

Buy-Side Analysts and Earnings Conference Calls

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Abstract

Companies' earnings conference calls are perceived to be venues for sell-side equity analysts to ask management questions. In this study, we examine another important conference call participant—the buy-side analyst—that has been underexplored in the literature due to data limitations. Using a large sample of transcripts, we identify 3,834 buy-side analysts from 701 institutional investment firms that participated (i.e., asked a question) on 13,332 conference calls to examine the determinants and implications of their participation. Buy-side analysts are more likely to participate when sell-side analyst coverage is low and dispersion in sell-side earnings forecasts is high, consistent with buy-side analysts directly acquiring information when a company's information environment is poor. Institutional investors trade more of a company's stock in the quarters in which their buy-side analysts participate on the call. Finally, we find evidence that buy-side analyst participation is associated with company-level changes in trading volume, institutional ownership, and short interest.

Keywords: Buy-side analysts; institutional investors; sell-side analysts; earnings conference calls

1. Introduction

The role of sell-side equity analysts in the capital markets has been researched extensively by academics over the past several decades (Bradshaw [2011]). In contrast, due to data limitations, there has been little research on buy-side analysts. Buy-side analysts work for institutional investment firms and have different incentives and responsibilities compared to their sell-side counterparts working at brokerage firms (Groysberg, Healy, and Chapman [2008]), which makes buy-side analysts not only worthy of study in their own right, but also makes it unclear as to whether the inferences and conclusions from the sell-side analyst literature are generalizable to buy-side analysts. While it is widely assumed that buy-side analysts conduct fundamental research and make stock recommendations to their firms' portfolio managers, little is known about how they gather information because their research activities are not generally observable. In this paper, we contribute to the literature by 1) using earnings conference call transcripts to identify a large sample of buy-side analysts who participated (i.e., asked a question) in the calls, 2) examining the economic determinants of their participation, 3) investigating the role of their participation in their investment firms' trading of the companies' stock, and 4) exploring the implications for future stock returns, trading volume, total institutional ownership, and short interest of the company hosting the conference call.¹

The few published papers on buy-side analysts have relied on survey data or proprietary data from a single investment firm and focused on the outputs of their research: earnings forecasts (Groysberg, Healy, and Chapman [2008]) and stock recommendations (Groysberg, Healy, Serafeim, and Shanthikumar [2013], Cheng, Liu, and Qian [2006], Rebello and Wei [2014], Frey and Herbst [2014]). In particular, Rebello and Wei [2014] and Frey and Herbst

¹ Throughout this paper, we use the terms "firm" and "institution" when referring to an institutional investment firm that employs a buy-side analyst and the term "company" when referring to a company that hosts an earnings conference call.

[2014]) find that buy-side recommendations are associated with fund manager trades and positive abnormal returns for the funds. In contrast to studies that focus on the outputs, Brown, Call, Clement and Sharp [2016] survey 344 buy-side analysts from 181 investment firms and conduct follow-up interviews with 16 analysts to gain insights about the inputs and incentives that shape buy-side research. When asked about conference calls, some respondents indicated that recent 10-K/Qs are more useful in determining stock recommendations, only easy or leading “softball” questions are asked in a public forum, and private “call-backs” following conference calls are the preferred venue to ask questions. While these views expressed by a few survey respondents are informative, other buy-side analysts likely have different opinions about the relative and absolute usefulness of conference calls since we observe thousands of them in our sample asking informative questions. Thus, we view our study as complementary to Brown et al. [2016] in trying to better understand buy-side analysts’ research activities, and in particular, their participation in conference calls.

Throughout this paper, we refer to “participation” as asking at least one question during a company’s conference call because we cannot observe analysts (buy-side or sell-side) who merely listen during the call or who wanted to ask a question but were not selected by management (Mayew [2008]). As such, we underestimate buy-side interest in absolute terms and possibility relative to sell-side interest, depending on the propensity of each type of analyst to want to ask, and be selected, to ask a question. Notwithstanding this limitation, we examine observable buy-side participation to shed light on its importance as one of the research activities performed by buy-side analysts and to answer several unexplored research questions. In particular, we are interested in understanding the prevalence of buy-side analysts in companies’ earnings conference calls and the reasons they participate in the calls. We also test predictions

about whether buy-side analyst participation is related to a company's information environment, trading in the company's stock by the employing institution, and company-level capital market outcomes.

Using a sample of 57,784 conference call transcripts from the second quarter of 2002 through the first quarter of 2009, we identify 3,834 buy-side analysts from 701 institutional investment firms who asked at least one question on 13,332 earnings conference calls. Our sample includes some of the largest investment firms in the U.S. (e.g., Blackrock, Fidelity, Wellington, and T. Rowe Price) and several of the buy-side analysts named in *Institutional Investor* magazine's annual "Best of the Buy-Side" rankings, as voted by hundreds of sell-side analysts each year.² The participation by these highly-respected buy-side analysts suggests that asking questions on a conference call is one aspect of their research and due diligence. Buy-side analysts ask questions in 23% of all earnings conference calls, over 3,000 conference calls have two or more buy-side analysts asking questions, 76% of the companies in our sample have had at least one conference call with buy-side participation, and buy-side analysts represent 5% of all questioners. Thus, although the vast majority of conference call participants are sell-side equity analysts, participation by buy-side analysts in earnings conference calls is not uncommon.

Next, we examine why buy-side analysts participate in conference calls despite the common perception that they are venues for sell-side analysts and company managers to interact. Unlike sell-side analysts, who act as information intermediaries gathering and disseminating information about companies, buy-side analysts work for institutions who can take positions in the companies and they usually keep their information gathering activities private, so their

² There were 35 buy-side analysts from 17 investment firms voted as the "Best of the Buy-Side" between 2003 and 2008. We find that eight of these analysts are in our sample of earnings conference call transcripts. One of them is described as having little time to waste because he covers 55 companies; the time and effort he allocates to listen and participate in a company's earnings conference call suggests that conference call participation is not a trivial task (Martin [2005]).

observable participation in conference calls makes for a unique research setting that has been previously underexplored. While there are several plausible scenarios for why a buy-side analyst would ask a question in a conference call, such as to cast the company in a positive (or negative) light after having taken a long (or short) position in the company's stock, our reading of many transcripts and the nature of the questions asked (see Appendix 1 for examples) lead us to posit that buy-side analysts generally ask questions to acquire or clarify information. We predict this scenario is more likely when the company's information environment is poor and the uncertainty about its future performance is greater. Consistent with this prediction, we find that buy-side analysts are more likely to participate when a company has lower sell-side analyst coverage and when there is greater dispersion in earnings forecasts made by sell-side analysts.

In our next analysis, we investigate whether conference call participation by buy-side analysts is indicative of their investment firms' trading of the shares of the company hosting the conference call. Using pre- and post-conference call ownership data, we examine changes in quarterly institutional ownership to better understand whether investment firms tend to change their shareholdings in the quarters in which their buy-side analysts participate in the conference calls. We use a difference-in-differences approach with a control sample of the same firm-company pairs as the treatment sample (but for quarters without conference call participation) to examine if conference call participation is associated with a greater degree of trading. This design allows us to examine differences in ownership changes based on the same pairs of institutions and companies across quarters in which the key difference was participation in the conference call. We find that in the quarters in which a buy-side analyst participates in a company's conference call, the employing institution is not only more likely to change its ownership, but also tends to change its shareholdings to a greater degree than in the quarters

without their analyst participating in the conference call. We interpret our results as suggesting that institutions and their buy-side analysts view conference calls as a useful channel to gather or clarify information to update their research (although we cannot definitively rule out the other previously-mentioned scenarios) and that buy-side analysts' participation is associated with institutions' trading in the company's stock.

Finally, we test whether buy-side analyst participation is associated with company-level capital market outcomes, such as future absolute stock returns, trading volume, institutional ownership, and short interest. This is an empirical question because one particular buy-side analyst asking a question may proxy for broad buy-side interest and management's answer to a question may lead to correlated trading across many investment firms. Conversely, if the participating institution trades based on private knowledge augmented with the public information gained from asking a question on the conference call, then other institutions may not trade in a similar way. Our results indicate that there is an association, as the number of buy-side analysts participating on the conference call is positively associated with subsequent absolute changes in share turnover, absolute changes in institutional ownership, and absolute changes in short interest.³

We conduct several robustness checks and exploratory analyses, including an examination of certain characteristics of the questions that buy-side analysts ask and a comparison to sell-side analysts. Compared to sell-side analysts, buy-side analysts 1) tend to ask, on average, slightly more questions, 2) their questions are shorter, 3) their tone of questions are similar, and 4) they elicit shorter responses from the hosting company's CEOs and CFOs. While

³ Our results show positive associations and not causal effects. We do not argue that having a buy-side analyst participate on a company's conference call causes that company's stock price to react. Our results are consistent with buy-side analysts on a call proxying for overall buy-side interest, which is associated with company-level stock market outcomes.

there could be several explanations for these differences, we believe that the results suggest that buy-side analysts tend to ask more pointed or focused questions that elicit more focused answers from management, compared to the types of questions that sell-side analysts tend to ask. However, we cannot rule out other explanations such as management's shorter response being reflective of them not willing or reluctant to answer buy-side analysts' questions.

This study contributes to the literature by examining one role that buy-side analysts play in the capital markets. Our study is related to two working papers that also examine buy-side analysts in a conference call setting. Cen, Dasgupta, and Rangunathan [2012] find that buy-side analysts tend to participate after recent stock price run-ups and run-downs, but they tend to ask questions earlier in calls after recent price declines, suggesting they are trying to avoid further losses in their firm's portfolio. They also find that buy-side participation and their earlier questions are associated with negative abnormal returns surrounding the calls, consistent with buy-side analysts contributing to greater information production during the call when the news is negative. Call, Sharp, and Shohfi [2016] find that buy-side analysts tend to participate in a call when there is high uncertainty about that company. Buy-side analysts have a higher-than-expected rate of being the first questioner, and their interactions with company management tend to be shorter and less positive in tone compared to sell-side analysts. They also find that buy-side participation is associated with higher company stock bid-ask spreads and buy-side positive (negative) tone is associated with positive (negative) changes in institutional holdings.⁴

⁴ Another study of the conference call setting that includes buy-side analysts is Heinrichs, Park, and Soltes [2015], which uses proprietary data on institutional clients of Thomson Reuters who accessed audio recordings and transcript records of earnings conference calls to shed light on the different types of market participants who "consume" the calls. They find that 57% of timely consumers (those who access on the day of the call) are buy-side analysts and slightly more than half of them do not own the company's stock prior to the call (as of the most recent calendar quarter-end). While their findings are consistent with the other studies that illustrate general buy-side interest in earnings conference calls, the authors note that analysts typically dial a telephone number provided by a conference call vendor (e.g., Intercall, BT Conferencing, ACT Conferencing, etc.) to participate (i.e., ask a

Our paper, along with Cen et al. [2012] and Call et al. [2016], contribute to our overall understanding of different reasons that buy-side analysts participate in conference calls, characteristics of the questions asked, and the associated capital market implications. Among our three predictions, the first prediction has the most overlap with Call et al. [2016], although the two papers use different proxies for information uncertainty.⁵ Our second prediction is unique to our paper. We examine the trading behavior at the institutional level and adopt the institution-company pair research design, which is a key feature of our study. Our third prediction differs from Call et al. [2016] because of a different focus. We focus on unidirectional variables (absolute returns and absolute changes in trading volume, institutional ownership, and short interest) because buy-side analysts' conference call participation is unidirectional (does not mean good or bad news), whereas Call et al. [2016] focus on directional variables (stock returns, changes in bid-ask spread and institutional ownership). Furthermore, both trading volume and short interest are examined only in our study. Finally, another distinct feature of our study is the common theme of information to link our three predictions, from a company's information environment to institutional trading and ownership changes following information acquisition.

