The effect of industry co-location on analysts' information acquisition costs

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ABSTRACT: We examine how the co-location of firms in the same industry affects analysts' cost of gathering and processing information. Prior research finds evidence consistent with firms being more knowledgeable about other firms in the same geographical area. We argue that this improved knowledge base affects the information set of financial analysts. Consistent with this conjecture, we find that when the firms in an analyst's portfolio are located farther away from other firms in the same industry, the analyst's portfolio size is smaller and the average accuracy, timeliness, and frequency of their forecast revisions are lower. We further find that the additional costs that analysts incur to follow distant firms are amplified when earnings are more difficult to forecast. Lastly, we provide some evidence that managers communicate their knowledge about other firms in the same geographic area to analysts and investors. Specifically, managers are more likely to reference firms in their industry that are geographically closer during conference calls. This paper provides additional evidence that the co-location of firms in the same industry not only affects operating and strategic decisions (as documented in the existing literature) but also analysts' costs of gathering and analyzing information about the firm.

Keywords: Geographic Location; Voluntary Disclosure; Security Analysts

JEL Classification: D83; M40; M41; R10; R12

I. INTRODUCTION

The co-location of firms in the same geographic area can affect the firm's operations, strategy, and information environment. Marshall (1920) suggests that co-locating near other firms in the same industry results in several positive externalities, such as knowledge spillovers that facilitate innovation and growth, specialized labor forces, and reduced costs from obtaining inputs or shipping products to customers. The prior research suggests that these positive externalities increase managers' knowledge and awareness of other firms in the same geographic area (e.g., Lovely et al., 2005; Audretsch and Feldman, 1996). We add to this literature on co-location by exploring its effects on the information environment. Specifically, we examine the impact of co-location on the information gathering and processing costs of an important information intermediary, financial analysts.

We predict that analysts' information acquisition and processing costs decrease when the firm is geographically closer to other firms in the industry for three reasons. First, the managers' increased knowledge of other firms in their geographical area, if communicated to analysts, is likely to improve analysts' information sets. The prior research provides evidence consistent with executives and employees being more knowledgeable about other firms in the same geographic area (Jaffe et al., 1993). Second, analysts are more likely to visit firms that are located in close proximity to other firms in the industry, which likely provides informational benefits by allowing analysts 1) to speak informally with managers as well as with lower level employees and 2) to quickly and effectively compare the operations and facilities of the firms in the same geographic area. Third, local media outlets are more likely to compare and contrast local firms (i.e., firms in the same geographic area), reducing the analysts' costs of performing similar analyses.

We conduct several tests to examine analysts' costs of following firms that are located geographically farther away from other firms in the industry.[1] Our analyses are conducted at the analyst

[1] While a firm's choice of location is not exogenously determined, we do not believe that effects on analysts' costs play a first-order role in management's decision on where to locate. Thus, we do not believe that reverse causality is a plausible alternative

portfolio level (i.e., based on analyst-year observations), under the assumption that constraints on an analyst's time would require the analyst to cover fewer firms as the information acquisition and processing costs of covering the firms in their portfolio increase, otherwise the quality of their output would suffer. We first examine whether analysts follow fewer firms when the average distance between the firms in the analyst's portfolio and other firms in the same industry increases. Consistent with expectations, we find that analysts have fewer firms in their portfolios when analysts follow firms that are farther away from other industry firms.

We then examine whether the quality of the analysts' output deteriorates when the firms in their portfolios are farther away from other firms in the industry. We analyze three measures of analyst output: forecast accuracy, forecast timeliness (i.e., how quickly they revise their forecasts following an earnings announcement), and forecast revision frequency. If the distance between the firms in the analyst's portfolio and other industry firms increases the costs incurred to gather and process information, then we expect analyst forecast accuracy, timeliness, and revision frequency to deteriorate as this distance increases. Consistent with our expectations, we find that the average forecast accuracy, timeliness, and revision frequency for firms in the analysts' portfolios declines as the average distance of the firms in the analysts' portfolios increases.

We also examine when the geographical spacing of the firms in the analyst's portfolio has a greater influence on the number of firms followed by the analyst, analyst forecast accuracy, the timeliness of analyst revisions, and the number of analyst forecast revisions. We expect the additional costs that analysts incur to gather and process information about firms located farther away from other firms in the same industry to be less relevant when earnings are relatively easy to forecast, as the analysts' need for additional information from other information sources (e.g., managers and employees) is reduced. Consistent with expectations, we find that forecasting difficulty magnifies the relation between co-

explanation. It is possible that a third factor affects both the decision to locate outside an industry cluster as well as analyst costs (i.e., a possible correlated omitted variable problem). As we discuss in Section III, we believe our research design (based on an analyst-year specification), the inclusion of numerous control variables, and our cross-sectional analyses, reduce the likelihood that our results are driven by a correlated omitted variable.

location and analyst portfolio size, accuracy, revision timeliness, and number of revisions. These results suggest that forecasting difficulty exacerbates the need for analysts to acquire and analyze additional information about the firms they cover, and that the cost of acquiring this information is higher for firms that are geographically distant from other firms in the same industry.

Importantly, these results hold after controlling for important firm-specific and analyst-specific characteristics, which affect analysts' costs and benefits of acquiring information. Some of the firm-specific characteristics included as control variables are firm size, growth, institutional ownership, performance, share turnover, volatility, and business concentration. Some of the analyst-specific characteristics included as control variables are the analyst's general experience, the analysts' firm-specific experience, the distance between the analyst and the followed firms, the number of industries followed by the analyst, and the size of the brokerage house that employs the analyst. We also control for the co-movement of earnings, as Engelberg et al. (2013) argue that the geographical clustering of firms within an industry leads to greater co-movement of fundamentals. Lastly, we include year fixed effects, analyst fixed effects, and industry fixed effects.

In additional robustness tests, we examine whether analysts are more likely to drop (add) coverage of firms that relocate farther away from (closer to) other industry firms, providing additional support that the geographic location of the firm (relative to other industry firms) affects the costs that analysts bear in gathering and processing information. We identify 216 firm-year observations in which the firm relocates to a geographical area more than 100 miles away than the previous location. We find evidence consistent with analysts being more likely to drop (add) coverage when a firm moves to a location farther away from (closer to) other firms in the industry, providing additional evidence that the location of the firm can affect analysts' information acquisition and processing costs.

Lastly, we provide some evidence to support our conjecture that managers communicate a portion of their information about other firms in the same geographic area to analysts and other market participants. Specifically, we examine the extent to which managers reference other firms during their conference calls. We provide evidence that the probability of a manager mentioning a firm in the same industry during a conference call decreases as the geographic distance between the two firms increases. While there are other possible reasons managers mention firms in their geographical area, these results are at least suggestive of managers having greater knowledge of these firms and communicating this information to investors and analysts.

Our study contributes to both the analyst literature as well as the literature on firm geography. Beyer et al. (2010) suggests that more research is needed to understand why firms are added to analyst portfolios and what firm characteristics affect this decision. We directly add to the analyst literature by providing evidence that the firm's location can affect analyst information acquisition and processing costs, thereby affecting the size of the analyst's portfolio as well as the accuracy, timeliness, and frequency of his/her forecast revisions. We also provide evidence that the additional analyst costs associated with locating farther away from other firms in the industry are primarily driven by firms with earnings that are more difficult to forecast. This evidence is important to investors and managers in understanding the costs that analysts incur to follow firms.

We also contribute to the growing literature on the firm's geographical location by examining the effects of a firm's location *relative to other firms in its industry*. Prior studies have examined how an analyst's geographical location relative to the firm impacts the analyst's forecasting behavior (e.g., Orpurt, 2004; Malloy, 2005; Bae et al., 2008). In addition, Loughran and Schultz (2005) find that fewer analysts follow firms located in rural areas, which are unlikely to be areas of high analyst concentration. We believe that we make an important contribution to the literature by documenting how the *firm's relative location to other firms in the industry* affects the costs that analysts incur to follow these firms.

Engelberg et al. (2013) also examine the effects of a firm's location relative to other firms in their industry. They demonstrate greater co-movement in fundamentals among firms in the same industry and geographical cluster, leading to higher analyst following for firms in these industry clusters. Our study takes an analyst perspective, focusing specifically on the effects of distance on the costs of acquiring and processing information about the firm. Because firms might differ in terms of their non-informational benefits to coverage (e.g., differences in trading commissions), the relation between a firm's location, relative to other industry firms and its analyst following could be influenced by either higher non-informational benefits or lower information acquisition and processing costs. Thus, the finding in Engelberg et al. (2013) is possibly due to differences in these non-informational benefits. In contrast, because our study examines associations at the analyst portfolio level, we believe we provide more direct tests of the effect of firm distance on analysts' information acquisition costs (relative to a firm-level regression).[2] In addition, we explicitly control for the co-movement of fundamentals in our empirical tests and find that co-movement in fundamentals is not the sole mechanism by which analysts' information acquisition costs are impacted by geographical clustering. Rather, we posit that managers have more information about geographically closer firms in the industry and that they communicate this information to analysts, improving the information set of analysts. The evidence based on our analysis of management's communication with analysts during conference calls supports our theory. Understanding how the firms' location can influence the firm's information environment is likely of importance to managers, investors, and other market participants.

The rest of the paper is organized as follows. In Section 2, we discuss the prior literature and develop our hypotheses. In Section 3, we outline the empirical models, describe the sample and discuss the results of the tests of our hypotheses. In Section 4, we examine the effect of co-location on managers' communications with analysts. In Section 5, we conduct several robustness tests. We conclude this study in Section 6.

II. THEORY AND HYPOTHESIS DEVELOPMENT

Co-location

Marshall (1920) identifies three positive externalities that arise from the co-location of firms within the same industry. First, the localization of an industry creates a demand for specialized labor.

[2] Ultimately, while the benefits to covering certain firms (and covering them well) might be higher, unless the costs of acquiring and processing information about the firms are lower, an analyst will not be able to cover more firms or cover them effectively (with greater accuracy, timeliness, and frequency). The non-informational benefits might influence which firms within a set receive the analysts' attention but are unlikely to determine the size of the set or the overall quality of the coverage within the set.

Second, the geographic clustering of firms in an industry likely reduces the costs of obtaining inputs from suppliers and shipping goods to customers. Third, the geographic clustering of firms within an industry allows for knowledge spillovers that facilitate innovation and growth among firms in the industry. These positive externalities likely improve managers' knowledge of other firms in the same industry and geographical area. For example, the demand for specialized labor can result in a shared labor pool and employees moving between companies in the same industry. Prior research supports the notion that managers are more knowledgeable of firms in close geographic proximity. For example, Jaffe et al. (1993) find evidence that patent citations are attenuated when moving farther away from the original patent location. Prior research also provides evidence that firms co-locate when the benefits to knowledge sharing are greater. For example, Lovely et al. (2005) find evidence that firms dealing in high levels of foreign market exports tend to co-locate in the same geographic location, especially when foreign market information is difficult to obtain. Audretsch and Feldman (1996) find that more research and development intensive firms are more likely to co-locate in similar geographic areas.

