fund Analyst		-0.0719***	-0.1180***
		(-9.4021)	(-6.8829)
Mutual Fund Analyst		-0.0591***	-0.0754***
		(-6.0166)	(-3.9754)
RIA Analyst		-0.0518***	-0.0391
		(-4.5510)	(-1.3747)
Analyst Recommendation	0.0082***	0.0083***	0.0094***
	(6.5220)	(6.5907)	(7.3987)
Ln(Number of Analysts on Call)	0.0011**	0.0009**	-0.0006
	(2.5281)	(2.2106)	(-1.6185)
Forecast Error^2	0.0000	0.0000	0.0000
	(0.8162)	(0.7248)	(0.9067)
Realized Volatility	0.0156**	0.0153**	-0.0006*
	(2.1451)	(2.1305)	(-1.8053)
Intercept	0.0303***	0.0273***	0.0207***
	(6.5810)	(5.6876)	(4.4170)
N	526,153	526,153	526,153
Buy-Side Owners Only	No	No	Yes
Firm FE	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes
Additional Firm and Call Controls	Yes	Yes	Yes
R^2	0.0013	0.0013	0.0008

OLS models of abnormal length percentage $\left(\frac{analyst\ interaction\ length - average\ interaction\ length}{average\ interaction\ length\ on\ call}\right)$ of conference call Q&A analyst-executive interactions. T-statistics are presented in parentheses and are calculated based on standard errors clustered by firm. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are available in Appendix 1.

Table 6 – Analyst-Executive Question & Answer Interaction Tone

Panel A: Interaction tone by analyst type

		Buy-Side							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year		Hedge Fund	Mutual Fund	RIA	Other	Buy-Side Total	Sell-Side	Media	Aggregate Total
2007-2016	Positive	0.88%	0.96%	0.97%	0.90%	0.92%	1.11%	0.89%	1.03%
	Negative	1.09%	1.09%	1.04%	1.08%	1.08%	0.97%	1.23%	0.91%
	Net Tone	-0.21%	-0.12%	-0.07%	-0.18%	-0.17%	0.14%	-0.34%	0.12%
2007	Net Tone	-0.14%	-0.29%	-0.28%	-0.52%	-0.23%	0.13%	-0.29%	0.11%
2008	Net Tone	-0.26%	-0.25%	-0.26%	-0.32%	-0.25%	-0.01%	-0.37%	-0.03%
2009	Net Tone	-0.24%	-0.30%	-0.31%	-0.29%	-0.29%	-0.02%	-0.30%	-0.03%
2010	Net Tone	-0.06%	-0.10%	-0.11%	-0.05%	-0.10%	0.14%	-0.14%	0.12%
2011	Net Tone	-0.02%	-0.10%	-0.15%	-0.03%	-0.10%	0.12%	-0.34%	0.10%
2012	Net Tone	-0.07%	-0.14%	-0.13%	-0.19%	-0.12%	0.11%	-0.57%	0.10%
2013	Net Tone	-0.04%	-0.10%	-0.12%	-0.09%	-0.09%	0.18%	-0.18%	0.16%
2014	Net Tone	-0.01%	-0.11%	-0.13%	-0.03%	-0.09%	0.21%	-0.37%	0.20%
2015	Net Tone	0.05%	-0.11%	-0.16%	-0.01%	-0.09%	0.21%	-0.36%	0.20%
2016	Net Tone	-0.05%	-0.09%	-0.19%	-0.01%	-0.11%	0.21%	-0.46%	0.19%

Mean analyst-executive interaction tone (positive, negative, and positive minus negative (net)) for 559,628 analyst appearances based on the Loughran and McDonald (2011) dictionaries, as a percentage of words spoken. Columns (5H), (6H), and (8H) show results using the Harvard IV-4 dictionaries.