This paper continues as follows. The next section provides institutional background and develops testable hypotheses. Section 3 describes the sample and variable construction. Section 4 presents the empirical findings. We discuss sensitivity and robustness checks in Section 5 and conclude in Section 6.

2. Institutional Background and Hypothesis Development

2.1 Institutional Background

question). Therefore, reasons for buy-side analysts to access a call (through Thomson Reuters) may not be the same as those for them to participate in a call.

⁵ Both papers use sell-side analyst coverage, but we also use sell-side analyst forecast dispersion while Call et al. [2016] also use bid-ask spread and the S&P 1500 membership.

A buy-side analyst works for an institutional investment firm, which explains the “buy-side” moniker. Some of the largest investment firms, according to *Institutional Investor* magazine’s annual ranking, include Barclays Global Investors (now BlackRock), State Street Global Advisors, Fidelity Investments, and the Capital Group Companies (Capon [2005]). These firms and other smaller investment firms typically employ a team of buy-side analysts to analyze industry data and individual companies and make stock recommendations to their firms’ portfolio managers. Each buy-side analyst covers approximately 40 companies broadly grouped within a single sector, with many more companies on their “radar” (Retkwa [2009], Abramowitz [2006], Groysberg et al. [2008]), which differs from sell-side analysts who typically cover approximately 20 companies grouped within a narrow industry. Daily responsibilities include analyzing company financial statements and disclosures, meeting with company executives, and communicating with their sell-side counterparts to supplement their own research.

Sell-side analysts are considered information intermediaries who gather information about companies through many sources (such as conference calls), process and interpret that information, and disseminate that information to institutional clients (Groysberg et al. [2008], Bradshaw [2011]). Buy-side analysts, on the other hand, are typically private in their information gathering and processing activities. Perhaps the biggest difference between buy-side and sell-side analysts is that the former are directly held accountable for their stock picks, as their compensation and job security are dependent on the profitability of their research (Knox and Kenny [2003], Brown et al. [2016]). This fact suggests that the research activities buy-side analysts conduct prior to recommending that a portfolio manager buy or sell a particular stock are of utmost importance to the analysts. In this study, we examine participation in earnings

conference calls to better understand the activities that buy-side analysts conduct and their implications for institutional trading and other capital market outcomes.

It is important to note that participation by any type of analyst on a company's earnings conference call is not a random or first-come, first-serve occurrence. An analyst who wants to ask a question calls a specific phone number (Heinrichs et al. [2015]) and enters a question queue using a touch-tone keypad, and then management has discretion over whom to select from the queue to ask the next question (Skinner [2003], Mayew [2008], Mayew, Sharp, and Venkatachalam [2013]). Hence, our observations of buy-side analysts asking a question is a joint function of analysts wanting to ask a question and management selecting them to ask a question. Similarly, a lack of questions could be due to buy-side analysts not wanting to ask a question or management not allowing them to ask a question.⁶ The number of sell-side analysts in the queue may also affect management's decision to select a buy-side analyst if there are time constraints on the call.⁷ In robustness tests, we limit our sample to companies covered by six or fewer sell-side analysts to increase the likelihood that there is sufficient time for anyone to ask a question. In summary, our results regarding the determinants of buy-side analyst participation should be interpreted with this caveat in mind.

2.2 Hypothesis Development

Prior research into earnings conference calls shows that they are an important voluntary disclosure medium for companies and a source of information for sell-side analysts (Tasker [1998], Frankel, Johnson, and Skinner [1999], Bowen, Davis, and Matsumoto [2002], Bushee, Matsumoto, and Miller [2003, 2004]). Our transcript data show that thousands of buy-side

⁶ Like prior papers that have examined the dynamics of conference calls (e.g., Mayew et al. [2013]), we cannot observe the question queue and such data are not available.

⁷ While Call et al. [2016] find that buy-side analysts tend to receive priority over sell-side analysts in being allowed to ask the first question, Cen et al. (2012) show that buy-side analysts tend to be called later in the Q&A session, as captured by their Buy-side *Sequence* variable.

analysts also participate in the calls and the nature of their questions suggests they are trying to gather or clarify information about the company's performance, indicating that the call is also a source of information for buy-side analysts. Although Brown et al. [2016] show, using survey data and follow-up interviews, that some buy-side analysts avoid or are cautious about participating in the Q&A portion of conference calls, we posit that buy-side analysts are more inclined to ask questions under certain conditions.

When a company's information environment is poor, typically characterized by little to no coverage by sell-side analysts, we expect more buy-side analysts to gather their own information. Conversely, when there is a high level of coverage by sell-side analysts, buy-side analysts can rely on their sell-side counterparts for industry knowledge, access to management, and company-specific information. We also expect that even if a company has sell-side coverage, greater uncertainty about firm fundamentals can be a reason for buy-side analysts to ask questions in a conference call. These predictions are supported by the model in Cheng, Liu, and Qian [2006], which shows that institutional fund managers rely more on buy-side research when the quality of sell-side research decreases and the uncertainty in sell-side earnings forecasts increases. For these reasons, our first prediction is as follows:

Prediction 1: Buy-side analysts are more likely to participate in a company's earnings conference call when the company's information environment is poor.

Prior research shows that buy-side analyst recommendations influence the investment firm's trading decisions (Rebello and Wei [2014], Frey and Herbst [2014]). When buy-side analysts focus attention on one of the companies in their coverage or on their radar, they conduct more due diligence on that company (Retkwa [2009], Abramowitz [2006]). If participation in a company's earnings conference call is part of a buy-side analyst's due diligence process in forming or updating his or her stock recommendations, then it follows that conference call

participation will be associated with trading by the buy-side analyst's investment firm. Specifically, for those institutions that own the company's stock prior to the conference call (hereafter, owning institutions), we predict they are more likely to change their shareholdings by the next calendar quarter and by greater amounts compared to a control group of owning institutions without buy-side participation on the conference call. For those institutions that do not own the company's stock prior to the conference call (hereafter, non-owning institutions), we predict that they are more likely to establish shareholdings by the next calendar quarter and by greater amounts compared to a control group of non-owning institutions without buy-side participation. Thus, our second prediction is as follows:

Prediction 2: Institutional investment firms trade more of a company's stock when their buy-side analysts participate in the company's conference call, relative to institutional investment firms without buy-side analyst participation.

We next examine the implications of buy-side participation for company-level outcomes. It is not clear *ex ante* whether company-level future market outcomes such as stock returns and volume would be associated with one buy-side analyst asking a question or the trading by that analyst's employing institution. On the one hand, if institutional trading is correlated across institutions in general and they react in a similar way to the public information heard in response to a buy-side analyst's question, then we would expect to find that buy-side participation in conference calls is associated with the hosting company's stock returns and volume. On the other hand, if the trading by the institution with a buy-side analyst on the call reflects private information that is augmented by the public information heard from the call, then other institutions will not make similar trades and we would not expect to detect company-level outcomes. For example, one buy-side analyst may have private information about a company that other analysts (buy-side or sell-side) do not have. If that analyst asks a question and

interprets management's answer differently than other analysts, then the trades of that analyst's employing institution will not be correlated with the trades of other institutions, in which case company-level stock outcomes will not be significantly correlated with buy-side participation.

For our tests, we use future absolute stock returns, changes in share turnover, changes in total percentage institutional ownership, and changes in short interest as measures of capital market outcomes. As in prediction 2, we test for absolute changes in the market measures and we express our third prediction in the alternative form.

Prediction 3: Participation by buy-side analysts on a company's earnings conference call is positively correlated with future absolute stock return, absolute changes in trading volume, absolute changes in total institutional ownership, and absolute changes in short interest.

3. Sample data

Our data is comprised of companies with available conference call transcripts from the Thomson Reuters StreetEvents database from the second quarter of 2002 through the first quarter of 2009.⁸ As shown in Table 1, Panel A, our full sample includes 57,784 earnings conference calls from 3,418 companies.⁹ The transcripts contain a list of participants, their affiliations, the text of management's prepared remarks, and the questions and answers between management and analysts.¹⁰ We use a python script to parse the text of the transcripts to collect the names and affiliations of all questioners. There are a total of 381,826 questioners in our sample, roughly seven per conference call.

⁸ Our sample period starts in the second quarter of 2002 when conference call transcripts became available on the StreetEvents database. Our sample ends in the first quarter of 2009 because we obtained the database from Thomson Reuters in mid-2009.

⁹ We require that the date of a company's conference call (from Thomson Reuters) be the same or one day after the date of the earnings announcement provided by Compustat. We find that 78% of the conference calls occur on the same date as the earnings announcement and 22% occur on the next day. Our sample is reduced in regressions in which requisite data are not available for all control variables.

¹⁰ In Section 5.1, we discuss textual analyses that we conduct on the transcripts.

To identify buy-side analysts and rule out sell-side analysts, retail investors, and business reporters, we undertake a four-step process. We first search all affiliations for keywords that are common in the names of institutional investment firms: “capital,” “asset,” “fund,” “investment,” “management,” “advisors,” “partners,” “investors,” and combinations such as “capital management” and “asset management.” This first step identifies 10,615 questioners as possible buy-side analysts.¹¹ In the second step, we screen the remaining 371,211 questioners (without the keywords in their affiliation) and exclude 359,442 of them whose affiliation is known to be a sell-side brokerage firm or investment bank based on data from I/B/E/S, leaving another 11,769 questioners as possible buy-side analysts. However, since I/B/E/S does not contain an exhaustive list of sell-side firms because they do not all disseminate their research through I/B/E/S, we take further measures to exclude sell-side analysts (described in our fourth step). In the third step, we take the 22,384 possible buy-side analysts obtained from the first two steps (10,615 + 11,769) and match the affiliations to names of institutional investors in the Thomson Reuters database of 13F filings.¹² This third step results in 17,685 questioners from 721 unique affiliations that closely match a 13F filer, which we require to increase the likelihood that an analyst’s affiliation is a true institutional investment firm and not a retail or individual investor.¹³

In the fourth and final step, we manually conduct Internet searches of the 721 affiliations to exclude questioners from sell-side firms not covered by I/B/E/S, as well as questioners from

¹¹ We take this first step to attempt to *directly* and proactively identify institutional investment firms, even though many of these investment firms would have been identified *indirectly* using the second step. We believe this step is prudent because if any of these investment firms failed to match to a 13F institutional investors (third step) due to slight misspellings, we can manually check the spellings and make necessary corrections to complete the match.