The idea that firms in the same industry, particularly competitors, would willingly share information with each other might seem implausible. However, Stein (2008) provides a theoretical framework for information spillovers among competitors. He argues that firms mutually benefit from conversations with their competitors and analytically shows that honest knowledge sharing can occur between firms even if the firms are in competition, as long as there are complementarities in idea production – that is, firms build on and refine an idea when exchanging information.[3] Moreover, knowledge sharing can occur not only with competitors but also with other firms in a firm's supply chain – i.e., customers and suppliers.

[3] Despite the benefits, not all firms choose to locate in close proximity to their competitors, suggesting additional costs or reduced benefits to being located in an industry cluster. Shaver and Flyer (2000) argue that the costs of contributing to the industry cluster outweigh the benefits of being part of the cluster for firms with the best technologies, training programs, suppliers, or distributors. As a result, these firms are more likely to locate outside the industry cluster because they are less likely to benefit from knowledge spillovers, a specialized labor force, and reduced transportation costs. Alcacer (2006) provides evidence consistent with more-capable firms co-locating less often than less-capable firms in the cellular handset industry. Close geographic locations can also increase competition in some industries. Baum and Haveman (1997) argue that hoteliers in Manhattan locate close to each other when they are similar on one product dimension but different on other dimensions to avoid local competition.

Analyst Behavior

We consider how the co-location of firms within an industry affects the information acquisition and processing costs of an important group of information intermediaries, financial analysts. Investors use analyst research (e.g., earnings forecasts, stock recommendations, target prices, and other qualitative and quantitative analyses) to help establish earnings expectations and aid in the price discovery process (e.g., Brown and Rozeff, 1978; Givoly and Lakonishok, 1979; Brown et al, 1987; Fried and Givoly, 1982; Asquith et al., 2005; Frankel et al., 2006). Therefore, understanding the factors that impact the quality of analyst output is important.

Analysts gather data from many sources including firm disclosures, industry publications, market trends, and informal communication with the firm's employees. We anticipate that the geographic location of the firm relative to other firms in the industry reduces analysts' costs of obtaining and analyzing useful and relevant information in three ways. First, as discussed above, executives and employees likely know more about other firms in the same geographic area. To the extent managers communicate this information to analysts (as hypothesized above) and this information is useful to analysts, following firms located in close proximity to other firms in the industry will improve the analysts' information set. For example, managers or employees may use other firms as a benchmark or reference point when talking about their firm. Managers can communicate this information to analysts publicly (e.g., during a firm-sponsored conference call) as well as privately (e.g., during a site visit or a one-on-one phone call). While management cannot privately disclose material information that is not also disclosed to the public (due to Regulation Fair Disclosure), analysts can ask clarifying and follow-up questions about the firm's current or future operations to improve the information content of their recommendations or the accuracy of their forecasts.[4]

[4] As an example, in a recent conference call held by Herbalife (January 10, 2013), management openly invited analysts and other interested market participants to call management and visit the production facilities to obtain clarification on the firm's business model. In addition, Green et al. (2012) provide evidence that analysts who interact with corporate managers at broker-hosted conferences have more informative stock recommendations, and this persists in the post Reg FD era.

Second, when firms in the same industry are located in close proximity to one another, analysts may be more likely to visit these firms and more likely to visit multiple firms in quick succession. While out-of pocket transportation costs are admittedly trivial for most brokerage houses, time constraints are likely real and, at the margin, could affect an analysts' propensity to make a site visit. Physically visiting a firm's location likely provides additional informational benefits because it allows the analyst to talk with managers informally and also allows them to speak with lower level employees.[5] In addition, visiting multiple locations in quick succession likely enables analysts to more efficiently compare and contrast the operations of those firms and their conversations with management and other employees, potentially allowing them to identify subtle differences in the firms' operations.

Finally, local information sources (e.g., local newspapers) may reduce analysts' costs of gathering and analyzing data about related firms located in the same geographical location. Local information sources are more likely to compare and contrast the operations and performance of related firms in their geographical area, reducing the amount of data gathering and analysis performed by the analyst.

Based on the above, we predict that the costs of gathering and processing information about a firm are significantly higher for firms that are geographically more distant from other firms in the same industry. We formally state our first hypothesis in alternative form below.

H1 - ***Analysts incur greater information acquisition and processing costs to follow firms that are geographically farther away from other firms in the same industry.***

To the extent managers are unwilling to share information about other firms in the same geographical area, site visits are ineffective, and the local information sources are uninformative, the geographic distance of the firm to other firms in the same industry may not affect the information acquisition costs of following a firm. It is possible that the vast majority of analysts' information is gathered through other channels such as mandatory disclosure, industry publications, and other industry

[5] As evidence of the information advantage of visiting a firm's physical location, Malloy (2005) finds that individual analysts who are located closer to firms (presumably allowing them to visit the physical location more frequently) are relatively more accurate than other analysts following the firm.

and firm specific data sources. Also, if firms operating farther away from other firms in the same industry have earnings that are easier for analysts to forecast, this could offset the increased costs and reduced benefits from being located farther away. As a result, we examine how forecasting difficulty affects the relation between the firms' geographical spacing and analysts' costs. We expect earnings that are easier to forecast to at least partially offset the higher costs associated with following firms that are geographically farther away from other firms in the same industry. Our formal hypothesis stated in alternative form is:

H2 - ***Analysts' information acquisition costs of following firms that are geographically farther away from other firms in the same industry increase with forecasting difficulty.***

III. EMPIRICAL ANALYSIS

Sample Selection

We obtain our sample from the universe of U.S. firms with data from Compustat, CRSP, and IBES between 1994 and 2011.[6] We require at least 20 observations per year for each Global Industry Classification Standard (GICS) code to ensure that firms have the opportunity to locate near other firms in the same industry.[7] We also require there to be sufficient data to calculate the dependent and independent variables in our regression analyses.

Our primary analyses are conducted at the analyst-year level.[8] We assume that any individual analyst's time is constrained (to the number of hours in a day); thus, an analyst's ability to effectively cover the firms in his/her portfolio is more likely to manifest at the portfolio level. Thus, when the analyst's portfolio is comprised of firms located farther away from other industry firms, we expect the

[6] We choose 1994 as the initial start date of our sample because we collect address information from company reports issued to the SEC which are readily available online through EDGAR beginning in 1994.

[7] Our results are robust to requiring 10, 30, or 50 firms per industry. Also, we define industry based on the GICS industry code classification because Bhojraj, et al (2003) provide evidence that GICS codes best capture stock return co-movement within each industry relative to SIC codes and NAICS codes. In Section 5, we perform robustness tests using an alternative measure of industry based on Hoberg and Phillips (2010), which uses textual analysis to identify firms with similar product descriptions in mandatory SEC disclosures.

[8] An alternative specification would be to conduct the analysis at the firm-analyst-year level. However, such a specification would not allow us to analyze the effect of geographical spacing on the size of an analysts' portfolio. Moreover, it is possible an analyst compensates for the higher information acquisition costs of covering a geographically distant firm by spending less time covering another firm in their portfolio. The analyst might make this trade-off if the geographically distant firm is an especially important firm to the analyst's clientele (i.e., because of non-informational benefits). Thus, the effect of geographical location is likely to manifest most notably at the analyst's portfolio level.

analyst to have a smaller portfolio size, lower average forecast accuracy, less timely forecast revisions, and fewer forecast revisions per firm. An analyst-year "portfolio-level" design is distinct from a firm-year level design because it more specifically controls for analysts' non-informational benefits of covering certain firms (e.g., firms that generate higher trading commissions). At the firm-level, analysts may choose to cover firms with higher non-informational benefits, which affects firm-level analyst following, accuracy, and timeliness. These non-informational benefits, if correlated with the distance between the firm and other industry firms, can represent correlated omitted variables in a firm-year level research design. However, at the analyst-portfolio level, these non-informational benefits might influence which firms within the portfolio receive the analyst's attention but are unlikely to significantly influence the size of the portfolio or the overall quality of the coverage within the portfolio. Rather, the size of the portfolio and the quality of the coverage for firms in the portfolio will be a function of the aggregate costs of acquiring and processing information about the firms in the portfolio. This design implicitly assumes that analysts have similar capacities and that they maximize this capacity. It is possible that analysts vary in their capacity to cover firms effectively (e.g., because they are smarter, more experienced, or have greater access to support staff or technology). We address this possibility by including numerous analyst-related control variables, which are more fully described below. All variables are also defined in Appendix A.

Location Measures

Following prior research, we use the firm's headquarters as a proxy for its location.[9] We collect the addresses of firms' headquarters from reports filed with the SEC for each firm-year.[10] When missing, we use the addresses provided by Compustat. We measure the distance of a firm relative to all other firms

[9] Several finance and management papers use the firm's headquarters as its location such as Coval and Moskowitz (1999), Zhu (2002), Ivkovic and Weisbenner (2005), Loughran and Schultz (2004 and 2005), Malloy (2005) and Chhaochharia, Kumar, and Niessen-Ruenzi (2012). We use the headquarters location rather than the state of incorporation because firms tend to incorporate in states with favorable tax and bankruptcy laws and often do not incorporate in the state of their primary operations (Coval and Moskowitz 1999). The headquarters is likely close to the firm's principal operations and is also where top management operates. For these reasons, information transfers are most likely to occur in the geographic area of the firm's headquarters. However, to the extent a firm operates in multiple geographic locations, information spillovers may occur in areas outside the firm's headquarters.