Table 6 – Analyst-Executive Question & Answer Interaction Tone

Panel B: Multivariate analysis of analyst-executive interaction tone

OLS Models - Analyst Interaction Net Tone in Question and Answer Session			
	(1)	(2)	(3)
Buy-Side Analyst	-0.0023***		
	(-10.1796)		
Hedge Fund Analyst		-0.0030***	-0.0032***
		(-7.4541)	(-5.9947)
Mutual Fund Analyst		-0.0021***	-0.0021***
		(-4.7495)	(-4.7520)
RIA Analyst		-0.0013***	-0.0013***
		(-5.1235)	(-5.1339)
Short Interest	-0.0009	-0.0009	-0.0010
	(-1.0296)	(-1.0143)	(-1.1183)
Hedge Fund Analyst × Short Interest			-0.0166***
			(-3.5444)
Forecast Error	0.0000*	0.0000*	0.0000*
	(1.8109)	(1.7895)	(1.7863)
Runup (-42,-1) CAR	0.0005***	0.0005***	0.0005***
	(3.7474)	(3.7376)	(3.7365)
Analyst Recommendation	0.0001**	0.0001**	0.0001**
	(1.9899)	(2.0736)	(2.0644)
Intercept	-0.0092***	-0.0094***	-0.0094***
	(-7.2816)	(-7.3946)	(-7.3955)
N	526,153	526,153	526,153
Firm FE	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes
Additional Firm and Call Control	Yes	Yes	Yes
R^2	0.0113	0.0114	0.0114

OLS models of analyst-executive interaction net tone $\left(\frac{positive\ words - negative\ words}{total\ words}\right)$ using the Loughran and McDonald (2011) dictionaries. Columns (1H), (2H), and 3H) show results using the Harvard IV-4 dictionaries. T-statistics based on standard errors clustered by firm. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are available in Appendix 1.

Table 7 – Market Implications of Buy-Side Analyst Conference Call Participation

Panel A: Summary statistics and univariate tests

		(1) (-1,+1) 4 F-F VW CAR	(2) Δ Equity Bid-Ask Spread	(3) Δ Implied Volatility	(4) Δ Short Interest
(i) All Conference Calls	N	81,652	76,515	62,064	76,496
	Mean	0.0004	0.1391 ***	-0.0119 ***	-0.0002
(ii) No Buy-side Analyst Appearance	N	66,583	62,607	52,131	62,592
	Mean	0.0006 **	0.1339 ***	-0.0123 ***	-0.0002
(iii) Buy-side Analyst Appearance(s)	N	15,069	13,908	9,933	13,904
	Mean	-0.0007	0.1626 ***	-0.0099 ***	0.0000
(iv) Positive Sell-side Tone	N	48,511	45,694	37,772	45,682
	Mean	0.0062 ***	0.1402 ***	0.0138 ***	-0.0002
(v) Negative Sell-side Tone	N	27,832	26,101	21,437	26,095
	Mean	-0.0094 ***	0.1371 ***	-0.0091 ***	-0.0001
(vi) Positive Buy-side Tone	N	6,165	5,699	3,844	5,696
	Mean	0.0040 ***	0.1656 ***	-0.0107 ***	0.0000
(vii) Negative Buy-side Tone	N	6,961	6,423	4,764	6,422
	Mean	-0.0044 ***	0.1601 ***	-0.0095 ***	-0.0002
Buy-side Appearance: Yes (iii) versus No (ii)	t-stat	-1.8570 *	6.3783 ***	3.7477 ***	1.7489
Sell-side Tone: Positive (iv) versus Negative (v)	t-stat	25.2613 ***	0.7536	-9.1249 ***	-1.1471
Buy-side Tone: Positive (vi) versus Negative (vii)	t-stat	1.8837 *	0.0825	-0.3482	0.3409
Positive Tone: Buy-side (vi) versus Sell-side (iv)	t-stat	-10.6950 ***	-1.0664	3.4716 ***	0.4688
Negative Tone: Buy-side (vii) versus Sell-side (v)	t-stat	16.0965 ***	-0.1590	-6.4753 ***	-1.0611

Mean abnormal returns (-1, +1), changes in bid-ask spreads, changes in implied volatility, and changes in short interest around the conference call for various subsamples are presented above. Column (1H) uses Harvard IV-4 dictionaries for tone calculations. Unpaired sample t-statistics are also presented. Detailed variable definitions are available in Appendix 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7 – Market Implications of Buy-Side Analyst Conference Call Participation