¹² Form 13F is the reporting form filed by institutional investment managers pursuant to Section 13(f) of the Securities Exchange Act of 1934. Institutional investment managers that use the United States mail (or other means or instrumentality of interstate commerce) in the course of their business and that exercise investment discretion over \$100 million or more in Section 13(f) securities must file Form 13F.

¹³ This requirement rules out true institutional investment firms that manage less than \$100 million in assets and biases our sample toward large institutional investment firms.

firms that have both buy-side and sell-side operations.¹⁴ We exclude the latter to be conservative in our identification of buy-side analysts. We went to each firm's website (if still active) or its Bloomberg Business online description (which includes inactive firms) to confirm its type. Through these manual searches, we further exclude 164 questioners from nine sell-side firms and 376 questioners from 11 firms with both types of operations.¹⁵

Through this extensive procedure, we identify 17,145 questioners, or 4.5% of the total, as working for institutional investment firms. To estimate the number of unique buy-side analysts, we compute the number of unique caller names from each investment firm, while allowing for some variation and misspellings of names.¹⁶ We estimate there are 3,834 unique buy-side analysts from 701 institutional investment firms in our sample.¹⁷ The top 50 institutional investment firms ranked by total number of conference calls, along with their number of buy-side analysts in our sample, is shown in Appendix 2.

We find that 23% of the earnings conference calls in our sample, or 13,332 calls, have at least one buy-side analyst who asked a question. Table 1, Panel B, shows the percentage of conference calls with buy-side analyst participation by year and calendar quarter. There has been

¹⁴ In our sample, these types of firms have filed Form 13F in the past, which is the reason they were not ruled out after the third step.

¹⁵ The nine sell-side firms (in our sample) not covered by I/B/E/S are GunnAllen Financial, SG Cowen, Hibernia Southcoast, Gerard Klauer Mattison, Royal Bank of Canada (RBC), Orion Securities, LJR Great Lakes Review, VSR Financial Services, and Waterhouse Securities. The 11 firms (in our sample) with both types of operations (in our sample) are Barclays, Keefe Bruyette & Woods (KBW), JMP Securities, Wachovia Bank, Deutsche Bank, Bernstein, Arnhold & S. Bleichroeder, Bank of America, Credit Suisse, AG Edwards, and UBS.

¹⁶ Specifically, we compute the number of unique names per investment firm using only the first four letters of the analyst's name. For example, "Stephan Smith" would be considered the same person as "Stephen Smith" because the first four letters of each name is "Step." However, it is still possible for common names to vary in spelling within the first four letters, such as "John" and "Jon." For such cases, our estimate of the number of unique buy-side analysts in our sample would be overstated.

¹⁷ In untabulated analyses, we estimate the average portfolio value for each of the 701 institutional investment firms during our sample period and find that most of them fall into the 3rd or 4th quartile (4th being the highest) in terms of total portfolio size among all institutional investment firms in the Thomson Reuters 13F database.

a general decline in buy-side participation, from 29% in 2003 to 19% in 2008.¹⁸ Table 1, Panel C, shows that there are 10,311 conference calls with one buy-side analyst, 2,387 conference calls with two buy-side analysts, 512 conference calls with three buy-side analysts, and 122 conference calls with four or more buy-side analysts. Lastly, Panel D shows the number of companies that have had buy-side analysts ask questions on one or more calls during our sample period. There appears to be significant variation across companies, with 23.6% of sample companies never having a buy-side analyst ask a question, 14.5% of companies having buy-side participation only once, 34.6% of companies having buy-side participation on two to five calls, 16.8% of companies having buy-side participation on six to nine calls, and 10.5% of companies that have had buy-side analysts ask question on ten or more of their conference calls.

In addition to data from the conference call transcripts, we require other data sources for our empirical tests. We use I/B/E/S data to compute sell-side analyst coverage and earnings forecast variables, Thomson Reuters 13F filings data to compute institutions' quarterly ownership in companies, Compustat data to compute companies' quarterly financial variables and monthly short interest, and CRSP data to compute stock returns and trading volume. These data requirements reduce our total sample sizes in subsequent regression analyses.

4. Empirical Analysis

4.1 Determinants of Buy-Side Analyst Participation on Conference Calls

To test our first prediction, we run an ordered logistic regression with three ordinal levels on the dependent variable *Number-of-BSA* (Green [1990], Allison [1999]). The first level is zero buy-side analysts on the conference call, the second level is one buy-side analyst, and the third

¹⁸ Call et al. [2016] also document a general decline in yearly buy-side participation, from 25% in 2008 to 8% in 2013.

level is two or more buy-side analysts on the call (i.e., *Number-of-BSA*=0, 1, or 2+).¹⁹ Our regression equation is as follows:

$$Prob[Number-of-BSA=0, 1, \text{ or } 2+]_{i,t} = \beta_0 + \beta_1 Number-of-SSA_{i,t} + \beta_2 Dispersion_{i,t} + \beta_k Control\ Variables_{i,t} + Fixed\ Effects + \varepsilon_{i,t} \quad (1)$$

Our first prediction is that buy-side analysts are more likely to participate in a company's earnings conference call when the company's information environment is poor. We use the level of sell-side analyst coverage and forecast dispersion to proxy for a company's information environment. For each company *i* and quarter *t*, we measure the level of sell-side analyst coverage with the variable *Number-of-SSA*, defined as the natural log of one plus the number of unique sell-side analysts in the I/B/E/S detailed earnings per share (EPS) database who provided any type of EPS forecast for the company from the prior conference call date to one day before the current conference call date. For companies with no EPS forecasts in a given quarter, we set *Number-of-SSA* to zero. We measure sell-side analyst forecast dispersion, *Dispersion*, as the standard deviation of analysts' current quarter EPS forecast measured over the same period as *Number-of-SSA*. For companies with no EPS forecasts or one forecast from a single sell-side analyst, we cannot compute a standard deviation. Therefore, to avoid losing observations of companies with coverage from zero or one sell-side analyst, we set *Dispersion* equal to the mean value for the sample.²⁰ Our predictions are that the estimated coefficients for *Number-of-SSA* and *Dispersion* are negative and positive, respectively ($\beta_1 < 0$ and $\beta_2 > 0$).

We include several variables to control for other factors that may be associated with interest in the company in general and interest in the earnings conference calls in particular. We

¹⁹ We also run an OLS regression in which the dependent variable *Number-of-BSA* ranges from zero to seven. Results are presented in Table A1 of our online appendix; inferences are similar to those from Table 2, Panel C.

²⁰ Table A2 of our online appendix provides results of four additional specifications in which *Dispersion* is not set to the mean (resulting in the loss of 8,056 observations in the regression) or *Dispersion* is scaled by the company's stock price on the date of the conference call (*Dispersion-Scaled*). To avoid a small denominator problem, we require the stock price to be equal to or greater than \$1.00 and set any missing values to the mean. All inferences are similar to those from Table 2, Panel C.

control for total institutional ownership with the natural log of one plus the number of institutional investors in the company (*Number-of-II*), as the more institutional investors a company has, the more likely it is that a buy-side analyst will participate on the conference call. We control for company size using the natural log of market value of equity (*Company-Size*), company age using the natural log number of months that the company has been listed in CRSP (*Company-Age*), the company's book-to-market ratio (*Book-to-Market*), two indicator variables for whether the company had a positive or negative earnings surprise in the quarter (*Pos-Surprise* and *Neg-Surprise*), and the company's stock return over the 90-day period prior to the conference call (*Ret-Prior90days*). To control for a time-of-day effect in which there is possibly more interest in the conference call if it occurs during trading hours, we include an indicator variable (*Intraday*) for whether the start of the call occurs between 9:30am and 3:45pm Eastern Time. If there are multiple calls taking place at the same time for companies within the same industry, a buy-side analyst may not be able to participate on both calls in real-time. Thus, we include *Concurrent-Calls*, defined as the natural log of the number of conference calls that take place for companies in the same industry (Fama-French 10 industry groups) on the same day and at the same start time. We include the absolute value of future three-month returns (*Abs-Ret*) to proxy for potential mispricing in the company's stock at the time of the conference call, which could attract buy-side interest in the company. Lastly, we include quarter and industry (Fama-French 10 industry groups) fixed effects in one specification and quarter and company fixed effects in a second specification.

Descriptive statistics of the variables used in our determinants test are shown in Table 2, Panel A. All continuous explanatory variables are winsorized at the 1st and 99th percentiles. For indicator variables, only the mean is shown. The median values for the number of sell-side

analysts and forecast dispersion are 6 and 0.026, respectively. The median number of institutional investors is 116, the median company market capitalization is \$921 million, and the median company age is 147 months or 12 years. Conference calls take place during trading hours 53% of the time and the median number of concurrent conference calls for companies in the same industry is 2.

Panel B shows mean and median values, along with tests for differences, of the variables for companies partitioned by whether buy-side analysts participated on their conference calls or not.²¹ The mean (median) number of sell-side analysts covering companies with buy-side analyst participation is 6.2 (5.0), which is lower than 7.9 (6.0) for companies without buy-side participation. The mean (median) forecast dispersion for companies with buy-side analysts is 0.044 (0.033), which is higher than 0.039 (0.024) for companies without buy-side participation. Differences in values in the control variables indicate that companies with buy-side analyst participation tend to be smaller in market capitalization, are older, have higher book-to-market ratios, have higher prior returns, and have fewer positive and more negative earnings surprises. Their conference calls also tend to occur more often during trading hours and have fewer concurrent calls from companies in the same industry. All differences in the mean and median values for each group are significant at the 1% level, except for absolute future three-month returns (*Abs-Ret*). These univariate results support Prediction 1 and are consistent with buy-side analysts participating on earnings conference calls of companies with lower sell-side analyst coverage and higher earnings forecast dispersion—proxies for a poor information environment.

We next test our prediction in a multivariate setting. The results of estimating regression equation (1) are presented in Table 2, Panel C. Robust standard errors are clustered by

²¹ To ease presentation of univariate differences, we form two groups only (0 and 1 or more buy-side analysts on a call). In the subsequent ordered logistic regression, we form three levels of the dependent variable (0, 1, and 2 or more).

companies; z-statistics are presented in parentheses below the coefficients. Column (1) presents results when quarter and industry fixed effects are included. In terms of the model's goodness of fit, the pseudo- R^2 is 3.6% and the area under the receiver operating characteristic (ROC) curve is 0.63. Regarding the control variables, the positive coefficients for *Book-to-Market*, *Neg-Surprise*, and *Intraday*, and the negative coefficient for *Concurrent-Calls* are consistent with our expectations and the univariate results reported in Panel B. The fact that the estimated coefficient on *Pos-Surprise* is also statistically positive indicates that the marginal effect of an earnings surprise in either direction is positive. Turning to our main variables of interest, the estimated coefficient for the level of sell-side coverage (*Number-of-SSA*) is significantly negative (-0.307), indicating that an interquartile decline in the number of sell-side analysts from 11 to 3 (2.485 to 1.386 in log form), holding all other variables fixed, corresponds to a 29% $[(\exp(-0.307)-1)*(-1.099)]$ increase in the odds of the number of buy-side analysts on the call being at a higher level. The estimated coefficient for *Dispersion* is significantly positive (1.570), indicating that an interquartile increase in the dispersion of sell-side analyst forecasts from 0.011 to 0.040, holding all other variables fixed, corresponds to an 11% $[(\exp(1.570)-1)*0.029]$ increase in the odds of the number of buy-side analysts on the call being at a higher level. Column (2) presents results when industry fixed effects are replaced by company fixed effects. The results for the two key variables of interest are qualitatively similar and the inferences remain the same. Overall, the results in Panel C are consistent with buy-side analysts taking a more active role in acquiring information (i.e., asking questions) during earnings conference calls when the company's information environment is poor.²²

4.2 Institutional Trading Associated with Buy-Side Analyst Participation on Conference Calls

²² Call et al. [2016] arrive at a similar conclusion using various proxies for company uncertainty. They find that buy-side analysts are more likely to appear on conference calls of companies followed by fewer sell-side analysts, with higher bid-ask spreads, and not included the S&P 1500 index.