[10] Compustat provides the most recent address of the firm. However, because our sample period covers such a long time span, we manually collect the address of the firm's headquarters as of each reporting date. The address is found in the firms' annual report and is potentially different than the business and mailing addresses provided in the header of each filing. We identify the headquarters as the address the company specifically specifies as its "principal executive offices."

in its industry using the universe of firms for which we have location data, regardless of the availability of data to estimate our regression analyses. We calculate two variables to estimate the distance of a firm to other firms within its industry. First, we measure the average distance (in miles) between the firm's headquarters and the headquarters of the 10 closest firms within the industry (GICS code) for firm *i* in year *t*, which we label as the $DIST\ 10_{i,t}$ variable.[11] Second, we calculate the number of firms in the industry located within 100 miles of firm *i* in year *t*, which we label as the $\#\ FIRMS\ 100_{i,t}$ variable.[12,13] After calculating the firm specific distance measures, we then aggregate the firm distance measures by analyst portfolio and year. The $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable is equal to the average $DIST\ 10_{i,t}$ ($\#\ FIRMS\ 100_{i,t}$) variable for all firms that analyst *a* follows in year *t*. We provide descriptive statistics for the $DIST\ 10_{a,t}$ and $\#\ FIRMS\ 100_{a,t}$ variable in Table 1. The mean of the $DIST\ 10_{a,t}$ variable is equal to 113.4, suggesting that the average analyst portfolio includes firms whose average distance to the 10 closest firms in its industry is 113.4 miles. The mean of the $\#FIRMS\ 100_{a,t}$ variable is equal to 19.55, suggesting that the average analyst portfolio includes firms that have, on average, 19.55 firms in their industry that are located within 100 miles.[14] When examining how the relative location of the firm affects analysts' costs of gathering and processing information, we further transform the distance variables with the following steps. We first multiply $\#\ FIRMS\ 100_{a,t}$ by negative one so that $DIST\ 10_{a,t}$ and $\#\ FIRMS\ 100_{a,t}$ are both increasing in the distance between the firm and other firms within the same industry. We then standardize the distance measures to take values between 0 and 1 by placing them in deciles from 0 to 9 and dividing by 9.

[11] Chhaochharia et al. (2012) use similar methods to measure the distance of the firm to institutional investors.

[12] We choose to define our distance measures using the number rather than the percentage of firms in the industry located near the firm's headquarters because we believe the potential for information spillovers increases with the number of firms located nearby, regardless of the number of other firms in the industry that are not located nearby. For example, suppose Firm A has 5 firms located nearby and 20 firms in its industry while Firm B has 25 firms located nearby and 100 firms in its industry. An industry concentration measure would indicate that 25 percent of firms are located nearby for both firms. However, firm B has greater potential for information spillovers given the greater number of firms located nearby. For this reason, we use the number rather than the percentage of firms located nearby in our main analysis. As a robustness test, we also examine distance measures using the percentage of firms within an industry that are located nearby. See section 5 for additional detail.

[13] As an additional robustness test, we perform all analyses using the mean distance between the firm and the 5 closest firms in its industry and the number of firms located within 50 miles and find qualitatively similar results for all tests (untabulated).

[14] In untabulated results we examine which industries are more and less likely to have firms that co-locate in the same geographical area. We find that the software and biotechnology industry are two of the most concentrated industries. We also find that the air-freight and construction materials industries are two of the three most distant industries.

Measures for Analyst Gathering and Processing Costs

We use several measures to examine whether analysts' costs to gather and process information increase when the firms in their portfolios are farther away from other firms in the industry. Our first measure for analyst gathering and processing costs is the number of firms included in the analyst's portfolio in year *t*, which we label *# FIRMS* $FOLL_{a,t}$. Given constraints on analysts' time, the more difficult it is to gather and process information on the firms in their portfolio, the fewer firms the analyst is likely to cover, *ceteris paribus*. In Table 1, the mean (median) value for the *# FIRMS* $FOLL_{a,t}$ variable is equal to 12.82 (12), suggesting that the average analyst in our sample follows approximately 12 to 13 firms per year.

Our second measure is analyst forecast accuracy ($ACCURACY_{a,t}$), which is equal to the average quarterly forecast accuracy for each firm followed by analyst *a* during year *t*. If, as we hypothesize, the firms' proximity to other firms in the industry increases analysts' information sets, analysts' average forecast accuracy should improve when the firms in their portfolios are less distant. We define each firm's forecast accuracy as the absolute value of the difference between the firm's actual quarterly EPS (earnings per share) and analyst *a*'s latest forecasted EPS for the firm scaled by share price at the beginning of the quarter, removing stale forecasts made more than 90 days prior to the earnings announcement. We multiply the accuracy variable by -1 so that the $ACCURACY_{a,t}$ variable is increasing as the forecast accuracy improves. We note that the average $ACCURACY_{a,t}$ variable is equal to -0.39.

Our third measure for analysts' costs of gathering and processing information is the timeliness of analyst revisions. Similar to Zhang (2008), we assume that higher information acquisition and processing costs result in longer delays in issuing forecasts following important news events such as earnings announcements. The *QUICK* $REV_{a,t}$ variable is equal to the percentage of firms in the analyst's portfolio for which analyst *a* updates his or her quarterly forecast within two days following each firm's quarterly earnings announcement. The mean (median) *QUICK* $REV_{a,t}$ variable of 0.30 (0.25) suggests that the average (median) analyst revises approximately 30% (25%) of his/her forecasts within two days following the firms' earnings announcements.

Our fourth measure is the number of analyst forecast revisions per firm. We assume that higher information acquisition and processing costs result in fewer forecast revisions per firm. We compute the number of forecast revisions per firm by counting the number of forecasts issued by the analyst (for any fiscal period end date) during each calendar quarter and dividing by the number of firms followed by the analyst in each quarter. We then compute the # $REV_{a,t}$ variable as the average number of forecast revisions per firm over the four calendar quarters. The mean (median) of the # $REV_{a,t}$ variable is equal to 5.87 (5.31), suggesting that the average (median) analyst produces approximately 5.87 (5.31) forecast revisions per quarter for each firm included in his/her portfolio.

Control Variables

We also include several control variables that could be associated with the relative location of the firms included in the analyst's portfolio and the costs that analysts incur to gather and process information. As discussed previously, because analysts may differ in their capacity to effectively cover firms in their portfolio, we include several variables related to the analyst (e.g., experience). Precise variable definitions are provided in Appendix A. Descriptive statistics are reported in Table 1. The analyst-related variables included in our analysis are:

- $DIST\ TO\ FIRM_{a,t}$: the average distance between the analyst and the firms in the analyst's portfolio. $DIST\ TO\ FIRM_{a,t}$ captures the informational benefits of the analyst's geographic proximity to the firm (Malloy 2005).[15] The average (median) analyst follows firms that are 1,310 (1,024) miles away from the analyst's location. This long distance is likely driven by the fact that most brokerage houses are primarily located in New York City and San Francisco (Malloy, 2005).

[15] Because analyst location data is currently unavailable, we estimate the analyst's location using the following procedure. We start by identifying all of the branch locations of the brokerage house that employs analyst *a* by searching brokerage house websites and, where unavailable, searching Internet sites such as investing.businessweek.com, which often provides the brokerage house branch locations. We then assign analyst *a* to the brokerage house branch location with the lowest average distance between the branch location and the firms' in the analyst's portfolio. The $DIST\ TO\ FIRM_{a,t}$ variable is equal to the average distance between the analyst's assigned brokerage house location and each firm's headquarters in the analyst's portfolio. To validate our proxy for analyst location, we replicate Malloy (2005) and find similar results to those reported in his paper. Specifically, we find that relative forecast accuracy is decreasing in the distance between the analyst and the firm using our measure of analyst location.

- *HORIZON*$_{a,t}$: the average horizon of the forecasts made for the firms followed by the analyst. *HORIZON*$_{a,t}$ controls for differences in the information available to analysts at the time of their forecasts. The mean (median) *HORIZON*$_{a,t}$ is 52 days, indicating that the average forecast is made 52 days prior to the earnings announcement.
- *EXP*$_{a,t}$: the overall experience of the analyst. *EXP*$_{a,t}$ helps control for differences in analysts' ability that accrues with experience. The average *EXP*$_{a,t}$ is 2,099 days, suggesting that the average analyst has 5.75 years of overall experience.
- *FIRM EXP*$_{a,t}$: the average experience of the analyst with the firms in his/her portfolio. This variable helps to capture differences in analysts' familiarity and expertise in following specific firms. The average *FIRM EXP*$_{a,t}$ variable is equal to 838 days, suggesting that the average analyst has 2.30 years of experience following the average firm in his/her portfolio.
- *#INDUSTRIES*$_{a,t}$: the number of unique industries in the analyst's portfolio. This variable helps control for analysts' specialization. *#INDUSTRIES*$_{a,t}$ has a mean value equal to 2.84, suggesting that the average analyst follows approximately 2.84 industries.
- *BROKER SIZE*$_{a,t}$: the size of the brokerage house. This variable serves as a proxy for the analyst's resource support (e.g., subordinate analysts, databases, estimation techniques, industry connections, etc.), which likely allows for more efficient and effective gathering and processing of information.

We also identify control variables that are specific to the fundamentals of the firms that are included in the analyst's portfolio. For each of the firm-specific variables, we calculate the average across all firms included in the analyst's portfolio to obtain portfolio-specific measures.

- *ASSETS*$_{a,t}$: firm size measured using total assets. The average analyst portfolio includes firms that hold an average of $10.5 billion in assets.
- *ANALYST FOLLOWING*$_{a,t}$: the average number of analysts following the firm. The mean analyst portfolio includes firms followed by an average of 16.53 analysts. Both firm size and analyst following helps control for the information environments of the firms in the analysts' portfolio.

- $ROA_{a,t}$: profitability measured using return on assets. The mean analyst portfolio includes firms that are on average profitable.
- $BTM_{a,t}$: growth opportunities measured using the book-to-market ratio. The average analyst portfolio includes firms with an average book-to-market ratio of 0.49.
- $INST\ OWN_{a,t}$: the percentage of institutional ownership. Institutional ownership helps to control for investors' demand for information. The average analyst portfolio includes firms with 52% institutional ownership, on average.
- $TURN_{a,t}$: the percentage of shares traded during the year. $TURN_{a,t}$ is included to control for investor attention. The average analyst's portfolio includes firms whose shares turn over on average 2.53 times during the year.
- $BUS\ CONC_{a,t}$: the business segment concentration of the firm. $BUS\ CONC_{a,t}$ is included to control for differences in the difficulty of covering firms with diverse vs. concentrated operations. The mean of $BUS\ CONC_{a,t}$ is 0.92, suggesting that the mean analyst portfolio contains firms that are, on average, concentrated in a single industry.
- $EARN\ VOL_{a,t}$: the standard deviation of seasonally adjusted earnings over the preceding 16 quarters (requiring a minimum of at least 8 quarters).
- $RET\ VOL_{a,t}$: the average monthly return volatility over the previous 12 months. Both $EARN\ VOL_{a,t}$ and $RET\ VOL_{a,t}$ help control for the difficulty in the forecasting environment.
- $AGE_{a,t}$: the age of the firm helps to control for differences in the difficulty of forecasting early-stage vs. mature firms. The average analyst portfolio includes firms that are on average 19.38 years old.
- $EARN\ COMOVE_{a,t}$: the correlation between each firm's operating income and the operating incomes of the ten geographically closest firms in the same industry over the previous 12 quarters (requiring a minimum of 8 prior quarters). $EARN\ COMOVE_{a,t}$ helps control for the operating similarities between the firm and other firms that are in the same geographical area (Engelberg et al., 2013).