Panel B: Multivariate analyses

Dependent Variable	CAR (-1,+1)		Δ Equity Bid-Ask Spread		Δ Implied Volatility		Δ Short Interest	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Buy-Side Appearance	-0.0018**		0.0949***		0.0020**		0.0038***	
	(-2.0329)		(3.9764)		(2.2901)		(3.6408)	
Buy-Side Tone		0.2233**		1.5039		-0.0414		-0.1245
		(2.5555)		(0.7749)		(-0.7109)		(-1.4674)
Hedge Fund Appearance		-0.0015*		0.1013***		0.0009		0.0044***
		(-1.6770)		(3.4928)		(0.7056)		(2.9132)
Mutual Fund Appearance		-0.0047***		-0.0087		0.0019		0.0054***
		(-3.0039)		(-0.2146)		(1.2605)		(2.6101)
RIA Appearance		0.0011		0.1315**		0.0011		0.0019
		(0.7125)		(2.4876)		(0.9613)		(1.2562)
Sell-Side Tone	1.5502***	1.5419***	2.4118**	2.3771*	-0.2677***	-0.2667***	-0.0516	-0.1126
	(16.8457)	(16.9266)	(2.0005)	(1.9457)	(-5.0979)	(-5.0964)	(-0.7093)	(1.0503)
Forecast Error	0.0013***	0.0013***	-0.0067*	-0.0066*	-0.0001	-0.0001	-0.0003	-0.0003
	(7.2996)	(7.3120)	(-1.9266)	(-1.9016)	(-0.5752)	(-0.5703)	(-1.2148)	(-1.2383)
Runup (-42,-1) CAR	0.0314***	0.0314***	0.0866*	0.0867*	-0.0005	-0.0005	-0.0124***	-0.0125***
	(7.6881)	(7.6940)	(1.7605)	(1.7629)	(-0.1483)	(-0.1567)	(-3.3932)	(-3.4290)
Intercept	0.1582***	0.1588***	2.9840***	2.9966***	-0.0524***	-0.0522***	-0.0625***	-0.0613***
	(10.7199)	(10.7309)	(8.5565)	(8.5712)	(-3.9121)	(-3.8993)	(-3.3547)	(-3.2541)
N	76,335	76,335	76,335	76,335	60,787	60,787	76,330	76,330
Industry FE (SIC3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Firm and Call Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.0320	0.0323	0.0613	0.0609	0.0416	0.0415	0.0512	0.0512

OLS models analyzing the determinants of abnormal returns (columns (1) and (2)), changes in equity bid-ask spread (columns (3) and (4)), changes in implied volatility ((columns (5) and (6)), and changes in short interest (columns (7) and (8)). T-statistics based on standard errors clustered by firm and year-quarter are reported in parentheses. Variable definitions are available in Appendix 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8 – Sell-Side Implications of Buy-Side Analyst Conference Call Participation

Panel A: Summary statistics and univariate tests

		(1) Δ Mean Price Target	(2) Δ Number of Analysts	(3) Δ Number of Revisions
(i) Overall	N	81,652	81,652	81,652
	Mean	0.0057 ***	-0.0031 ***	1.3522 ***
(ii) No Buy-side Analysts	N	66,583	66,583	66,583
	Mean	0.0068 ***	-0.0030 ***	1.4870 ***
(iii) Buy-side Analyst Appearance	N	15,069	15,069	15,069
	Mean	0.0006	-0.0038 **	0.7565 ***
(iv) Sell-side Tone (Pos-Neg) > 0	N	48,511	48,511	48,511
	Mean	0.0153 ***	-0.0004	1.4558 ***
(v) Sell-side Tone (Pos-Neg) < 0	N	27,832	27,832	27,832
	Mean	-0.0103 ***	-0.0072 ***	1.2858 ***
(vi) Buy-side Tone (Pos-Neg) > 0	N	6,165	6,165	6,165
	Mean	0.0080 ***	0.0018	0.6613 ***
(vii) Buy-side Tone (Pos-Neg) < 0	N	6,961	6,961	6,961
	Mean	-0.0061 ***	-0.0104 ***	0.8456 ***
Buy-side Appearance: Yes (iii) versus No (ii)	t-stat	-7.2716 ***	-0.5404	-28.5384 ***
Sell-side Tone: Positive (iv) versus Negative (v)	t-stat	34.3609 ***	5.1247 ***	9.4531 ***
Buy-side Tone: Positive (vi) versus Negative (vii)	t-stat	2.6349 ***	1.2322	-0.6129
Positive Tone: Buy-side (vi) versus Sell-side (iv)	t-stat	-13.6916 ***	-1.4899	0.7769
Negative Tone: Buy-side (vii) versus Sell-side (v)	t-stat	22.1081 ***	3.1745 ***	11.1902 ***