In this section we examine whether the institutional investment firms with buy-side analysts on companies' conference calls trade (and by what amounts) the stock of the company hosting the conference call. The purpose of this analysis is to better understand whether buy-side analyst participation is associated with institutional trading in the company's stock. We use a difference-in-differences approach with a control sample of quarters when the same institutions did *not* have buy-side analysts on the company's conference call (i.e., we hold the institution-company pair fixed) to examine if conference call participation is indicative of greater trading. Using data from the Thomson Reuters 13F filings database, we compute the percentage ownership (i.e., percentage of a company's total shares outstanding) that each institution has for each company in our sample, measured at the calendar quarters ended before and after the conference call, to compute changes in quarterly ownership.

Before proceeding with a discussion of our analysis, we note that 13F filing data only provides snapshots of institutions' holdings at the end of each calendar quarter and do not capture the exact timing of when the institutions made their trades or whether they traded in and out of a stock within a quarter. As a result, our classifying an investment firm as an "owning-institution" because it owned a company's stock as of the last calendar quarter ended prior to the conference call would be incorrect if the firm sold its entire position prior to the call. We would also misclassify a "non-owning institution" if that firm bought a company's stock after the calendar quarter began (but before the conference call).²³ Another reason we might misclassify an owning institution is if a buy-side analyst supports a specific portfolio manager who does not own the company's stock, but the investment firm owns the stock through other funds. This

²³ In our sample, the median amount of time that a company's earnings conference call takes place after the end of a calendar quarter is 32 days, indicating that if a firm's quarterly ownership in a company changed, there was roughly one month prior to the call and two months after the call in which the trades could have occurred. In a robustness check discussed in Section 5.3, we try to increase the likelihood that trading took place after the conference call by limiting our sample to conference calls that took place within three weeks of the beginning of a calendar quarter.

scenario could happen within larger investment firms. Therefore, our analysis of changes in quarterly ownership within groups of owning and non-owning institutions, based on conference call participation, should be interpreted with this measurement error in mind.

In our computation of investment firms' quarterly changes in ownership of companies, levels and changes in ownership can be zero or non-zero for any company-institution pair in any given quarter. With a sample of 57,784 conference calls (involving 3,418 companies) and 701 institutional investment firms, there is a total of 40,506,584 ($57,784 \times 701$) possible company-institution-quarter combinations for our analyses. However, we eliminate about 31% of these observations in which an institution did not appear to exist (i.e., not in the 13F database) at the time of a company's conference call, which leaves approximately 28 million observations in which any of the institutions in our sample could have plausibly owned or not owned the company hosting the conference call.

Table 3, Panel A presents the percentage of owning and non-owning institutions with and without buy-side analysts on a conference call that increased, decreased, or did not change their level of ownership in a company. The mean and median of the changes in quarterly ownership are presented for both the institutions with and without buy-side analyst participation, along with tests for differences. Of the 7,696 buy-side analysts from owning institutions that participated on a call, 45.2% of the institutions increased their ownership, 48.6% decreased their ownership, and 6.2% did not change their ownership during the quarter. Of the owning institutions without buy-side analyst participation, 40.2% increased their ownership, 49.7% decreased their ownership, and 10.1% did not change their ownership. Thus, a comparison within owning institutions suggests that there are slightly more changes in ownership (93.8% vs. 89.9%) among institutions with buy-side analysts on the conference call. Of the 9,449 buy-side analysts from non-owning

institutions that participated on a conference call, 8.2% of the institutions established initial ownership in the company. By comparison, only 1.3% of non-owning institutions without buy-side analyst participation established initial ownership in the company.²⁴

Regarding the magnitude of changes in ownership, we first focus on institutions that increased ownership and find that owning institutions with buy-side analysts on the call had a mean and median increase of 0.5% (of a company's total shares outstanding), compared to a mean (median) increase of 0.2% (0.1%) for owning institutions without buy-side analysts on the call. The difference in differences is significant at the 1% level using a two-tailed *t*-test for means and a Wilcoxon signed-rank test for medians. Non-owning institutions with buy-side analysts on the call had a mean (median) ownership of 1.2% (0.4%) after the call, compared to a mean (median) ownership of 0.3% (0.1%) for non-owning institutions without buy-side analysts on the call. The difference in differences is significant at the 1% level for both the mean and median. For institutions that decreased ownership, we find that owning institutions with buy-side analysts on the call had a mean and median decrease of 0.7%, compared to a mean (median) decrease of 0.2% (0.1%) for owning institutions without buy-side analysts on the call. The difference in differences is again significant at the 1% level for the mean and median. The results in Panel A indicate that when a buy-side analyst participates on a company's earnings conference call, the analyst's investment firm changes its ownership of the company's stock by a greater degree than when its buy-side analyst does not participate on the call.²⁵

²⁴ Non-owning institutions, particularly hedge funds, may have a short position in a company's stock. To check the robustness of our results, we exclude 1,812 of the 9,449 buy-side analysts who work for hedge funds (based on our manual internet searches described in Section 3). We still find that 7.6% (582) of the remaining 7,637 non-owning institution (similar percentage shown in Table 3 Panel A) established an ownership position in the company hosting the conference call by the next calendar quarter. One slight difference is that the mean initial ownership position is 1.3% of shares outstanding, compared to the 1.2% in Table 3, Panel A.

²⁵ We also examined whether the results differ depending on the direction of earnings surprises. Table A3 of our online appendix presents results conditional on *Pos-Surprise*=1 and *Neg-Surprise*=1. In either partition, the results are similar to those presented in Table 3, Panel A.

We next test Prediction 2 in a multivariate setting, where the dependent variable is the absolute change in percentage ownership that institution j has in company i in quarter t (*Abs-Chg-Ownership* _{i,j,t}).

$$\begin{aligned} \text{Abs-Chg-Ownership}_{i,j,t} = & \beta_0 + \beta_1 \text{Participate-in-Call}_{i,j,t} + \beta_2 \text{BS-NumQ} \\ & + \beta_k \text{Control Variables}_{i,t} + \text{Fixed Effects} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

The main variable of interest is an indicator variable (*Participate-in-Call* _{i,j,t}) for whether a buy-side analyst employed by institution j participated on company i 's conference call in quarter t . If conference call participation is associated with greater changes in ownership, then the coefficient for *Participate-in-Call* will be significantly positive ($\beta_1 > 0$). Another variable of interest is a proxy for the number of questions (*BS-NumQ* _{i,j,t}) asked by the analyst from institution j , defined as the number of back-and-forth dialogues between the analyst and management, which captures the number of times a given analyst and management take turns speaking to each other. If a greater number of buy-side questions is associated with greater changes in ownership, then the coefficient for *BS-NumQ* will be significantly positive ($\beta_2 > 0$).

We control for several firm- and company-specific factors that may be associated with institutions' quarterly changes in ownership in companies. In particular, changes in ownership may be related to the size of an institution's shareholding in a given company and the size of the institution's total portfolio. Accordingly, we include the variable *Value-of-Holding*, defined as the natural log of the dollar value of ownership that institution j has in company i and *Inv-Firm-Size*, defined as the natural log of total dollar value of all the investment firm's shareholdings. We also include *Firms-in-Portfolio* as the natural log of the total number of companies in an institution's portfolio to capture the amount of attention (or lack of) that a company may receive from the portfolio manager. We include a company's absolute stock return from the prior 90 calendar days (*Abs-Ret-Prior90days*) to control for ownership changes related to short-term price

movements.²⁶ Lastly, we include fixed effects for quarter, industry, and either investment firm or company-investment firm pair. All control variables are measured as of the calendar quarter before the conference call.

Descriptive statistics of the firm and company characteristics are shown in Table 3, Panel B. The mean (median) *Abs-Chg-Ownership* is 0.017% (0.000%), which reflects the large number of observations with zero change in ownership. Conditional on a non-zero change (not tabulated), the mean (median) value is 0.204% (0.029%). The median investment firm has \$750 million ($\exp(20.436)$) in assets under management and holds shares in 92 companies ($\exp(4.522)$).

The results of estimating regression equation (2) are presented in Panel C. In Column (1), where quarter, industry, and investment firm fixed effects are included, the estimated coefficient for *Participate-in-Call* is significantly positive (at the 1% level), indicating that when buy-side analysts participate on a company's conference call, the analyst's institution tends to change its ownership in the company by a greater amount. The estimated coefficient of 0.144 indicates that an investment firm's absolute quarterly change in ownership in a company is greater by 0.144% (approximately two-thirds of the mean value of *Abs-Chg-Ownership* conditional on a non-zero change) when it has one of its buy-side analysts participate on the call. The coefficient for the number of questions asked by the buy-side analyst (*BS-NumQ*) is also significantly positive (at the 5% level), although the statistical and economic significance is smaller than for the indicator *Participate-in-Call*. For the control variables, there is a greater absolute change in ownership when the value of shareholdings is greater, when the institutional investment firm is larger, and when absolute prior returns are greater. When there is a greater number of companies in an

²⁶ Prior returns are not available for all company-institution-quarters used in the univariate analyses of Table 3 Panel A, which results in a relatively smaller sample size for the regression.

institution's portfolio, there tends to be smaller changes in ownership. In Column (2), where investment firm fixed effects are replaced by company-investment firm fixed effects, the coefficients for *Participate-in-Call* and *BS-NumQ* remain significantly positive (the latter at the 10% level). For the same company-investment firm pairs, the firms are more likely to trade the company's stock and to a greater degree in the quarters when their buy-side analyst participated in the call, compared to when they did not participate in the call.

As an additional regression specification, we estimate equation (2) using only the observations in which changes in ownership are non-zero. In Column (3), the coefficients for *Participate-in-Call* and *BS-NumQ* are both significantly positive at the 1% level, while in Column (4), the coefficient for *Participate-in-Call* is significant at the 10% level and *BS-NumQ* becomes insignificant. Thus, the results suggest a positive association between buy-side participation in a conference call and larger absolute changes in ownership in a company by the employing institution, while the results for the number of questions asked are weaker. Overall, the results in Panel C are consistent with Prediction 2.