- *$HERF_{a,t}$*: the Herfindahl-Hirshman index. *$HERF_{a,t}$* helps control for any effects of industry competition on the size of the analyst's portfolio (Chang et al. 2006) or the quality of coverage.

In addition, we include year fixed effects to control for unidentified time-variant fluctuations in the size of the analysts' portfolio. We also include analyst fixed effects to control for unidentified analyst-specific characteristics. We also include industry fixed effects (for the industries covered by analyst *a* in year *t* that comprise at least 10% of the firms in the analyst's portfolio) to control for variation in geographical clustering across industries. Lastly, we cluster the standard errors by analyst to correct for potential serial-correlation that is not fixed (e.g., the serial correlation in the number of firms that the analyst follows decays over time; Peterson, 2009).

Empirical Design and Tests

Analyst Portfolio Size

To examine whether the number of firms included in analysts' portfolios is smaller when the average distance of the firms in the portfolio is higher, we first examine the Pearson and Spearman correlations between the *$\#FIRMS\ FOLL_{a,t}$* variable and the distance variables (*$DIST\ 10_{a,t}$* and *$\#\ FIRMS\ 100_{a,t}$*) in Table 2. We find negative and significant Pearson and Spearman correlations between the *$DIST\ 10_{a,t}$* and *$\#\ FIRMS\ FOLL_{a,t}$* variables, providing preliminary evidence that the location of the firm in the analyst's portfolio relative to other industry firms is associated with a decrease in the number of firms followed by the analyst. We find negative but insignificant Pearson and Spearman correlations between the *$\#\ FIRMS\ 100_{a,t}$* and *$\#\ FIRMS\ FOLL_{a,t}$* variables. However, our main tests of hypothesis one are based on the following multivariate regression (Equation 1):

$$ln(\#\ FIRMS\ FOLL_{a,t}) = \alpha_0 + \alpha_1\, DIST_{a,t} + \alpha_2\, DIST\ TO\ FIRM_{a,t} + \alpha_3\, ln(HORIZON_{a,t}) + \alpha_4\, ln(EXP_{a,t}) + \alpha_5\, ln(FIRM\ EXP_{a,t}) + \alpha_6\, ln(\#\ INDUSTRIES_{a,t}) + \alpha_7\, ln(BROKER\ SIZE_{a,t}) + \alpha_8\, ln(ANALYST\ FOLLOWING_{a,t}) + \alpha_9\, ln(ASSETS_{a,t}) + \alpha_{10}\, BTM_{a,t} + \alpha_{11}\, INST\ OWN_{a,t} + \alpha_{12}\, ROA_{a,t} + \alpha_{13}\, TURN_{a,t} + \alpha_{14}\, BUS\ CONC_{a,t} + \alpha_{15}\, EARN\ VOL_{a,t} + \alpha_{16}\, RET\ VOL_{a,t} + \alpha_{17}\, ln(AGE_{a,t}) + \alpha_{18}\, HERF_{a,t} + \alpha_{19}\, EARN\ COMOVE_{a,t} + YEAR + INDUSTRY + ANALYST + \varepsilon_{a,t} \quad (1)$$

We present the results of equation 1 in Table 3. All variables are as previously defined. Column 1 (Column 2) presents the results using the *DIST 10*$_{a,t}$ (*# FIRMS 100*$_{a,t}$) variable. We find that the coefficient on the *DIST 10*$_{a,t}$ (*# FIRMS 100*$_{a,t}$) variable is equal to -0.102 (-0.079) and significant at the 1% level, which is consistent with our hypothesis that the location of the firms in the analyst's portfolio relative to other industry firms impacts analyst's costs of gathering and processing information. Since we take the natural log of the dependent variable and the distance variables are decile ranked and range between 0 and 1, we are able to interpret the coefficient on the *DIST 10*$_{a,t}$ (*#FIRMS 100*$_{a,t}$) variable as the percentage change in the dependent variable as the *DIST 10*$_{a,t}$ (*#FIRMS 100*$_{a,t}$) variable increases from its 1st to 10th decile (values of 0 to 1). As a result, the coefficient of -0.102 (-0.079) suggests a 10.2% (7.9%) decrease in the number of firms followed by the analyst when the *DIST 10*$_{a,t}$ (*# FIRMS 100*$_{a,t}$) variable moves from the 1st to 10th deciles, which appears to be economically as well as statistically significant.

Of the control variables, the analyst-related variables, in particular, appear to be important determinants of portfolio size. Analysts with more experience, working for larger brokerage houses and covering more industries have larger portfolio sizes. We also find a negative and significant coefficient on the *DIST TO FIRM*$_{a,t}$ variable, suggesting that analysts follow fewer firms when the average distance between the analyst and the firms in the analyst's portfolio increases, consistent with Malloy (2005). Several of the firm-related variables are also significant. For example, portfolio sizes are larger when the firms in the portfolio have lower profitability, greater business concentration and lower return volatility. Also consistent with expectations, we find a positive coefficient on *EARN COMOVE*$_{a,t}$, suggesting that analysts follow more firms when the firms in their portfolio have earnings that co-move with the earnings of nearby industry firms, presumably because the co-movement makes forecasting easier.

We also examine whether the effect of the geographic spacing of the firm relative to other firms in the industry has a more negative effect on analysts' information acquisition and processing costs when earnings are more difficult to forecast (Hypothesis 2). Equation (2) presents the regression used to examine whether the difficulty in forecasting earnings exacerbates the relation between the location of the firms in the analyst's portfolio (relative to other industry firms) and the analysts' portfolio size.

$$ln(\#\ FIRMS\ FOLL_{a,t}) = \alpha_0 + \alpha_1\ DIST_{a,t} + \alpha_2\ DIST_{a,t} * HIGH\ EARN\ VOL_{a,t} + \alpha_3\ HIGH\ EARN\ VOL_{a,t} + \Sigma\ \mu_i\ CONTROLS_{a,t} + YEAR + INDUSTRY + ANALYST + \varepsilon_{a,t} \quad (2)$$

The $HIGH\ EARN\ VOL_{a,t}$ variable is equal to 1 when the $EARN\ VOL_{a,t}$ variable is above the sample median and 0 otherwise. The coefficient on the interaction between the $DIST_{a,t}$ and $HIGH\ EARN\ VOL_{a,t}$ variables is the coefficient of interest in testing Hypothesis 2. If the additional costs that analysts incur to follow more distant firms are amplified when firms' earnings are more difficult to forecast, then we expect to find a negative coefficient on the interaction between the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) and $HIGH\ EARN\ VOL_{a,t}$ variables. All control variables that are included in equation (1) are also included in equation (2) with the exception of the $EARN\ VOL_{a,t}$ variable, which is replaced by the $HIGH\ EARN\ VOL_{a,t}$ variable. All variables are as previously defined.

The results using the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable are included in Column 3 (4) of Table 3. The coefficient on the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable is negative and significant at the 1% level, suggesting that an analyst follows fewer firms when the average firm in his/her portfolio is farther away from other industry firms even when forecasting difficulty is low. More importantly, the coefficient on the interaction between the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) and $HIGH\ EARN\ VOL_{a,t}$ variables is negative and significant at the 1% level, which is consistent with expectations. Thus, the negative relation between the number of firms followed by the analyst and the location of the firms in the analyst's portfolio relative to other industry firms is amplified when earnings are more difficult to forecast. In fact, the coefficient on the interaction is approximately 100% (163%) larger than the main effect on the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable, suggesting that the effect of the relative location of the firms in the analyst's portfolio on the number of firms followed by the analyst more than doubles when firms' earnings are more difficult to forecast. The sum of the coefficients on the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable and the interaction between the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) and $HIGH\ EARN\ VOL_{a,t}$ variable is equal to -0.130 (-0.108) and is significant at the one percent level, suggesting a 13.0% (10.8%) decrease in the number of firms followed by the analyst when the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable moves from the 1st to 10th decile for analysts with difficult to forecast portfolios (i.e., $HIGH\ EARN\ VOL_{a,t} = 1$). The control variables in Columns 3 and 4 have similar signs to those presented in Columns 1 and 2.

Forecast Accuracy

We next examine whether analysts' forecasts are less accurate when the firms in their portfolio are farther away from other industry firms. As reported in Table 2,we find a negative and significant Pearson and Spearman correlation between the $DIST\ 10_{a,t}$ ($\#\ FIRMS\ 100_{a,t}$) and $ACCURACY_{a,t}$ variables, providing preliminary evidence that analysts are less accurate when their portfolios consist of firms that are farther away from other industry firms. Similar to our previous analyses, our main tests are based on a multivariate analysis that allows us to control for several other firm and analyst characteristics.

$$ACCURACY_{a,t} = \alpha_0 + \alpha_1 DIST_{a,t} + \Sigma\, \mu_i\, CONTROLS_{a,t} + YEAR + INDUSTRY + ANALYST + \varepsilon_{a,t} \quad (3)$$

We present the results of estimating equation 3 in columns 1 and 2 of Table 4. Consistent with expectations, we find a negative coefficient on the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable, which is statistically significant at the 10% (1%) level. The coefficient on the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable is equal to -0.024 (-0.044), representing a 6.1% (11.2%) reduction relative to the mean $ACCURACY_{a,t}$ variable when the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable moves from its 1st to 10th decile. This evidence is consistent with analysts incurring additional costs to gather and process information when following firms that are farther away from other firms that in the same industry.

We continue to include the same control variables from equation 1 to control for possible alternative explanations. Consistent with prior research, we find a negative coefficient on $HORIZON_{a,t}$, suggesting that analysts are less accurate when forecasting at longer horizons. In addition, we find a negative and significant coefficient on $\#\ INDUSTRIES_{a,t}$, suggesting that analysts are less accurate when they follow more industries. We also find that analysts are more accurate when the firms in their portfolio are more profitable, have greater analyst following, more institutional ownership, less volatile operating environments, and lower competition. One unexpected finding is that forecast accuracy is lower when co-movement of earnings is higher.