Changes in the number of covering sell-side analysts, the number of sell-side forecast revisions per analyst, and changes in (standardized) sell-side price target around the conference call for various subsamples. Column (1H) uses Harvard IV-4 dictionaries for tone calculations. Unpaired sample t-statistics are also presented. Detailed variable definitions are available in Appendix 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8 – Sell-Side Implications of Buy-Side Analyst Conference Call Participation

Panel B: Multivariate analyses

Dependent Variable	Δ Mean Price Target		Δ Number of Analysts		Δ Number of Forecasts	
	(1)	(2)	(3)	(4)	(5)	(6)
Buy-Side Appearance	0.0011		-0.0183***		-0.0682**	
	(1.1227)		(-8.6890)		(-2.0798)	
Buy-Side Tone		0.1758***		0.2333*		-2.0636
		(2.7097)		(1.7770)		(-1.0463)
Hedge Fund Appearance		0.0017		-0.0140***		-0.1511***
		(1.4285)		(-4.7808)		(-4.4061)
Mutual Fund Appearance		-0.0003		-0.0154***		-0.0438
		(-0.1728)		(-3.8331)		(-1.0273)
RIA Appearance		0.0026		-0.0142***		0.0829**
		(1.3544)		(-4.7799)		(2.2709)
Sell-Side Tone	1.7224***	1.7167***	0.4825***	0.4739***	-2.1240	-2.0262
	(20.7610)	(20.7415)	(3.2636)	(3.1912)	(-1.0788)	(-1.0242)
Forecast Error	0.0020***	0.0020***	-0.0001	-0.0001	0.0007	0.0007
	(8.1191)	(8.1467)	(-0.1320)	(-0.1533)	(0.7294)	(0.7355)
Forecast Error^2	-0.0000	0.0000	-0.0000	-0.0000	0.1954***	0.1958***
	(-0.0045)	(0.0022)	(-0.4655)	(-0.4693)	(3.9701)	(3.9665)
Runup (-42,-1) CAR	0.1593***	0.1593***	0.0021	0.0020	0.0190	-0.0129
	(20.9389)	(20.9212)	(0.7347)	(0.7292)	(0.0219)	(-0.0149)
Intercept	0.1564***	0.1570***	-0.2514***	-0.2526***	-3.0408***	-3.0676***
	(9.0648)	(9.0802)	(-5.1281)	(-5.1418)	(-3.9228)	(-3.9349)
N	76,335	76,335	76,335	76,335	76,335	76,335
Industry FE (SIC3)	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Additional Firm and Call Controls	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.2449	0.2450	0.0931	0.0930	0.2146	0.2148

OLS models analyzing the determinants of the number of covering sell-side analysts, the number of sell-side forecast revisions per analyst, and changes in (standardized) sell-side price target around earnings conference calls. Column (2H) uses Harvard IV-4 dictionaries for tone calculations. T-statistics based on standard errors clustered by firm and year-quarter are reported in parentheses. Variable definitions are available in Appendix 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Appendix 1 – Variable Definitions

Variable Name	Variable Definition
S&P 1500 Index Member	Indicator variable equal to one if a firm is a member of the Standard & Poor's 1500 index and equal to zero otherwise (Compustat).
Institutional Ownership	Percentage of institutional ownership in shares outstanding in the Thomson Reuters 13-F filing immediately prior to conference call date.
Number of Covering Analysts	Number of analysts from covering the firm prior to conference call. (I/B/E/S)
Number of Forecasts per Analyst	Mean number of annual forecasts made by each analyst in the year prior to the conference call. (I/B/E/S)
Market Value	Equity market capitalization, in millions of US dollars, as of 30 days prior to the conference call. (CRSP)
Leverage (Market)	Book value of debt and equity (Compustat) divided by the market value of equity (CRSP).
M/B Ratio	Ratio of market value of equity (CRSP) to book value of equity (Compustat).
Return on Assets	Net income over the last twelve months divided by total book value of assets. (Compustat)
Dividend Yield	Net income divided by average total assets over the last twelve months. (Compustat)
Forecast Error	The ratio of the difference between actual EPS and the consensus EPS estimate, divided by the consensus EPS estimate. (I/B/E/S)
Runup (-42,-1) CAR	Four factor Fama-French model adjusted runup return over the (-42,-1) window relative to the conference call date. (Eventus)
Realized Volatility	Standard deviation of daily stock returns in the 90-day period prior to the conference call date. (CRSP)
Q&A Length	Number of words spoken. Abnormal length by participant standardizes based on average participant-management interaction on the call.
Q&A Tone	Percentage of words spoken that match positve and negative dictionaries according to Loughran and McDonald (2011).
3-day (-1,+1) CAR	Four factor Fama-French model adjusted value-weighted abnormal return over the (-1,+1) window relative to the conference call date. (Eventus)
Δ Equity Bid-Ask Spread	Standardized change in equity bid-ask spread over the (-5,+5) window relative to the conference call date. (CRSP)
Δ Implied Volatility	Standardized change in implied volatility across the firm's ATM options over the (-5,+5) window relative to the conference call date. (OptionMetrics)
Δ Short Interest %	Change in number of shares sold short (Compustat) prior to and following the event event date standardized by shares outstanding (CRSP).