4.3 Conference Call Participation and Future Absolute Returns, Share Turnover, Institutional Ownership, and Short Interest

Thus far we have examined the participation of individual buy-side analysts on companies' earnings conference calls and the related trading decisions of individual institutional investment firms that employ the analysts. However, it is unclear whether such decisions at the institution level are noticeable at the company level, where a company may have hundreds or thousands of institutional investors. Even if we observe one institution change its ownership in a company, a similar decision by other institutional investors is needed to move the company's stock price, trading volume, total institutional ownership, and short interest.

As previously discussed, we believe it is an empirical question as to whether buy-side analyst participation on conference calls is associated with company-level capital market outcomes. Our third prediction is that there is a positive association with future absolute stock returns, absolute changes in share turnover, absolute changes in total institutional ownership, and absolute changes in short interest. The basic regression equation is as follows.

$$\begin{aligned} \text{Market-Variable}_{i,t+s} = & \beta_0 + \beta_1 \text{Number-of-BSA}_{i,t} + \beta_k \text{Control Variables}_{i,t} \\ & + \text{Quarter and Company Fixed Effects} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

*Market-Variable*_{*i,t+s*} represents *Abs-Ret*, *Abs-Chg-Turnover*, *Abs-Chg-Inst-Own*, and *Abs-Chg-Short-Int* over a specific future period *s* after the conference call in quarter *t*. For each company *i* and quarter *t*, *Abs-Ret*_{*i,t*} is the company's absolute stock return over the 90 calendar days after its conference call, *Abs-Chg-Turnover*_{*i,t*} is the absolute daily average share turnover percentage over the 90 calendar days after a conference call less the daily average share turnover percentage over the 90 calendar days before the conference call, *Abs-Chg-Inst-Own*_{*i,t*} is the absolute change in total percentage institutional ownership from the calendar quarter ended before the conference call to the calendar quarter ended after the conference call, and *Abs-Chg-Short-Int*_{*i,t*} is the absolute change in short interest as a percentage of total shares outstanding from the month before the conference call to the month after the conference call.

The independent variable of interest is *Number-of-BSA*, defined as the number of buy-side analysts who asked a question on the conference call, and we predict a positive coefficient ($\beta_1 > 0$). We include control variables that may be associated with any of the four dependent variables or our independent variable of interest. *Abs-Surprise* is defined as the absolute value of actual reported EPS minus the most recent sell-side analyst mean consensus forecast prior to the earnings announcement. We also include company size and the book-to-market ratio as previously defined. To control for stock return momentum, we use *Ret-Prior11mo* as the stock

return for the 11-month period starting one year prior to the conference call date and ending one month prior to the conference call date. We include *NC-Analysts* and *Cov-Analysts-Absent*, as defined in Jung, Wong, and Zhang [2015], who show that changes in sell-side analyst interest, as measured by their participation or lack of participation in a company's earnings conference calls, are associated with future company growth, stock returns, and changes in institutional following and share turnover. *NC-Analysts* is the number of non-covering sell-side analysts on the conference call and *Cov-Analysts-Absent* is the number of covering sell-side analysts who are absent from the current conference call (but participated on the prior conference call), both scaled by the number of sell-side analysts on the conference call.²⁷

To control for other possible omitted factors that may be associated with each of our dependent variables, we include a lagged version (measured for the prior quarter) of the dependent variable ($Abs-Ret_{i,t-1}$, $Abs-Chg-Turnover_{i,t-1}$, $Abs-Chg-Inst-Own_{i,t-1}$ and $Abs-Chg-Short-Int_{i,t-1}$). Descriptive statistics of the regression variables are shown in Table 4, Panel A.

For the final control variable, we include the inverse mills ratio (*Inverse-Mills*) to control for potential sample selection bias related to buy-side analysts' decision to participate on certain companies' earnings conference calls but not others. That is, since we do not observe when buy-side analysts do not participate in a call (but are perhaps listening), our variable for whether there are any buy-side analysts on a conference call is zero for a significant fraction of the observations. The results of our multivariate tests presented in Table 2 indicate that buy-side analysts tend to participate on the conference calls of companies with poorer information environments and companies that have higher book-to-market ratios, have earnings surprises,

²⁷ As in Jung et al. [2015], the computation of *Cov-Analysts-Absent* requires one lag quarter of data to determine if the absent sell-side analysts were on the prior conference call. Thus, for the regressions presented in Table 4 in which *Cov-Analysts-Absent* is included, the sample period is from the third quarter of 2002 to the first quarter of 2009.

and host conference calls during trading hours. As a result, regressions of future absolute stock returns, absolute changes in share turnover, absolute changes in institutional ownership, and absolute changes in short interest without correcting for the potential selection bias may lead to biased coefficient estimates (Heckman [1979]). To compute the inverse mills ratio, we first model the decision for a buy-side analyst to participate on a company's conference call using a probit regression similar to equation (1) except that the dependent variable is binary (1 for any buy-side analysts on the call and 0 for none). We then include *Inverse-Mills* from the probit regression into equation (3) as a control variable.²⁸

The results from estimating regression equation (3) are presented in Table 4, Panel B. In Column (1), the dependent variable is *Abs-Ret* and the estimated coefficient for *Number-of-BSA* is not significant. This result suggests that there is no post-earnings announcement return volatility associated with buy-side analyst participation on the conference call. In column (2), the dependent variable is *Abs-Chg-Turnover* and the estimated coefficient for *Number-of-BSA* is significantly positive (at the 10% level), indicating that buy-side participation is associated with changes in future share turnover. Column (3) shows the results when the dependent variable is *Abs-Chg-Inst-Own*, where the coefficient for *Number-of-BSA* is positive and significant at the 1% level. Lastly, Column (4) shows that the coefficient for *Number-of-BSA* is significantly positive at the 1% level when the dependent variable is *Abs-Chg-Short-Int*. Taken together, these results suggest that participation by buy-side analysts on companies' earnings conference calls is

²⁸ While the *Inverse-Mills* variable is included to correct for self-selection in the estimation of equation (3), it can also be interpreted as an estimate of the private information underlying the decision of a buy-side analyst to participate on a conference call or not (see Li and Prabhala [2007] for a detailed explanation).

associated with company-level changes in share turnover, institutional ownership, and short interest, providing support for Prediction 3.²⁹

5. Additional Analyses and Robustness Tests

5.1 Characteristics of questions by buy-side and sell-side analysts

We conduct a textual analysis of the earnings conference call transcripts to examine how the characteristics of questions asked by buy-side analysts compare with those asked by sell-side analysts. First, to estimate the number of questions asked by each analyst, we count the number of back-and-forth dialogues between each analyst and management, which captures the number of times a given analyst and management take turns speaking to each other. Each dialogue may begin with an analyst saying “Hello” to management and end with “Thank you,” therefore, the number of dialogues naturally overestimates the number of questions. But as long as this scenario occurs similarly for both types of analysts, a relative comparison should be fair. Second, to estimate the length of questions asked by each analyst, we count the total number of words spoken by an analyst and scale it by the number of dialogues. Third, to capture the tone of questions asked by each analyst, we use the Harvard IV-4 dictionary to count the total number of positive and negative words spoken by each analyst.³⁰ We define an analyst’s tone to be the number of positive words minus negative words, scaled by the total number of words. Finally, we also calculate the tone of CEOs and CFOs when they respond to each type of analyst and the length of their response.

²⁹ Another measure of buy-side participation that we used was the natural log of the total number of questions asked by all buy-side analysts on a conference call (*Number-of-BSA-Q*). Table A4 of our online appendix presents the results, which are similar to those presented in Table 4, Panel B. Because this measure had a 0.96 correlation with *Number-of-BSA*, we do not include both variables in the regression at the same time.

³⁰ The Harvard IV-4 dictionary has 1,045 positive words and 1,160 negative words. Loughran and McDonald [2011] show that the Harvard IV-4 dictionary incorrectly classifies some words in a sample of 10-K filings as negative, however, there should be less of a misclassification issue in a sample of conference call transcripts because the words are spoken by participants and not written in standard formats as in earnings reports.

The results of our analysis are presented in Table 5. We find that buy-side analysts, on average, tend to ask slightly more questions than sell-side analysts. The mean number of dialogues for buy-side analysts of 5.55 is greater than the mean of 5.14 for sell-side analysts (significant at the 1% level). The median value is 5.00 for each type of analyst, but 52% of the buy-side analysts have 5 or more dialogues, while 50% of sell-side analysts have 5 or more dialogues, which drives the significant difference in the Wilcoxon signed rank test. Buy-side analysts tend to ask shorter questions, as their number of words per dialogue has a mean (median) value of 33.72 (28.63), compared to a mean (median) value of 38.14 (32.67) for sell-side analysts. Correspondingly, both CEOs and CFOs tend to respond to buy-side analysts with shorter answers. The mean and median number of words per dialogue are about 10% to 17% fewer when management answers questions from buy-side analyst as compared to when they answer questions from sell-side analysts.

When we examine analyst tone, we find that the mean tone for buy-side analysts is not significantly different from the mean tone for sell-side analysts, while the median tone is less positive for buy-side analysts (significant at the 5% level).³¹ There is no difference in the tone of CFOs when they respond to buy-side and sell-side analysts, but the tone of CEO responses to buy-side analysts has a greater right-skewed distribution than that to sell-side analysts. Specifically, the mean CEO tone toward buy-side analysts is slightly more positive, while the median CEO tone toward buy-side analysts is significantly less positive. These results suggest that a minority of CEOs talk more positively when responding to a buy-side analyst. The economic magnitude of the differences in tone is small, as they amount to only 1% to 2% of the

³¹ As a sensitivity test, we include the absolute mean tone of all buy-side analysts on a conference call (*Abs-Mean-BS-Tone*) and include it in regression equation (3). Results are presented in Table A5 of our online appendix. We find little to no incremental explanatory power beyond the number of buy-side analysts on the call.

mean and median tone, which may be reflective of an inability of the Harvard IV-4 dictionary to detect subtle differences (if any) in the way buy-side and sell-side analysts speak.

5.2 Limiting sample of companies to those with sell-side analyst coverage of six or fewer

The results in Table 2, Panels B and C, indicate that buy-side analysts are more likely to participate in a company's earnings conference call when there are fewer sell-side analysts that cover the company. However, for companies that are covered by a large number of sell-side analysts, there may be less opportunity for buy-side analysts to ask questions if many sell-side analysts want to ask questions and there is a time constraint on the conference call. Call et al. [2016] find that buy-side analysts tend to receive priority to ask the first question, which should alleviate our concern about crowding. But as a robustness check, we repeat our analysis using a subsample of companies covered by six (the median value) or fewer sell-side analysts. This restriction eliminates 48% of the conference call observations from Table 2, Panel C. The untabulated results remain significant for the variables of interest and are presented in Table A6 of our online appendix.