We next examine whether the negative relation between the analyst's forecast accuracy and the distance of the firms included in the analyst's portfolio (relative to other industry firms) is amplified when earnings are more difficult to forecast. We estimate the following equation:

$$ACCURACY_{a,t} = \alpha_0 + \alpha_1\, DIST_{a,t} + \alpha_2\, DIST_{a,t} * HIGH\ EARN\ VOL_{a,t} + \alpha_3\, HIGH\ EARN\ VOL_{a,t} + \Sigma\, \mu_i\, CONTROLS_{a,t} + YEAR + INDUSTRY + ANALYST + \varepsilon_{a,t} \quad (4)$$

Similar to equation 2, we include the $HIGH\ EARN\ VOL_{a,t}$ variable and its interaction with the distance variables. We expect a negative coefficient on the interaction variables, suggesting that the firm's location affects forecast accuracy more when earnings are more difficult to forecast. We present the results using equation 4 in columns 3 and 4 of Table 4. In column 3 (4) we find that the coefficient on the $DIST\ 10_{a,t}$ ($\#\ FIRMS\ 100_{a,t}$) variable is insignificant; however, the coefficient on the interaction between the $DIST\ 10_{a,t}$ ($\#\ FIRMS\ 100_{a,t}$) and $HIGH\ EARN\ VOL_{a,t}$ variable is negative and significant at the 1% level. The sum of the coefficients on the $DIST\ 10_{a,t}$ ($\#\ FIRMS\ 100_{a,t}$) variable and the interaction between the $DIST\ 10_{a,t}$ ($\#\ FIRMS\ 100_{a,t}$) and $HIGH\ EARN\ VOL_{a,t}$ variable is equal to -0.064 (-0.075), suggesting that the reduction in forecast accuracy is equal to approximately 16.5% (19.3%) of the mean $ACCURACY_{a,t}$ variable when the $DIST\ 10_{a,t}$ ($\#\ FIRMS\ 100_{a,t}$) variable moves from its 1st to 10th decile and when earnings are more difficult to forecast ($HIGH\ EARN\ VOL_{a,t} = 1$). These results suggest that the location of the firms included in the analyst's portfolio relative to other industry firms impacts analyst forecast accuracy only when earnings are particularly difficult to forecast. We also note that the coefficients on the control variables are consistent with the coefficients presented in columns 1 and 2.

Forecast Revision Timeliness

We next examine the timeliness of analyst revisions to further test whether analysts' costs are higher when following firms that are farther away from other firms in the industry. The Pearson and Spearman correlations between the $QUICK\ REV_{a,t}$ and $DIST\ 10_{a,t}$ variables are negative and significant, providing preliminary evidence that analysts are less likely to revise forecasts immediately following the earnings announcements when following firms farther away from other industry firms. However, we do not find a significant correlation between the $QUICK\ REV_{a,t}$ and $\#\ FIRMS\ 100_{a,t}$ variables. As before, our main analysis is based on a multivariate regression that controls for analyst and firm characteristics that could affect the relation between $QUICK\ REV_{a,t}$ and the distance variables:

$$QUICK\ REV_{a,t} = \alpha_0 + \alpha_1\, DIST_{a,t} + \Sigma\, \mu_i\, CONTROLS_{a,t} + YEAR + INDUSTRY + ANALYST + \varepsilon_{a,t} \quad (5)$$

Table 5 reports the results using equation 5. In column 1 we find that the coefficient on the $DIST\ 10_{a,t}$ variable is equal to -0.016 and is significant at the 5% level. The coefficient suggests that moving from the lowest to the highest decile of the $DIST\ 10_{a,t}$ variable reduces the percentage of firm/quarters in which analysts quickly revise their forecasts by 1.6%, which is 5.3% of the mean $QUICK\ REV_{i,t}$ variable. We do not find a significant coefficient on the $\#\ FIRMS\ 100_{a,t}$ variable in column 2. These results provide some limited evidence that analysts incur higher costs when following firms located farther away from other firms in the industry.

We include the same control variables as in our prior tests; however, fewer of these variables are significant in this regression. We find that analysts revise their forecasts more quickly when the analyst has more experience with the firms that he or she follows ($FIRM\ EXP_{a,t}$) and when the analyst works for a larger brokerage house ($BROKER\ SIZE_{a,t}$). We also find that analysts are more likely to quickly revise their forecasts when stock turnover ($TURN_{a,t}$) is higher and when the earnings of the firms in their portfolios co-move more with other firms in the industry ($EARN\ COMOVE_{a,t}$).[16]

Similar to equations 2 and 4, we estimate equation 6 to examine whether the difficulty in forecasting earnings exacerbates the relation between the relative location of the firms in the analyst's portfolio and the analyst's ability to quickly revise his/her forecast.

$$QUICK\ REV_{a,t} = \alpha_0 + \alpha_1\, DIST_{a,t} + \alpha_2\, DIST_{a,t} * HIGH\ EARN\ VOL_{a,t} + \alpha_3\, HIGH\ EARN\ VOL_{a,t} + \quad (6)$$

[16] We also find that when forecast horizon is longer, revision timeliness is lower. This may be because some analysts regularly issue forecasts following earnings announcements (high revision timeliness) and do not subsequently update their forecast (resulting in longer horizons).

$$\Sigma\, \mu_i\, CONTROLS_{a,t} + YEAR + INDUSTRY + ANALYST + \varepsilon_{a,t}$$

We find an insignificant coefficient on the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable, suggesting that the relative location of the firms in the analyst's portfolio does not affect the analyst's cost of gathering and processing information when earnings are easier to forecast (i.e., $HIGH\ EARN\ VOL_{a,t} = 0$). Consistent with expectations, we find a negative coefficient on the interaction between the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) and $HIGH\ EARN\ VOL_{a,t}$ variables. This evidence is consistent with the location of the firms in the analyst's portfolio (relative to other industry firms) affecting the costs that the analyst bears when earnings are more difficult to forecast (i.e., $HIGH\ EARN\ VOL_{a,t} = 1$). The sum of the coefficients on the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable and the interaction between the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) and the $HIGH\ EARN\ VOL_{a,t}$ variables is equal to -0.027 (-0.018), which is significant at the 1% (5%) level. Thus, the percentage of firm/quarters for which the analyst quickly revises his/her forecast is 2.7% (1.8%) lower as the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable moves from the 1st to 10th decile, which is a change of approximately 9% (6%) of the mean $QUICK\ REV_{a,t}$ variable. The signs and magnitudes of the coefficients on the control variables are similar to those in columns 1 and 2 of Table 5.

Number of Analyst Forecast Revisions Per Firm

Finally, we examine the number of analyst forecast revisions per firm in the analyst's portfolio as our last test of the costs that analysts' incur to cover firms that are farther away from other firms in the industry. The Pearson and Spearman correlation between the $DIST\ 10_{a,t}$ ($\#\ FIRMS\ 100_{a,t}$) and $ln(\#\ REV_{a,t})$ variables are negative and significant, providing preliminary evidence that analysts make fewer forecast revisions per firm when their portfolios consist of firms that are farther away from other industry firms. We provide the multivariate regression specification in equation 7.

$$ln(\#\ REV_{a,t}) = \alpha_0 + \alpha_1 DIST_{a,t} + \Sigma\, \mu_i\, CONTROLS_{a,t} + YEAR + INDUSTRY + ANALYST + \varepsilon_{a,t} \qquad (7)$$

Table 6 reports the results of estimating equation 7. We find that the coefficient on the $DIST\ 10_{a,t}$ ($\#\ FIRMS\ 100_{a,t}$) variable is equal to -0.029 (-0.019) and is significant at the 5% (10%) level. Because our dependent variable is log transformed, these coefficients suggest that the number of analyst forecast revisions per firm decreases by 2.9% (1.9%) when moving from the lowest to the highest decile of the $DIST\ 10_{a,t}$ ($\#\ FIRMS\ 100_{a,t}$) variable, consistent with our expectations.

Similar to the preceding analyses, we use equation 8 to examine whether the difficulty in forecasting earnings affects the relation between the relative location of the firms in the analyst's portfolio and the number of forecast revisions per firm.

$$ln(\#\ REV_{a,t}) = \alpha_0 + \alpha_1 DIST_{a,t} + \alpha_2 DIST_{a,t} * HIGH\ EARN\ VOL_{a,t} + \alpha_3\ HIGH\ EARN\ VOL_{a,t} + \Sigma\ \mu_i\ CONTROLS_{a,t} + YEAR + INDUSTRY + ANALYST + \varepsilon_{a,t} \quad (8)$$

We find an insignificant coefficient on the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable, suggesting that the relative location of the firms in the analyst's portfolio does not affect the number of forecast revisions per firm when earnings are easier to forecast (i.e., $HIGH\ EARN\ VOL_{a,t} = 0$). In contrast, we find a negative coefficient on the interaction between the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) and $HIGH\ EARN\ VOL_{a,t}$ variables, suggesting that the location of the firms in the analyst's portfolio (relative to other industry firms) affects the number of forecast revisions per firm when earnings are more difficult to forecast (i.e., $HIGH\ EARN\ VOL_{a,t} = 1$). The sum of the coefficients on the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable and the interaction between the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) and the $HIGH\ EARN\ VOL_{a,t}$ variables is equal to -0.045 (-0.038) and is significant at the 1% (1%) level, suggesting that the number of forecast revisions per firm decreases by 4.5 (3.8) percent when moving from the 1st to 10th decile of the $DIST\ 10_{a,t}$ ($\#FIRMS\ 100_{a,t}$) variable when earnings are more difficult to forecast.

IV. ANALYSIS OF MANAGEMENT COMMUNICATION

The prior evidence in this paper is consistent with our hypothesis that the firm's geographic proximity to other industry firms produces information spillover effects that enhance managers' knowledge of other firms in the area. If managers communicate their enhanced knowledge, analysts' information acquisition costs are reduced. To provide some evidence on this issue, we examine the likelihood that a manager references geographically close firms in their industry when communicating with analysts, investors, and other market participants. Specifically, we examine whether firms are more likely to mention, during their earnings conference calls, other firms in the same industry as the distance between them decreases.[17] We recognize that conference calls are just one mechanism through which managers might convey their enhanced knowledge of other firms in their industry to analysts. As discussed previously, informal meetings that occur during site visits as well as during one-on-one phone calls also represent avenues through which managers can communicate their knowledge. However, these modes of communication are not directly observable.

For our sample firms, we obtain conference call manuscripts from Factiva's FD Wire from 2002 to 2011. We begin our analysis in 2002 because this is when Factiva began collecting conference calls. We find 41,365 total conference calls for 13,251 of our sample firms-years. The mean (median) firm has 3.12 (3) calls each year, which is reasonable since firms typically have one conference call per quarter. For each firm-year, we obtain the names of all other firms in the same industry from Compustat and search the conference call transcripts for mentions of these firms' names.[18] We then create a dataset of all firm *i-j* matches, where firm *i* is the firm holding the conference call and firm *j* is a firm in the same GICS industry as firm *i*. We do not require that firm *j* hold a conference call during the year. The resulting dataset consists of 2.38 million unique observations.

We then create an indicator variable ($MENTION_{i,j,t}$) that is equal to one if the managers of firm *i* or the analysts involved in the conference call mention firm *j* in any of firm *i*'s conference calls during year *t*. We also create two additional indicator variables equal to one if the managers of the firm mention

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[17] We acknowledge the possibility that firms may be more likely to reference other firms that are in the same geographic area for other reasons that are not necessarily associated with managers being more knowledgeable about other firms that are in the same geographic area. It is possible that similar economic shocks or similarities in operations are the primary motivation for referencing another firm in the same geographic area during a conference call. While we attempt to control for economic shocks and similarities in operations using control variables (e.g., $EARN\ COMOVE_{i,j,t}$, year fixed effects, industry fixed effects), we cannot completely rule out the possibility that managers reference other firms for reasons other than the managers being more knowledgeable about these other firms because of their geographic location.