Appendix 2 – Comparison of Buy-Side Analyst Appearances to Jung et al. (2017)

This table replicates the list of the top 50 buy-side institutions from Appendix 2 of Jung et al. (2017) (JWZ) along with the relative difference in appearances from the 2002-2009 Thomson Reuters sample versus the 2007-2016 S&P Capital IQ sample.

Institutional Investment Firm	JWZ # of Analysts	JWZ # of Calls with Analysts	Buy-Side Type	Difference in Appearances
Lord Abbett	36	701	Mutual Fund	-57.35%
Kennedy Capital Management	25	289	RIA	-40.48%
Zimmer Lucas Partners	52	282	Hedge Fund	-71.99%
Millennium Partners	46	274	Hedge Fund	-42.70%
Neuberger Berman	61	217	Mutual Fund	-56.68%
Cobalt Capital Management	17	204	Hedge Fund	-75.98%
SAC Capital	56	189	Hedge Fund	-47.09%
Gates Capital Management	21	185	Hedge Fund	-45.95%
Omega Advisors	17	180	Hedge Fund	-33.89%
Capital Returns Management	2	178	Hedge Fund	12.36%
Columbia Management	43	175	Mutual Fund	20.57%
Blackrock	34	173	Mutual Fund	-61.27%
Gagnon Securities	14	159	Hedge Fund	-37.74%
State of Wisconsin Investment Board	15	155	Government	-21.94%
Bricoleur Capital Management	3	151	Hedge Fund	-96.03%
Wellington Management	46	150	Mutual Fund	-85.33%
Tieton Capital Management	3	143	RIA	193.71%
Sage Asset Management	11	142	Hedge Fund	-24.65%
Heartland Advisors	13	139	Mutual Fund	109.35%
T. Rowe Price	26	136	Mutual Fund	-91.91%
Duquesne Capital Management	12	133	Hedge Fund	-74.44%
Adage Capital Management	11	132	Hedge Fund	55.30%
Arcadia Investment Management	3	129	RIA	-36.43%
Alliance Capital Management	30	121	Mutual Fund	-38.02%
Kalmar Investments	2	121	Mutual Fund	-47.11%
Sentinel Trust Company	7	121	Mutual Fund	-66.94%
Fenimore Asset Management	4	111	Mutual Fund	-18.02%
Davidson Investment Advisors	5	106	Mutual Fund	-94.34%
Talon Capital	8	105	Hedge Fund	-87.62%
Knott Capital Management	12	104	Hedge Fund	-82.69%
Kern Capital Management	4	98	Mutual Fund	-95.92%
Bank of New York	18	92	Mutual Fund	-94.57%
Priority Capital Management	8	92	Hedge Fund	-91.30%
Entrust Capital	5	87	Hedge Fund	-59.77%
NWQ Investment Management	4	81	Mutual Fund	-34.57%
Sigma Capital Management	32	80	Hedge Fund	-96.25%
Pilot Advisors	12	79	RIA	-44.30%
Wells Capital Management	15	79	RIA	-3.80%
Frontier Capital Management	7	77	Mutual Fund	-85.71%
Insight Capital Research	5	77	RIA	-100.00%
JLF Asset Management	7	77	Hedge Fund	-88.31%
Westcliff Capital Management	3	77	Hedge Fund	-45.45%
Cardinal Capital Management	13	75	Mutual Fund	141.33%
Franklin Advisory Services	4	75	Mutual Fund	-49.33%
Fidelity Investments	30	74	Mutual Fund	-35.14%
Gruber & McBaine Capital	7	73	Hedge Fund	-65.75%
Wynnefield Capital	5	73	Hedge Fund	10.96%
Delphi Management	9	72	RIA	-98.61%
Rutabaga Capital	3	72	RIA	-38.89%
Boston Company	22	71	Mutual Fund	-32.39%