5.3 Limiting conference calls to those near the beginning of a calendar quarter

The results in Table 3, Panel A, indicate that institutional investment firms are more likely to change their level of shareholdings, and to a greater degree, in the quarters in which their buy-side analysts participate on a company's conference call. As previously discussed, one caveat to this analysis is that since the Thomson Reuters database of 13F filings shows quarterly shareholdings, we cannot identify whether changes in shareholdings occur before or after (or both) the company's conference call. As a robustness check, we repeat this analysis using a reduced sample in which the dates of companies' conference calls are close to the beginning of the calendar quarter, which increases the likelihood that quarterly changes in ownership occur

after the conference call. For conference calls that are within three weeks of the beginning of the calendar quarter, the sample size is reduced by 83% (from 17,145 to 2,854 buy-side analysts in a conference call). The results are shown in Table 6. More of the owning institutions with buy-side analysts on the call changed their ownership, and by larger percentages of companies' shares outstanding, relative to those owning institutions without buy-side analysts on the call (95.4% vs. 90.4%). We also find that more of the non-owning institutions with buy-side analysts on the call established ownership positions, and by larger amounts, relative to those non-owning institutions without buy-side analysts on the call (6.9% vs. 1.6%). In sum, the results are qualitatively similar to those presented in Table 3, Panel A and provide additional evidence that the changes in ownership are more likely to have occurred after a firm's conference call.

6. Conclusion

In this study, we examine a large sample of buy-side analysts who participated (i.e., asked questions) on companies' earnings conference calls to better understand one channel in which buy-side analysts gather information. Contrary to the common perception that earnings conference calls are venues for sell-side analysts and company managers to interact, we find evidence that buy-side analysts participate in such calls when a company's information environment is poor. We also document that institutional investors tend to increase or decrease their ownership in the stock and to a greater degree when their buy-side analysts participate on the call. Finally, we find that buy-side analyst participation on conference calls is not only associated with investment firm-level trading, but also associated with company-level market outcomes. Overall, our study contributes to the literature on buy-side analysts by highlighting earnings conference calls as one of their important research activities, and by also highlighting

the implications of their participation for the institutional investment firms that employ them and for the companies that host the conference calls.

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APPENDIX 1

Examples from Transcripts of Buy-Side Analysts Asking Questions

Example 1: KeyCorp (Ticker: KEY) Q1 2002 Call, Apr. 17, 2002.

Mark Lynch, Wellington Management: “Good morning. Calling about the drop in service charges from the first quarter. I had thought that rise in the second half came from changes in pricing on panic, and now it's dying back down again. So is that due to some sort of customer backlash or something else going on?”

Example 2: Ross Stores, Inc. (Ticker: ROST) Q3 2003 Call, Nov. 18, 2003.

Frank Alonzo, T. Rowe Price: “Hi, guys. Good quarter. Just a quick question, John, on the D&A line. Can you break out for us what the depreciation was versus the amortization line, year-to-date?”

Example 3: Lear Corp. (Ticker: LEA) Q4 2003 Call, Jan. 26, 2004.

Thomas Crawley, Putnam Investments: “[First question] What percentage of your revenue now -- can you split it out between the Big Three, European and Asian? [Second question] Finally, the CapEx number? What is your sort of run rate going forward over the next couple of years? I know there were some timing issues between '03 and '04.”

Example 4: Nordstrom (Ticker: JWN) Q4 2004 Call, Feb. 15, 2005

Teresa Donahue, Neuberger Berman: “I had 3 questions, 2 of them merchandising-related. First of all, I noticed you haven't talked in some time -- you haven't called out the women's areas for the most part in some time as being strong. I was wondering -- relative to the rest of the Company. I was wondering what opportunities you see there? Secondly, if you discussed it, I apologize, I missed it. But the contribution of merchandise margin versus B&O in the quarter, you know, in terms of quantifying? And then finally, I was just wondering who you're benchmarking yourself against in setting your margin targets for the next 3 years?”

Example 5: Hartford (Ticker: HIG) Q4 2005 Call, Jan. 27, 2006

Alan Strauss, Lord Abbett: “On page 11, you guys put down the ROA. Could you let us know what the ROE of these businesses are, especially the mutual fund business, because ROA doesn't make a lot of sense to me”

Example 6: Family Dollar (Ticker: FDO) Q3 2007 Call, Jun. 28, 2007

Tien San Lucas, AIM Investments: “Hi, good morning. You've made a lot of progress in your apparel category. Can you give me a sense of the margin improvement in this category? Then secondly, are there any structural or other reasons why you wouldn't be able to apply your learnings to other product categories?”

Example 7: American Commercial Lines, Inc. (Ticker: ACLI) Q2 2008 Call, Jul. 30, 2008

Lee Hicks, Farallon Capital: “[First question] Hey, guys. How are you doing? In terms of the debt refinancing that you guys have planned for Q1, how are you thinking about the capital structures going forward? And what do you think an optimal amount of debt is for the Company? Because, if you look in the first half of the year you guys had roughly 50 million of EBITDA, and I'm just -- just doing the simple numbers but if you annualize it will probably be 100, 125; and is this the kind of business where you can put 4 to 5 times of leverage. [Second question] So if what holds true, then an equity offering is something you guys aren't considering? [Third question] Okay. And then just a regulatory question. This is the last one. But there's a regulation out there called subchapter M which covers the admission standards for the tugs. Where do you guys stand in compliance with your tug fleet, and how much does it typically cost to overhaul a boat? [Fifth question] And what does it usually cost to overhaul a vessel?”

Example 8: Adolor Corporation (Ticker: ADLR) Q4 2008 Call, Feb. 25, 2009

Allen Seymour, Columbia Management: “Yes. My question has to do with kind of the receptiveness of the doctors to marketing and how you -- if you can characterize how with whether you have got some early adopters that are very excited about the drug or, you know, what is your experience in terms of reordering from -- from hospitals? Those things you might give us some insight as to sort of, if you will, the trajectory of the acceptance of the product.”

APPENDIX 2

Top 50 Investment Firms with Buy-Side Analysts on Conference Calls

Institutional Investment Firm	Number of Analysts	Number of Conference Calls
Lord Abbett	36	701
Kennedy Capital Management	25	289
Zimmer Lucas Partners	52	282
Millennium Partners	46	274
Neuberger Berman	61	217
Cobalt Capital Management	17	204
SAC Capital	56	189
Gates Capital Management	21	185
Omega Advisors	17	180
Capital Returns Management	2	178
Columbia Management Investment Advisors	43	175
Blackrock	34	173
Gagnon Securities	14	159
State of Wisconsin Investment Board	15	155
Bricoleur Capital Management	3	151
Wellington Management	46	150
Tieton Capital Management	3	143
Sage Asset Management	11	142
Heartland Advisors	13	139
T. Rowe Price	26	136
Duquesne Capital Management	12	133
Adage Capital Management	11	132
Arcadia Investment Management	3	129
Alliance Capital Management	30	121
Kalmar Investments	2	121
Sentinel Trust Company	7	121
Fenimore Asset Management	4	111
Davidson Investment Advisors	5	106
Talon Capital	8	105
Knott Capital Management	12	104
Kern Capital Management	4	98
Bank of New York	18	92
Priority Capital Management	8	92
Entrust Capital	5	87
NWQ Investment Management	4	81
Sigma Capital Management	32	80
Pilot Advisors	12	79
Wells Capital Management	15	79
Frontier Capital Management	7	77
Insight Capital Research and Management	5	77
JLF Asset Management	7	77
Westcliff Capital Management	3	77
Cardinal Capital Management	13	75
Franklin Advisory Services	4	75
Fidelity Investments	30	74
Gruber & McBaine Capital Management	7	73
Wynnefield Capital	5	73
Delphi Management	9	72
Rutabaga Capital	3	72
Boston Company	22	71

TABLE 1*Sample and Summary Statistics of Buy-Side Analyst Participation on Conference Calls***Panel A: Earnings Conference Calls by Year and Calendar Quarter and Unique Companies by Year**

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Total	Unique Companies
2002	-	536	1,010	1,229	2,775	1,472
2003	1,370	1,382	1,694	1,824	6,270	1,946
2004	1,864	1,822	1,910	1,957	7,553	2,141
2005	2,016	2,095	2,159	2,195	8,465	2,400
2006	2,202	2,214	2,355	2,361	9,132	2,635
2007	2,397	2,430	2,517	2,610	9,954	2,892
2008	2,695	2,736	2,757	2,741	10,929	3,088
2009	2,706	-	-	-	2,706	2,689
Total	15,250	13,215	14,402	14,917	57,784	3,418

Panel B: Percentage of Conference Calls with at Least One Participating Buy-Side Analyst

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Total
2002	-	22%	16%	24%	21%
2003	30%	30%	28%	28%	29%
2004	28%	25%	27%	26%	26%
2005	25%	25%	24%	27%	25%
2006	25%	23%	25%	23%	24%
2007	21%	19%	19%	22%	21%
2008	20%	18%	20%	18%	19%
2009	19%	-	-	-	19%
Total	23%	23%	23%	24%	23%

Panel C: Number of Buy-Side Analysts Participating per Conference Call

Number of Buy-Side Analysts	Conference Calls	Percent of Calls
0	44,452	76.9%
1	10,311	17.8%
2	2,387	4.1%
3	512	0.9%
4	91	0.2%
5	27	0.1%
6	3	0.0%
7	1	0.0%
Total	57,784	100.0%

TABLE 1—Continued**Panel D: Number of Companies that have had Buy-Side Analysts on their Conference Calls**

Calls with Buy-Side Participation	Number of Companies	Percent of Companies
0	807	23.6%
1	495	14.5%
2	388	11.4%
3	312	9.1%
4	254	7.4%
5	228	6.7%
6	204	6.0%
7	130	3.8%
8	140	4.1%
9	100	2.9%
10+	360	10.5%
Total	3,418	100.0%

Table 1 presents descriptive statistics of the sample of earnings conference calls used in this study. Panel A shows the number of conference calls by year and calendar quarter. Panel B shows the percentage of conference calls each year and calendar quarter that had buy-side analyst participation (i.e., asked a question) on the call. Panel C shows the number of conference calls with zero, one, or multiple buy-side analysts participating on the call. Panel D shows the number of companies that have had buy-side analysts ask questions on one or more calls during our sample period.