[18] A potential concern is the use of abbreviations such as "corp" instead of "corporation" or simply omitting the word "corporation" when referencing another firm in the industry. We attempt to mitigate this problem by removing all instances of the words "corporation" or "incorporated" (and their counterparts "corp" and "inc") in our search. For firms in which the company name is ambiguous, we include the word "corp" or "inc" in our search. For example, we include "corp" for "News Corp" but exclude "corp" for "Microsoft Corp." We also manually examine each company name to identify potential alternative abbreviations likely used by analysts (e.g., Exxon for ExxonMobile).

the industry firm first (*MENTION (MGR FIRST)*$_{i,j,t}$) and if the analysts mention the industry firm first (*MENTION (ANAL FIRST)*$_{i,j,t}$).[19] In these tests, we do not use the *DIST 10*$_{a,t}$ and *# FIRM 100*$_{a,t}$ variables (as previously described) because we are looking at unique firm *i-j* combinations rather than average values of an analyst's portfolio. The *DISTANCE*$_{i,j,t}$ variable is our variable of interest and represents the decile ranked distance between the headquarters of firm *i* and firm *j* during year *t*.[20] We find 14,153 total mentions of industry firms in our sample. While this may appear small relative to the total number of paired observations in our sample, we find that 31.3% of our sample firms mention at least one other firm in the same industry in their conference calls during the year.

Based on the significant differences in firm specific characteristics discussed in Section 3, we test whether firms are less likely to mention more geographically distant industry firms by estimating the following logistic regression.

$$CONF\ CALL\ MENTIONS_{i,j,t} = \alpha_0 + \alpha_1 DISTANCE_{i,j,t} + \Sigma\, \mu_n CONTROLS + YEAR + INDUSTRY + \varepsilon_{i,t} \qquad (9)$$

CONF CALL MENTIONS$_{i,j,t}$ equals either *MENTIONS*$_{i,j,t}$, *MENTIONS(MGR FIRST)*$_{i,j,t}$, or *MENTIONS(ANAL FIRST)*$_{i,j,t}$. We expect a negative coefficient on the *DISTANCE*$_{i,j,t}$ variable. We include control variables for both the mentioning firm (firm *i*) and the mentioned firm (firm *j*) since the firm characteristics (e.g., size, profitability, earnings volatility, etc.) of either firm could influence the decision to mention a firm. We also include an indicator variable equal to 1 if firm *i* and firm *j* are competitors and 0 otherwise (*COMPETITOR*$_{i,j,t}$). We define competitors using the Hoberg and Phillips (2010) text-based network industry definitions, which use contextual analysis of the product descriptions in the 10-K's to identify product competitors. This variable represents a potentially correlated omitted variable if firms locate closer to competitors and if firms are more likely to mention competitors during conference calls. We also include the co-movement of earnings between firm *i* and firm *j* (*EARN COMOVE*$_{i,j,t}$), defined as

[19] We note that 72.7 percent of the mentions in our sample are initiated by the manager.

[20] The ranking process of the *DISTANCE*$_{i,j,t}$ variable is similar to that for the *DIST 10*$_{i,t}$ and *# FIRMS 100*$_{i,t}$ variables. Using all firm combinations, we decile rank the distance between firm *i* and *j*, subtract 1 and divide by 9 to obtain a variable ranking taking on values between 0 and 1.

the correlation between the quarterly operating incomes scaled by lagged total assets of firm *i* and firm *j* over the twelve quarters prior to period *t*, to control for the possibility that more similar firms (i.e., those that respond similarly to industry shocks) locate more closely together and are more likely to mention each other in their conference calls. We also include an indicator variable equal to 1 if an analyst follows both firm *i* and firm *j* in year *t* and equal to 0 otherwise ($SHARED\ ANALYST_{i,j,t}$) to control for analysts' demand for comparative information for the firms included in their portfolios. We also include year and industry (GICS code) indicator variables to control for differences in mentions over time and across industries. Finally, we cluster the standard errors by firm ***i-j*** combinations due to potential serial correlation in our dependent and independent variables (Petersen, 2009).[21]

We report the results of estimating Equation 9 in Table 7. We note that the coefficient on the $DISTANCE_{i,j,t}$ variable is equal to -0.286 in Column 1, suggesting that managers and analysts are less likely to mention other firms in the same industry when those firms are geographically farther away. We also note that the odds ratio is equal to 0.75, suggesting that management and analysts are 25% less likely to mention a firm in the same industry that is in the 10th distance decile compared to a firm in the 1st distance decile. These results suggest that managers communicate their knowledge and awareness of other industry firms in the same geographic area with analysts and investors during the earnings conference call. We find similar results in Columns 2 and 3 when the managers of the firm are the first to mention the industry firm and when the analysts are the first to mention the industry firm, respectively. Specifically, the coefficient on $DISTANCE_{i,j,t}$ in Column 2 (Column 3) is equal to -0.283 (-0.221) and the odds ratio is 0.75 (0.80). These results suggest that both managers and analysts are less likely to mention industry firms that are located farther away from the firm.[22]

[21] Note that any particular firm-year will be represented in the sample multiple times (as it will be matched to all other firms in its industry). However, while the control variables will be identical across these observations, our dependent variable ($MENTION_{i,j,t}$) and our independent variable of interest ($DISTANCE_{i,j,t}$) are unique to the *i-j* pair. Thus, any time-series correlation in the error terms and $DISTANCE_{i,j,t}$ variable are likely related to the *i-j* pair, and we therefore estimate our standard errors clustering at the *i-j* pair level. We obtain inferentially similar results if we cluster by firm rather than by firm pairs.

[22] One potential concern is that an unusual, geographic-specific event (e.g., a natural disaster) causes firm *i* to mention firm *j* in a particular year. To address this concern, we conduct two sensitivity tests. First, we eliminate observations where firm *i* reports an extraordinary item in year *t*. Our results are robust to excluding firms-years that report extraordinary items. Second, we

We find that both characteristics of the mentioning firm as well as the mentioned firm influence the decision to mention another firm. In particular, larger and older firms with greater analyst following and higher earnings volatility are more likely to mention another firm. We also note that firms are more likely to mention direct competitors and that managers are more likely to mention other industry firms that are older, larger, have higher earnings volatility, have greater industry segment concentration, have lower institutional ownership, have lower book-to-market ratios, have greater earnings co-movement, and have greater analyst following. Managers are also more likely to mention other industry firms that are followed by at least one of the firm's analysts. [23]

V. ROBUSTNESS TESTS

Analyst Coverage Decisions Following Firm Headquarters Relocations

Our primary analysis is based on a "levels" specification because changes in firms' headquarter locations are relatively rare events, significantly reducing the power of any analysis based on relocations. Moreover, the decision to move locations is not likely to be an exogenous event. The types of events that accompany headquarter changes can be largely idiosyncratic in nature, making the identification of the associated event and the design of an appropriate empirical control difficult. Moreover, it is possible the associated event will significantly increase analyst attention immediately following the headquarter relocation or, alternatively, increase the costs that analysts incur to gather and process information about the firm. These factors could potentially offset or overpower the effects associated with a firm's location relative to its peers. Despite these drawbacks, we believe there is some value in examining changes in

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calculate the median market-adjusted returns over a given year for all firms in a given metropolitan statistical area (MSA). We then rank the median market-adjusted returns by MSA-year and classify MSA-years in the bottom decile as potentially facing an unusual negative geographic shock in that year. Deleting observations from these MSA-years also has no effect on our results.

[23] We also conduct an analysis based on a propensity score matched sample. Specifically, we match each mentioned firm to a non-mentioned firm (in the same industry) with similar characteristics to the mentioned firm (based on a propensity-score) and compare the distance of the mentioned firms to the distance of the non-mentioned propensity-score matched firms. The propensity score is based on a model of the probability that a firm is mentioned by another firm in its industry. We model this probability as a function of size, growth, institutional ownership, analyst following, performance, share turnover, business concentration, earnings and return volatility, and firm age. We find that 20% of the mentioned firms are within 100 miles of the mentioning firm, while only 14% of the matched control firms are within 100 miles of the mentioning firm. This difference is significant at the 1% probability level. This evidence further supports the conjecture that firms are more likely to mention industry firms that are located nearby.

firm locations. Finding results consistent with our hypotheses when using a sample of headquarters relocations provides additional support for the conclusions we draw from our primary analyses.

We expect analysts' information acquisition costs to decrease when the firm relocates closer to other firms in the industry and to increase when the firm moves farther away. As a result, we expect the change in information acquisition costs to affect analysts' coverage decisions of the relocating firms. We identify relocating firms as those firms in which the headquarters location in year *t* is greater than or equal to 100 miles from the headquarters location in year *t-1*. We choose 100 miles to ensure the firm is truly relocating away from industry firms in its previous geographical area. We also do our best to identify typical corporate events that are likely to coincide with headquarter changes. We eliminate observations where the firm relocation appears to be the result of a merger by excluding observations with merger and acquisition data in the SDC database. We find a total of 216 firm-year observations in which the firm relocates to another geographical area.

Following Liang et al. (2008), we estimate an ordered probit regression at the analyst-firm-year level where the dependent variable $CHANGE_{a,i,t}$ is equal to -1 if analyst *a* covered firm *i* in year *t-1* but stops covering firm *i* in year t, equal to 0 if analyst *a* did not cover firm *i* in year *t-1* or in year *t*, equal to 1 if analyst *a* covered firm *i* in year *t-1* and in year *t*, and equal to 2 if analyst *a* did not cover firm *i* in year *t-1* but begins covering firm *i* in year *t*. Similar to Liang, et al (2008) our sample includes analyst-firm-year observations for which the analyst could have covered the relocating firm, but chose not to. Specifically, each relocating firm is paired with all analysts that cover at least one other firm in the relocating firm's industry in year *t-1*. We include the change in our distance variables ($\Delta DIST\ 10_{i,t+1}$ and $\Delta\#\ FIRMS\ 100_{i,t+1}$) to test whether analysts' coverage decisions change when firms move farther away from or closer to other firms in their industry. Positive (negative) values indicate the firms moved farther away from (closer to) other industry firms as a result of the relocation.