Appendix 3 – Example Text Pattern Matching with Soundex Strings and Levenshtein Distances

This Table documents differences between phonetic (Soundex) and character based (Levenshtein distance) text pattern matching algorithms. Panel A provides the number of conference all appearances using the listed institution name string in our sample. It also shows the Soundex string and Levenshtein distance from Jung, Wong, and Zhang (2017, JWZ) name "Lord Abbett." Panel B contains accuracy rates for the patterns in Panel A using Soundex and Levenhstein distance at similar thresholds. Panel C provides a list of JWZ institution names that are identical at Levenshtein distances with similar Soundex accuracy.

Panel A: Text Patterns for One Buy-Side Institution

CSS Text Pattern	CSS # of Appearances	Soundex (6 Digits)	Levenshtein Distance from "Lord Abbett"
Lord, Abbett & Co. LLC	98	L63132	11
Lord Abbett	88	L6313	0
Lord Abbott	56	L6313	1
Lord, Abbett	17	L6313	1
Lord Abbett & Company	9	L63132	10
Lord Abbett & Co.	7	L63132	6
Lord, Abbett and Company	6	L63135	13
Lord, Abbett & Co.	6	L63132	7
Lord, Abbet & Co.	5	L63132	7
Lord, Abbett & Company	1	L63132	11
Lordap	1	L631	7
Lord Abbett & Co. LLC	1	L63132	10
Lord Abbott.	1	L6313	2
Lord, Abbott & Company	1	L63132	12
Lord, Abett & Co	1	L63132	7
Lord, Abbett & Co	1	L63132	6
Lord Abbot	1	L6313	2
Abbott	1	A130	6

Panel B: Levenshtein Distances for Other Institutions

List of JWZ Institution Strings with Levenshtein Distance ≤ 12 to ""Lord Abbett"

Name	Lev Dist.	Soundex
SAC Capital	10	S134
Blackrock	11	B4262
Talon Capital	11	T45213
Omega Advisors	12	O52312
T. Rowe Price	12	T6162
Entrust Capital	12	E53623
Pilot Advisors	12	P43126
Rutabaga Capital	12	R31213
Boston Company	12	B23525

Appendix 4 – Returns and Analyst Tone Using Different Tone Dictionaries

Panel A: Net Tone Across Dictionaries

	Mean Standardized Net Tone (Call Level)		
	N	Harvard IV-4	L&M (2011)
Buy-Side Interactions	15,069	0.1640% ***	-0.1195% ***
Sell-Side Interactions	77,889	0.1625% ***	0.1703% ***
Difference		0.0015%	-0.2898% ***

Panel B: Relationship between Mean (-1,+1) 4F-F VW Returns and Net Tone Across Dictionaries

	Harvard IV-4 Dictionary Tone Quintile					
	(H1)	(H2)	(H3)	(H4)	(H5)	(H5) - (H1)
Mean Return (Buy-Side Tone)	0.0645%	-0.6814%	-0.5304% ***	0.1707%	0.0004%	-0.0641%
Mean Return (Sell-Side Tone)	-0.0564%	-0.0769%	0.0510%	-0.2486% *	0.2326% ***	0.2890% ***
Difference	0.1209%	-0.6045%	-0.5815% ***	0.4193%	-0.2322%	-0.3531% ***

	Loughran and McDonald (2011) Dictionary Tone Quintile					
	(L1)	(L2)	(L3)	(L4)	(L5)	(L5) - (L1)
Mean Return (Buy-Side Tone)	-0.5254% ***	-0.3601% **	-0.2486%	0.1671%	0.6331% ***	1.1586% ***
Mean Return (Sell-Side Tone)	-1.1281% ***	-0.5532% ***	0.1080% *	0.5904% ***	1.2295% ***	2.3576% ***
Difference	0.6027% ***	0.1931%	-0.3566% **	-0.4234% **	-0.5964% ***	-1.1990% ***

Net tone quintiles of four-factor (-1, +1) excess returns around earnings conference calls are presented for each dictionary and pattern matching algorithm. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.