TABLE 2
Determinants of Buy-Side Analyst Participation on Conference Calls

Panel A: Descriptive statistics of variables used in the determinants regressions

Variable	N	Mean	Min	1st Quartile	Median	3rd Quartile	Max
<i>Number-of-BSA</i>	56,879	0.297	0.000	0.000	0.000	0.000	7.000
<i>Number-of-SSA</i>	56,879	1.839	0.000	1.386	1.946	2.485	3.401
<i>Number-of-SSA</i> (not logged)	56,879	7.523	0.000	3.000	6.00	11.000	29.000
<i>Dispersion</i>	56,879	0.040	0.000	0.011	0.026	0.040	0.432
<i>Number-of-II</i>	56,879	4.568	0.000	4.174	4.762	5.293	7.379
<i>Number-of-II</i> (not logged)	56,879	163.179	0.000	64.000	116.000	198.000	1,601.000
<i>Company-Size</i>	53,516	6.930	1.033	5.821	6.825	7.941	13.134
<i>Company-Size</i> (not logged)	53,516	4,939.240	2.088	337.420	920.911	2,809.240	505,713.220
<i>Company-Age</i>	56,579	4.930	1.368	4.407	4.997	5.534	6.917
<i>Company-Age</i> (not logged)	56,579	204.551	2.926	81.008	147.025	252.132	1,008.660
<i>Book-to-Market</i>	52,138	0.542	0.021	0.279	0.450	0.672	5.484
<i>Pos-Surprise</i>	56,879	0.499	-	-	-	-	-
<i>Neg-Surprise</i>	56,879	0.273	-	-	-	-	-
<i>Ret-Prior90days</i>	56,869	0.002	-0.589	-0.117	0.006	0.117	0.712
<i>Intraday</i>	56,879	0.526	-	-	-	-	-
<i>Concurrent-Calls</i>	56,879	0.889	0.000	0.000	0.693	1.609	3.466
<i>Concurrent-Calls</i> (not logged)	56,879	3.816	1.000	1.000	2.000	5.000	32.000
<i>Abs-Ret</i>	56,879	0.176	0.002	0.056	0.123	0.236	0.960

TABLE 2—Continued

Panel B: Differences in means and medians of variables partitioned by buy-side conference call participation

	<i>Number-of-BSA>0</i>			<i>Number-of-BSA=0</i>			Differences	
	N	Mean	Median	N	Mean	Median	Mean	Median
<i>Number-of-SSA</i>	13,126	1.694	1.792	43,753	1.883	1.946	−0.189 ***	−0.154 ***
<i>Number-of-SSA</i> (not logged)	13,126	6.229	5.000	43,753	7.911	6.000	−1.683 ***	−1.000 ***
<i>Dispersion</i>	13,126	0.044	0.033	43,753	0.039	0.024	0.006 ***	0.009 ***
<i>Number-of-II</i>	13,126	4.493	4.727	43,753	4.591	4.779	−0.098 ***	−0.052 ***
<i>Company-Size</i>	12,357	6.792	6.718	41,159	6.971	6.858	−0.178 ***	−0.140 ***
<i>Company-Age</i>	13,039	4.982	5.057	43,540	4.914	4.977	0.067 ***	0.080 ***
<i>Book-to-Market</i>	12,021	0.576	0.486	40,117	0.532	0.440	0.045 ***	0.045 ***
<i>Pos-Surprise</i>	13,126	0.474	0.000	43,753	0.507	1.000	−0.033 ***	−1.000 ***
<i>Neg-Surprise</i>	13,126	0.296	0.000	43,753	0.266	0.000	0.030 ***	0.000 ***
<i>Ret-Prior90days</i>	13,124	0.011	0.013	43,745	−0.001	0.004	0.012 ***	0.010 ***
<i>Intraday</i>	13,126	0.593	1.000	43,753	0.506	1.000	0.088 ***	0.000 ***
<i>Concurrent-Calls</i>	13,126	0.814	0.693	43,753	0.911	0.693	−0.096 ***	0.000 ***
<i>Abs-Ret</i>	13,126	0.175	0.123	43,753	0.177	0.123	−0.002	−0.001

TABLE 2—Continued

Panel C: Ordered logistic regressions with three ordinal levels on the dependent variable (0, 1, or 2+)

Dependent variable:	Pred. Sign	<i>Number-of-BSA</i>	
		(1)	(2)
<i>Number-of-SSA</i>	—	−0.307 *** (−8.96)	−0.329 *** (−7.79)
<i>Dispersion</i>	+	1.570 *** (5.82)	0.920 *** (3.72)
<i>Number-of-II</i>		0.028 (1.29)	0.018 (0.80)
<i>Company-Size</i>		−0.032 (−1.51)	0.065 * (1.63)
<i>Company-Age</i>		0.013 (0.54)	−0.076 (−1.04)
<i>Book-to-Market</i>		0.087 ** (2.19)	0.021 (0.44)
<i>Pos-Surprise</i>		0.093 ** (2.51)	0.024 (0.64)
<i>Neg-Surprise</i>		0.190 *** (4.72)	0.125 *** (3.07)
<i>Ret-Prior90days</i>		−0.042 (−0.70)	−0.133 ** (−1.99)
<i>Intraday</i>		0.145 *** (3.54)	0.177 *** (3.96)
<i>Concurrent-Calls</i>		−0.049 ** (−2.22)	−0.037 * (−1.80)
<i>Abs-Ret</i>		0.126 (1.60)	0.163 ** (1.95)
Quarter Fixed Effects		Included	Included
Industry Fixed Effects		Included	Not Incl.
Company Fixed Effects		Not Incl.	Included
N		51,963	51,963
Pseudo R ²		0.036	0.017

TABLE 2—Continued

*** Indicates in Panel B significance at the 0.01 level, using a two-tailed test (means) and a Wilcoxon signed-rank test (medians); *, **, and *** indicate in Panel C significance at the 0.10, 0.05, and 0.01 level, respectively, using a two-tailed test based on standard errors clustered by companies.

Table 2 presents results related to testing the determinants of buy-side analyst participation (i.e., asking a question) on earnings conference calls. Panel A shows descriptive statistics of the variables used. *Number-of-BSA* is number of buy-side analysts who asked a question on the conference call. *Number-of-SSA* is the natural log of one plus the number of sell-side analysts that issued any type of EPS forecast for a company during the period from the prior conference call to one day before the current conference call. *Dispersion* is the standard deviation of sell-side analysts' current quarter EPS forecasts published in the period from the prior conference call to the current conference call. *Number-of-II* is the natural log of one plus the number of institutional investors in the company, measured as of the calendar quarter ended prior to the conference call. *Company-Size* is the natural log of market value of equity (in \$ millions), measured as of the fiscal quarter ended prior to the conference call. *Company-Age* is the natural log of the number of months that a company has been listed in CRSP, measured as of the calendar quarter ended prior to the conference call. *Book-to-Market* is book value of equity divided by market value of equity, measured for the fiscal quarter ended prior to the conference call. *Pos-Surprise* is an indicator variable set to 1 (0 otherwise) if the actual reported quarterly EPS is greater than the sell-side analyst consensus mean EPS forecast. *Neg-Surprise* is an indicator variable set to 1 (0 otherwise) if the actual reported quarterly EPS is less than the sell-side analyst consensus mean EPS forecast. *Ret-Prior90days* is the stock return for the 90 calendar days before the conference call. *Intraday* is an indicator variable set to 1 (0 otherwise) if a conference calls starts between 9:30am and 3:45pm Eastern Time. *Concurrent-Calls* is the natural log of the number of conference calls for companies in the same industry that occur on the same day and start time. *Abs-Ret* is the absolute value of stock return for the 90 calendar days after the conference call.

Panel B shows tests for differences in mean and median values of the variables for companies with buy-side analysts on their conference calls and companies without buy-side analysts on their conference calls.

Panel C shows the results of ordered logistic regressions where the dependent variable, *Number-of-BSA*, is the number of buy-side analysts who asked a question on the conference call, grouped into three ordinal levels (0, 1, and 2 or more). Z-statistics are shown in parentheses below the coefficient estimates.

TABLE 3*Buy-Side Analyst Participation on Conference Calls and Institution-Level Changes in Quarterly Ownership***Panel A: Changes in quarterly institutional ownership conditional on buy-side analyst participation on conference calls**

	Total	% Increased Ownership	Change in Ownership Mean	Change in Ownership Median	% Decreased Ownership	Change in Ownership Mean	Change in Ownership Median	% No Change in Ownership
Owning institutions:								
with buy-side analyst on the call	7,696	45.2%	0.5%	0.5%	48.6%	-0.7%	-0.7%	6.2%
without buy-side analyst on the call	2,131,917	40.2%	0.2%	0.1%	49.7%	-0.2%	-0.1%	10.1%
Difference in differences			0.3%***	0.4%***		-0.5%***	-0.6%***	
Non-owning institutions:								
with buy-side analyst on the call	9,449	8.2%	1.2%	0.4%	-	-	-	91.8%
without buy-side analyst on the call	25,629,407	1.3%	0.3%	0.1%	-	-	-	98.7%
Difference in differences			0.9%***	0.3%***		-	-	

Panel B: Descriptive statistics of variables used in regressions of absolute changes in ownership by investment firms

Variable	N	Mean	Min	1st Quartile	Median	3rd Quartile	Max
<i>Abs-Chg-Ownership (%)</i>	27,778,640	0.017	0.000	0.000	0.000	0.000	3.080
<i>Participate-in-Call</i>	27,778,640	0.001	-	-	-	-	-
<i>BS-NumQ</i>	27,778,640	0.003	0.000	0.000	0.000	0.000	17.000
<i>Value-of-Holding</i>	27,778,562	1.146	0.000	0.000	0.000	0.000	23.513
<i>Value-of-Holding</i> (in \$mm, not logged)	27,778,562	2.468	0.000	0.000	0.000	0.000	16,283.000
<i>Inv-Firm-Size</i>	26,792,619	20.648	11.767	19.235	20.436	21.816	27.203
<i>Inv-Firm-Size</i> (in \$mm, not logged)	26,792,619	8,696	0.129	225.811	749.941	2,981.349	651,922.949
<i>Firms-in-Portfolio</i>	26,792,619	4.712	0.000	3.829	4.522	5.476	8.465
<i>Firms-in-Portfolio</i> (not logged)	26,792,619	303.024	1.000	46.000	92.000	239.000	4,746.000
<i>Abs-Ret-Prior90days</i>	27,700,644	0.165	0.000	0.054	0.119	0.226	0.777

TABLE 3—Continued

Panel C: Regression of absolute changes in ownership by investment firms

Dependent Variable:	Pred. Sign.	<i>Abs-Chg-Ownership</i>			
		(1)	(2)	(3)	(4)
<i>Participate-in-Call</i>	+	0.144 *** (10.23)	0.070 *** (3.03)	0.199 *** (8.52)	0.032 * (1.78)
<i>BS-NumQ</i>	+	0.011 ** (2.42)	0.007 * (1.72)	0.012 *** (2.91)	0.002 (0.70)
<i>Value-of-Holding</i>		0.013 *** (12.53)	0.013 *** (6.70)	−0.0003 (−0.39)	−0.004 *** (−24.03)
<i>Inv-Firm-Size</i>		0.004 ** (2.27)	0.004 *** (10.10)	0.080 *** (6.11)	0.060 *** (5.65)
<i>Firms-in-Portfolio</i>		−0.006 *** (−4.32)	−0.007 *** (−33.37)	−0.077 *** (−5.79)	−0.044 *** (−24.15)
<i>Abs-Ret-Prior90days</i>		0.021 *** (11.13)	0.004 *** (6.02)	0.246 *** (10.61)	0.041 *** (6.20)
Quarter Fixed Effects		Included	Included	Included	Included
Industry Fixed Effects		Included	Included	Included	Included
Investment Firm FEs		Included	Not Incl.	Included	Not Incl.
Inv. Firm-Company Pair FEs		Not Incl.	Included	Not Incl.	Included
N		26,717,774	26,717,774	2,315,048	2,315,048
R ²		0.169	0.354	0.185	0.496

*, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level, respectively, using a two-tailed test based on standard errors clustered by investment firms (columns 1 and 3) or investment firm-company-pair (columns 2 and 4).