We also include several control variables identified by Liang et al. (2008) as being important for analysts' coverage decisions. Specifically, we include the change in the log of total assets $\Delta ln(ASSETS_{i,t})$, the change in an indicator variable for S&P 500 status ($\Delta SP500_{i,t}$), the change in the log of the number of analysts following the firm (Δ*ln(ANALYST FOLLOWING*$_{i,t}$*))*, the change in the log of annual trading volume (Δ*ln(VOLUME*$_{i,t}$*))*, the change in the annual stock market return (Δ*RET*$_{i,t}$), the change in the book to market ratio (Δ*BTM*$_{i,t}$), the change in the percentage of institutional ownership of the firm (Δ*INST OWN*$_{i,t}$), the change in the distance of the analyst to the firm (Δ*DIST TO FIRM*$_{a,i,t}$), the experience of the analyst relative to the average experience of the analysts following the firm where experience is defined as the number of years the analyst has provided forecasts on IBES as of year *t* (*REL EXP*$_{a,t}$), the change in the log of the size of the brokerage house (Δ*ln*(*BROKER SIZE*$_{a,t}$)), the number of firms followed by the analyst in year *t* (*# FIRMS FOLL*$_{a,t}$), the square of the number of firms followed by the analyst in year *t* (*# FIRMS FOLL*$_{a,t}^{2}$), an indicator variable if another analyst from the same brokerage house also covers the firm in year *t* (*BFOLL*$_{a,t}$), an indicator variable if another analyst from the same brokerage house covered the firm in year *t-1* but is no longer employed by the brokerage house in year *t* (*DEPART*$_{a,t}$), and an indicator variable if the firm is in the analyst's primary industry, where the primary industry is defined as the industry which comprises the largest proportion of the analyst's portfolio (*PRIMARY INDUSTRY*$_{a,i,t}$). Finally, we include industry and year fixed effects and cluster standard errors by analyst.

We present the results of the ordered probit regression in Table 8. In Column 1, we find a negative and marginally significant coefficient (t-stat = -1.660) on the *ΔDIST 10*$_{i,t}$ variable providing some evidence that analysts change their coverage decisions when firms move farther away from other firms in the industry. We also find a negative and significant (5% level) coefficient on the *Δ# FIRMS 100*$_{i,t}$ variable in Column 2 providing evidence that analysts' coverage decisions are negatively affected by firms' moving farther away from other firms in their industry. The control variables suggest that coverage decisions are positively affected by increases in firm size, changes in firms' S&P 500 status, increases in firms' institutional ownership, the number of firms in the analyst's portfolio, whether another analyst from the same brokerage house covers the firm, whether another analyst from the same brokerage house who covered the firm leaves the brokerage house, and if the firm is in the analyst's primary industry. Coverage decisions are negatively affected by changes in firms' book to market ratios and the relative experience of the analyst.

We also interact the *ΔDIST 10*$_{i,t}$ (*Δ# FIRMS 100*$_{i,t}$) variable with the *HIGH EARN VOL*$_{i,t}$ variable to determine whether the results are stronger when earnings are more difficult to predict. We find an insignificant coefficient on the interaction between the *ΔDIST 10*$_{i,t}$ (*Δ# FIRMS 100*$_{i,t}$) and the *HIGH EARN VOL*$_{i,t}$ variables. [24]

Alternative Measurements and Controls

We also perform several robustness tests to examine the sensitivity of our analyses to various design choices. First, we test the sensitivity of our industry definitions. We use GICS codes throughout the main body of the paper because we want to use a definition of industry that includes not only a firm's direct competitors but also firms in the supply chain (because information spillovers can occur across suppliers and customers as well). However, we also re-perform each test using the Hoberg and Phillips (2010) industry definitions to identify firm competitors. Using the Hoberg and Phillips (2010) industry classifications, we find similar results (untabulated) for all of our main analyses (Tables 3, 4, 5, and 6) with the exception that the number of analyst forecast revisions per firm is not robust to this alternative specification. These tests suggest that our main results are not solely driven by the co-location of significant suppliers and customers, who are more likely to share information because of their shared operations, but also by competitors who locate in close proximity to the firm.

Next, our distance measures are potentially influenced by the size of the industries of the firms in the analyst's portfolio. For example, a firm operating in an industry with 20 firms is less likely to have firms nearby than a firm operating in an industry with 200 firms. In our main analysis, we control for this

[24] In an additional set of untabulated tests, we regress changes (from year *t-1* to *t+1)* in analyst forecast accuracy, the timeliness of forecast revisions, and the number of forecast revisions on the change in distance for relocating firms. In contrast to the prior test, which includes analyst-firm-year observations for which the analyst could have covered the relocating firm but chose not to, this analysis includes only relocating analyst-firm-years and thus, is based on a relatively small sample size (n=567). We find no significant main effect on our change in distance variables after controlling for changes in the main independent variables used in prior tests. However, we find that analyst forecast accuracy decreases in the year following the headquarters relocation for firms with high earnings volatility. We also find some evidence that the timeliness of forecast revisions and the number of forecast revisions declines in the year following the headquarters relocation for firms with high earnings volatility when using an indicator variable to identify firms that move farther away from other industry firms as a result of the relocation (vs. the magnitude of the change in distance), though the number of forecast revisions result is only present when defining distance using the number of firms within 100 miles. Overall, these results are consistent with those reported in the main analyses and provide additional evidence that the distance between the firm and other industry firms affects analysts' information acquisition and processing costs for firms with earnings that are difficult to forecast.

problem by including indicator variables for the major industries covered by the analyst, defined as those industries that comprise at least 10% of the firms in the analyst's portfolio. However, we directly address this issue using two additional sensitivity tests. First, we find qualitatively similar results (untabulated) when we specifically control for the average number of firms in the industries included in the analyst's portfolio each year, with one exception. The coefficient on $DIST\ 10_{a,t}$ becomes insignificant in the accuracy regression. However, the interaction between the $DIST\ 10_{a,t}$ and $HIGH\ EARN\ VOL_{a,t}$ variables remains negative and significant. Second, we re-define our distance measures to be relative to the size of the firm's industry. We convert our two distance variables into percentage variables: 1) $DIST\ 10\%_{a,t}$ is defined as the average distance between the firm and the closest 10% of firms in the industry for the firms in the analyst's portfolio and 2) $\%FIRMS\ 100_{a,t}$ is defined as the average percentage of firms in the industry within 100 miles of the firm for all firms in the analyst's portfolio. Our results (untabulated) are consistent with these alternative definitions with two exceptions. First, we do not find significant coefficients on $\%DIST\ 10_{a,t}$ and $\%FIRMS\ 100_{a,t}$ in our accuracy regressions; however, we continue to find negative coefficients in our cross-sectional tests on the interactions between the $\%DIST\ 10_{a,t}$ ($\%FIRMS\ 100_{a,t}$) and $HIGH\ EARN\ VOL_{a,t}$ variables. Second, we continue to find negative and significant coefficients on $\%DIST\ 10_{a,t}$ and $\%FIRMS\ 100_{a,t}$ in our number of analyst forecast revisions regressions; however, we do not find significantly negative coefficients in our cross-sectional tests on the interactions between the $\%DIST\ 10_{a,t}$ ($\%FIRMS\ 100_{a,t}$) and $HIGH\ EARN\ VOL_{a,t}$ variables.

VI. CONCLUSION

We provide evidence that the co-location of firms within an industry affects analysts' costs of gathering and processing information. Based on prior research, we argue that firm managers who are geographically closer to other firms in the same industry are likely to know more about these firms, increasing the level of industry-specific information held by these managers. If managers communicate this information to analysts, we expect analysts' costs of gathering and processing information to decrease as they follow firms that are located geographically closer to other firms in the industry. We provide evidence consistent with this prediction. First, we find that analyst portfolios are smaller when the firms included in the analyst's portfolio are located farther away from other industry firms. We also find that analysts produce less accurate, less timely, and fewer forecasts when the firms in their portfolio are more distant from other firms in the industry. In additional cross-sectional tests, we find that the increased analyst costs that are associated with being farther away from other firms in the same industry are less of a concern when earnings are easier to forecast.

We also provide supporting evidence that managers are more knowledgeable about firms in the same industry that are geographically closer by examining the location of those firms mentioned by management during conference calls. We find that firms are less likely to mention other firms in the industry during conference calls as they become more geographically distant, providing some evidence that firms are more knowledgeable about firms that are geographically closer. Lastly, we provide evidence that analysts are more likely to drop coverage of firms that move farther away from other firms in the same industry.

To the best of our knowledge, we are the first to thoroughly examine the effect of a firm's geographic location, relative to other industry firms, on analysts' information acquisition costs. Our results are of potential interest to investors in understanding how the location of the firm relative to other industry firms affects information intermediaries' costs of obtaining information about the firm. We note that our results are not driven by other firm- and analyst-specific fundamentals that are documented in the prior literature, including the co-movement of fundamentals that are more likely to occur among firms that are geographically closer to each other (Engelberg et al., 2013).

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APPENDIX A
Variable Definitions

Distance Variables:

DIST 10$_{a,t}$	The decile rank (normalized between 0 and 1) of the average *DIST 10*$_{i,t}$ variable for all firms in analyst *a*'s portfolio in year *t*, where *DIST 10*$_{i,t}$ is defined as the distance (in miles) between firm *i* and the ten most geographically proximate firms in firm *i*'s industry (GICS).
# FIRMS 100$_{a,t}$	The decile rank (normalized between 0 and 1) of the average *# FIRMS 100*$_{i,t}$ variable for all firms in analyst *a*'s portfolio in year *t*, where *# FIRMS 100*$_{i,t}$ is defined as -1 multiplied by the number of firms in firm *i*'s industry (GICS) within 100 miles of firm *i*.

Dependent Variables:

ACCURACY$_{a,t}$	The average quarterly forecast accuracy for all firms that analyst *a* follows during year *t*, where forecast accuracy is defined as -1 multiplied by the absolute value of the difference between the firm's actual quarterly EPS (earnings per share) and analyst *a*'s latest forecasted EPS for the firm scaled by share price at the beginning of the quarter, removing stale forecasts made more than 90 days prior to the earnings announcement.
ln(# FIRMS FOLL$_{a,t}$*)*	The natural logarithm of the number of firms included in analyst *a*'s portfolio in year *t*.
QUICK REV$_{a,t}$	The percentage of firms in analyst *a*'s portfolio during year *t* for which analyst *a* updates his or her forecast within two days following each firm's quarterly earnings announcement.
# REV$_{a,t}$	The average number of forecast revisions per firm made by analyst *a* over the four calendar quarters in year *t*. The quarterly number of forecast revisions per firm is calculated as the number of forecast revisions made by the analyst during the calendar quarter divided by the number of firms followed by the analyst during the calendar quarter.