Table 3 presents results related to examining buy-side analyst participation (i.e., asked a question) on earnings conference calls and changes in institutional ownership. Panel A presents changes in institutional ownership of a companies' shares outstanding conditional on buy-side analyst participation. Panel B shows descriptive statistics of the variables used in regression equation (3). *Abs-Chg-Ownership* is the absolute change in percentage ownership that an institution has in company in a given quarter. Percentage ownership is defined as the number of shares owned by the institution divided by total shares outstanding of the company. *Participate-in-Call* is an indicator variable set to 1 (0 otherwise) if an institution's buy-side analysts asked a question on the conference call. *BS-NumQ* is the number of questions asked by the buy-side analysts. *Value-of-Holding* is the natural log of the dollar value ownership that an institutional investment firm has in a company, measured as of the calendar quarter ended prior to the conference call. *Inv-Firm-Size* is the natural log of the total dollar value of all of an investment firm's portfolio shareholdings, measured as of the calendar quarter ended prior to the conference call. *Firms-in-Portfolio* is the natural log of the number of companies in an institutional investment firm's portfolio, measured as of the calendar quarter ended prior to the conference call. *Abs-Ret-Prior90days* is the absolute value of stock return for the 90 calendar days before the conference call. Panel C shows the results of a regression in which the dependent variable is *Abs-Chg-Ownership* on *Participate-in-Call*, *BS-NumQ*, and control variables. Columns (1) and (2) include the full sample of firm-company-quarters and columns (3) and (4) restrict the sample to firm-company-quarters in which *Abs-Chg-Ownership* is non-zero.

Table 4*Buy-Side Analyst Participation on Conference Calls and Company-Level Market Outcomes*

Panel A: Descriptive statistics of variables used in regressions of future absolute returns, absolute changes in share turnover, absolute changes in percentage institutional ownership, and absolute changes in short interest

Variable	N	Mean	Min	1st Quartile	Median	3rd Quartile	Max
<i>Abs-Ret</i>	56,879	0.176	0.002	0.056	0.123	0.236	0.960
<i>Abs-Chg-Turnover (%)</i>	56,869	0.262	0.000	0.058	0.145	0.327	1.664
<i>Abs-Chg-Inst-Own (%)</i>	56,879	3.498	0.000	0.678	2.180	4.831	19.173
<i>Abs-Chg-Short-Int (%)</i>	56,879	1.117	0.000	0.110	0.481	1.338	38.057
<i>Number-of-BSA</i>	56,879	0.297	0.000	0.000	0.000	0.000	7.000
<i>Abs-Surprise</i>	56,879	0.007	0.000	0.000	0.001	0.004	0.196
<i>Company-Size</i>	53,516	6.930	1.033	5.821	6.825	7.941	13.134
<i>Company-Size (not logged)</i>	53,516	4,939.330	2.808	337.418	920.928	2,809.630	505,713.220
<i>Book-to-Market</i>	52,138	0.542	0.021	0.279	0.450	0.672	5.484
<i>Ret-Prior11mo</i>	56,797	0.096	-0.790	-0.199	0.046	0.295	2.206
<i>NC-Analysts</i>	54,716	0.245	0.000	0.000	0.167	0.375	1.000
<i>Cov-Analysts-Absent</i>	51,553	0.288	0.000	0.000	0.167	0.400	2.000

TABLE 4—Continued

Panel B: Regressions of future absolute returns, absolute changes in share turnover, absolute changes in percentage institutional ownership, and absolute changes in short interest

Dependent Variable:	Pred. Sign.	<i>Abs-Ret</i> (1)	<i>Abs-Chg-Turnover</i> (2)	<i>Abs-Chg-Inst-Own</i> (3)	<i>Abs-Chg-Short-Int</i> (4)
<i>Number-of-BSA</i>	+	0.001 (0.59)	0.004 * (1.80)	0.122 *** (3.79)	0.072 *** (3.83)
<i>Abs-Surprise</i>		0.237 *** (4.52)	0.615 *** (6.45)	9.149 *** (8.04)	0.248 (0.57)
<i>Company-Size</i>		−0.028 *** (−44.78)	0.041 *** (35.54)	−0.340 *** (−24.61)	−0.121 *** (−15.14)
<i>Book-to-Market</i>		0.030 *** (9.60)	0.013 *** (2.69)	0.078 (1.24)	−0.103 *** (−3.71)
<i>Ret-Prior11mo</i>		0.007 *** (3.13)	0.019 *** (4.42)	0.361 *** (7.09)	0.176 *** (5.98)
<i>NC-Analysts</i>		−0.003 (−1.05)	0.001 (0.13)	−0.100 (−1.24)	−0.016 (−0.44)
<i>Cov-Analysts-Absent</i>		0.000 (−0.17)	−0.008 ** (−2.54)	0.029 (0.64)	−0.009 (−0.34)
<i>Abs-Ret_{t-1}</i>		−0.009 (−1.29)			
<i>Abs-Chg-Turnover_{t-1}</i>			0.206 *** (27.56)		
<i>Abs-Chg-Inst-Own_{t-1}</i>				0.077 *** (11.93)	
<i>Abs-Chg-Short-Int_{t-1}</i>					0.045 *** (4.40)
<i>Inverse-Mills</i>		−0.284 *** (−58.91)	−0.235 *** (−25.46)	−1.875 *** (−16.23)	0.327 *** (−5.10)
Quarter Fixed Effects		Included	Included	Included	Included
Company Fixed Effects		Included	Included	Included	Included
N		48,957	48,953	48,957	48,957
R ²		0.360	0.343	0.241	0.249

TABLE 4—Continued

*, **, and *** indicate significance at the 0.10, 0.05, and 0.01 level, respectively, using a two-tailed test based on standard errors clustered by companies.

Table 4 presents results related to examining buy-side analyst participation (i.e., asked a question) on earnings conference calls and changes in company-level market outcomes. Panel A shows descriptive statistics of the variables used in the regressions. *Abs-Ret* is the absolute value of stock return for the 90 calendar days after the conference call. *Abs-Chg-Turnover* is the absolute value of the change in the average percentage (in %) share turnover from 90 days before the conference call to 90 days after the conference call. *Abs-Chg-Inst-Own* is the absolute value of the change in the total percentage institutional ownership (in %), measured from the calendar quarter ended prior to the conference call to the calendar quarter ended after the conference call. *Abs-Chg-Inst-Own* excludes the institutions with buy-side analysts on the call. *Abs-Chg-Short-Int* is the absolute value of the change in the short interest of the company as a percentage (in %) of total shares outstanding, measured from the month before the conference call to the month after the conference call. *Number-of-BSA* is the number of buy-side analysts who asked a question on the conference call. *Abs-Surprise* is the absolute value of actual reported quarterly EPS minus sell-side analyst consensus mean EPS forecast. *Company-Size* is the natural log of market value of equity (in \$ millions), measured as of the fiscal quarter ended prior to the conference call. *Ret-Prior11mo* is the stock return for the 90 calendar days before the conference call. *NC-Analysts* is the number of non-covering analysts who participated on the conference call, scaled by the total number of sell-side analysts on the conference call. *Cov-Analysts-Absent* is the number of covering sell-side analysts that participated on the prior conference call but did not participate on the current conference call, scaled by the total number of sell-side analysts on the conference call. *Abs-Ret_{t-1}* is the one-quarter lag of *Abs-Ret*. *Abs-Chg-Turnover_{t-1}* is the one-quarter lag of *Abs-Chg-Turnover*. *Abs-Chg-Inst-Own_{t-1}* is the one-quarter lag of *Abs-Chg-Inst-Own*. *Abs-Chg-Short-Int_{t-1}* is the one-quarter lag of *Abs-Chg-Short-Int*. Panel B show results of panel regressions of *Abs-Ret*, *Abs-Chg-Turnover*, *Abs-Chg-Inst-Own*, and *Abs-Chg-Short-Int*. Standard errors are clustered by companies and t-statistics are shown in parentheses below the coefficient estimates.

TABLE 5
Characteristics of Questions by Buy-Side and Sell-Side Analysts

Characteristics of questions by buy-side and sell-side analysts

	Total	Number of Dialogues		Length (Words per Dialogue)		Tone	
		Mean	Median	Mean	Median	Mean	Median
Buy-side analysts	17,128	5.55	5.00	33.72	28.63	0.084	0.078
Sell-side analysts	364,087	5.14	5.00	38.14	32.67	0.085	0.080
Difference		0.41 ***	0.00 ***	−4.42 ***	−4.04 ***	−0.001	−0.002 **
CEO response to buy-side analysts	12,532			55.26	40.11	0.085	0.075
CEO response to sell-side analysts	280,112			65.50	48.60	0.083	0.076
Difference				−10.24 ***	−8.49 ***	0.002 ***	−0.001 ***
CFO response to buy-side analysts	9,410			32.35	22.80	0.067	0.060
CFO response to sell-side analysts	208,996			37.94	25.40	0.066	0.060
Difference				−5.59 ***	−2.60 ***	0.001	0.000

*** Indicates in Panel B significance at the 0.01 level, using a two-tailed test (means) and a Wilcoxon signed-rank test (medians).

Table 5 presents characteristics of questions asked by buy-side analysts and compared with those for sell-side analysts. Number of dialogues is the number of back-and-forth dialogues between each analyst and management, which is a proxy for the number of questions asked by each type of analyst. Question length is the total number of words spoken by an analyst scaled by the number of dialogues. Tone is the number of positive words minus negative words, as categorized the Harvard IV-4 dictionary, scaled by the total number of words spoken.

TABLE 6*Buy-Side Analyst Participation on Conference Calls and Institution-Level Changes in Quarterly Ownership Subsample Analysis*

Changes in quarterly institutional ownership conditional on buy-side analyst participation on conference calls that took place within three weeks of the beginning of a calendar quarter

	Total	% Increased Ownership	Change in Ownership Mean	Change in Ownership Median	% Decreased Ownership	Change in Ownership Mean	Change in Ownership Median	% No Change in Ownership
Owning institutions:								
with buy-side analyst on the call	1,398	46.0%	0.5%	0.5%	49.4%	−0.6%	−0.5%	4.6%
without buy-side analyst on the call	452,270	40.7%	0.1%	0.0%	49.6%	−0.2%	−0.1%	9.6%
Difference in differences			0.4%***	0.5%***		−0.4%***	−0.5%***	
Non-owning institutions:								
with buy-side analyst on the call	1,456	6.9%	0.9%	0.3%	-	-	-	93.1%
without buy-side analyst on the call	3,995,199	1.6%	0.2%	0.0%	-	-	-	98.4%
Difference in differences			0.7%***	0.3%***		-	-	

Table 6 presents results related to examining buy-side analyst participation (i.e., asked a question) on earnings conference calls and changes in institutional ownership. The results are comparable to those shown in Table 3 Panel A except that the sample is limited to conference calls that take place within three weeks of the beginning of a calendar quarter. Changes in ownership refer to changes in the percentage of a company's total shares outstanding that are held by an institution.