Analyst Variables:

DIST TO FIRM$_{a,t}$	The decile rank (normalized between 0 and 1) of the average distance (in miles) between analyst *a* and all of the firms in analyst *a*'s portfolio in year *t*.
ln(# INDUSTRIES$_{a,t}$*)*	The natural logarithm of the number of industries followed by analyst *a* in year *t*.
ln(BROKER SIZE$_{a,t}$*)*	The natural logarithm of the number of analysts employed by analyst *a*'s brokerage house in year *t*.
ln(EXP$_{a,t}$*)*	The natural logarithm of the number of days that analyst *a* is included in IBES as of year *t*.
ln(FIRM EXP$_{a,t}$*)*	The natural logarithm of the average number of days that analyst *a* has followed the firms in his/her portfolio as of year *t*.
ln(HORIZON$_{a,t}$*)*	The natural logarithm of the average number of days between analyst

	a's last quarterly forecast and the quarterly earnings announcements for the firms followed by analyst *a* in year *t*.

Firm Variables:

$ln(AGE_{a,t})$	The average natural logarithm of the age of all firms in analyst *a*'s portfolio in year *t*, where age is defined as the number of years between the firm's fiscal period end date and the first date the firm appears in the Compustat database.
$ln(ANALYST\ FOLLOWING_{a,t})$	The average natural logarithm of the number of analysts following each firm in analyst *a*'s portfolio in year *t*.
$ln(ASSETS_{a,t})$	The average natural logarithm of total assets for all firms in analyst *a*'s portfolio in year *t*.
$BTM_{a,t}$	The average book to market ratio for all firms in analyst *a*'s portfolio in year *t*.
$BUS\ CONC_{a,t}$	The average business segment concentration for the firms included in analyst *a*'s portfolio in year *t*, where business segment concentration is defined as the Herfindahl-Hirschman Index computed for each firm's industry business segment sales in year *t*.
$EARN\ COMOVE_{a,t}$	The average earnings co-movement for all firms in analyst *a*'s portfolio in year *t*, where earnings co-movement is defined as the average correlation between each firm's operating income scaled by lagged total assets and the operating incomes scaled by lagged total assets of the ten geographically closest firms in the same industry over the previous 12 quarters (requiring a minimum of 8 prior quarters).
$EARN\ VOL_{a,t}$	The average earnings volatility for all firms in analyst *a*'s portfolio in year *t*, where earnings volatility is defined as the average standard deviation of seasonally adjusted earnings over the preceding 16 quarters (requiring a minimum of 8 prior quarters).
$HERF_{a,t}$	The average Herfindahl-Hirshman index for all firms in analyst *a*'s portfolio in year *t*.
$HIGH\ EARN\ VOL_{a,t}$	An indicator variable equal to 1 if the $EARN\ VOL_{a,t}$ variable is above the median, and equal to 0 otherwise.
$INST\ OWN_{a,t}$	The average percentage of institutional ownership for all firms in analyst *a*'s portfolio in year *t*.
$RET\ VOL_{a,t}$	The average monthly return volatility over the previous 12 months for all firms in analyst *a*'s portfolio in year *t*.
$ROA_{a,t}$	The average return on assets for all firms in analyst *a*'s portfolio in year *t*.
$TURN_{a,t}$	The average stock turnover for all firms in analyst *a*'s portfolio in year *t*.

Relocation Test Variables:

Dependent Variable:

$CHANGE_{a,i,t}$	An ordered variable equal to -1 if analyst *a* covered firm *i* in year *t-1* but stops covering firm *i* in year *t*, equal to 0 if analyst *a* did not cover firm *i*

	in year *t-1* or in year *t*, equal to 1 if analyst *a* covered firm *i* in year *t-1* and in year *t*, and equal to 2 if analyst *a* did not cover firm *i* in year *t-1* but begins covering firm *i* in year *t*.

Distance Variables:

$\Delta DIST10_{i,t}$	The decile rank (normalized between 0 and 1) of the change from year *t-1* to year *t* in the distance (in miles) between firm *i* and the ten most geographically proximate firms in firm *i*'s industry.
$\Delta \# FIRMS\ 100_{i,t}$	The decile rank (normalized between 0 and 1) of the change from year *t-1* to year *t* in -1 multiplied by the number of firms within 100 miles of firm *i*.

Other Independent Variables:

$\Delta ln(ANALYST\ FOLLOWING_{i,t})$	The change from year *t-1* to year *t* in the log of the number of analysts following firm *i*.
$\Delta ln(ASSETS_{i,t})$	The change from year *t-1* to year *t* in the log of total assets for firm *i*.
$\Delta BTM_{i,t}$	The change from year *t-1* to year *t* in the book to market ratio for firm *i*.
$\Delta DIST\ TO\ FIRM_{a,i,t}$	The decile rank (normalized between 0 and 1) of the change from year *t-1* to year *t* in the distance (in miles) of analyst *a* to firm *i*.
$\Delta INST\ OWN_{i,t}$	The change from year *t-1* to year *t* in the percentage of intuitional ownership for firm *i*.
$\Delta ln(BROKER\ SIZE_{a,t})$	The change from year *t-1* to year *t* in the log of the number of analysts employed by analyst *a*'s brokerage house.
$\Delta ln(VOLUME_{i,t})$	The change from year *t-1* to year *t* in the log of annual trading volume for firm *i*.
$\Delta RET_{i,t}$	The change from year *t-1* to year *t* in the annual stock market return for firm *i*.
$\Delta SP500_{i,t}$	The change from year *t-1* to year *t* in an indicator variable for S&P 500 status for firm *i*.
$BFOLL_{a,t}$	An indicator variable equal to 1 if another analyst from analyst *a*'s brokerage house also covers firm *i* in year *t*, and equal to 0 otherwise.
$DEPART_{a,t}$	An indicator variable equal to 1 if another analyst from analyst *a*'s brokerage house covered firm *i* in year *t-1* but is no longer employed by the brokerage house in year *t*, and equal to 0 otherwise.
$PRIMARY\ INDUSTRY_{a,i,t}$	An indicator variable equal to 1 if firm *i* is in analyst *a*'s primary industry in year *t*, where the primary industry is defined as the industry which comprises the largest proportion of analyst *a*'s portfolio in year *t*, and equal to 0 otherwise.
$REL\ EXP_{a,t}$	The experience of analyst *a* relative to the average experience of all other analysts following firm *i*, where experience is defined as the number of years the analyst has provided forecasts on IBES as of year *t*.

TABLE 1
Descriptive Statistics

This table presents the descriptive statistics for the variables used in the main empirical analyses. All variables are defined in Appendix A. All continuous variables are winsorized at the 1st and 99th percentiles.

Variable	Mean	Std. Dev.	Min	Q1	Median	Q3	Max
DIST 10$_{a,t}$ *(RAW)*	113.35	100.17	1.36	43.27	86.85	149.88	494.85
# FIRMS 100$_{a,t}$ *(RAW)*	19.55	15.87	0.50	7.08	15.00	28.40	71.57
# FIRMS FOLL$_{a,t}$	12.82	7.45	3.00	7.00	12.00	17.00	39.49
QUICK REV$_{a,t}$	0.30	0.26	0.00	0.05	0.25	0.50	0.92
ACCURACY$_{a,t}$	-0.39	0.41	-2.34	-0.49	-0.26	-0.14	0.00
# REV$_{a,t}$	5.87	2.69	2.07	4.00	5.31	7.10	15.87
DIST TO FIRM$_{a,t}$	1,310.41	1,124.39	12.20	657.95	1,023.78	1,526.70	4,985.20
HORIZON$_{a,t}$	51.60	16.85	8.00	40.94	52.50	63.24	88.00
EXP$_{a,t}$	2,099.03	2,017.79	13.00	455.00	1,471.48	3,206.69	8,516.27
FIRM EXP$_{a,t}$	837.71	902.75	0.00	155.83	531.75	1,206.05	4,172.58
# INDUSTRIES$_{a,t}$	2.84	2.01	1.00	1.00	2.00	4.00	10.88
BROKER SIZE$_{a,t}$	68.90	66.85	2.00	19.94	46.00	102.00	308.00
ANALYST FOLLOWING$_{a,t}$	16.53	8.07	2.44	10.50	15.60	21.37	40.75
ASSETS$_{a,t}$	10,506.64	21,418.61	49.03	895.62	3,015.74	9,123.40	134,388.97
BTM$_{a,t}$	0.49	0.25	0.06	0.32	0.44	0.60	1.42
INST OWN$_{a,t}$	0.52	0.22	0.00	0.36	0.53	0.70	0.96
ROA$_{a,t}$	0.02	0.12	-0.51	0.00	0.04	0.08	0.22
TURN$_{a,t}$	2.53	1.57	0.40	1.30	2.21	3.38	7.86
BUS CONC$_{a,t}$	0.92	0.10	0.52	0.89	0.96	1.00	1.00
EARN VOL$_{a,t}$	0.03	0.03	0.00	0.01	0.02	0.04	0.17
RET VOL$_{a,t}$	0.13	0.06	0.04	0.09	0.12	0.16	0.35
AGE$_{a,t}$	19.38	11.13	4.00	11.07	16.76	25.18	53.04
HERF$_{a,t}$	0.06	0.03	0.01	0.03	0.04	0.07	0.20
EARN COMOVE$_{a,t}$	0.09	0.13	-0.21	0.01	0.07	0.15	0.50

TABLE 2
Correlations

This table presents Pearson and Spearman correlations between variables used in the main empirical analyses above and below the diagonal, respectively. Values are bolded if significant at the 5 percent level or lower. All variables are defined in Appendix A.

	I	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	*IX*	*X*	*XI*	*XII*	*XIII*	*XIV*	*XV*	*XVI*	*XVII*	*XVIII*	*XIX*	*XX*	*XXI*	*XXII*	*XXIII*	*XXIV*
(I) DIST 10$_{a,t}$	1	**0.94**	**-0.02**	**-0.02**	**-0.02**	**-0.08**	**0.06**	**-0.03**	**0.04**	**0.06**	**0.18**	**-0.01**	**-0.17**	**0.07**	**0.14**	**0.03**	**0.21**	**-0.23**	**-0.13**	**-0.31**	**-0.23**	**0.27**	**0.29**	**-0.05**
(II) # FIRMS 100$_{a,t}$	**0.94**	1	-0.01	0.00	**-0.03**	**-0.06**	**0.08**	**-0.03**	**0.06**	**0.08**	**0.18**	0.00	**-0.13**	**0.07**	**0.13**	**0.05**	**0.21**	**-0.19**	**-0.15**	**-0.29**	**-0.22**	**0.27**	**0.33**	**-0.04**
(III) ln(# FIRMS FOLL$_{a,t}$)	**-0.02**	0.00	1	**0.18**	**0.02**	0.00	**-0.01**	**0.06**	**0.50**	**0.43**	**0.40**	**0.09**	**0.08**	**0.11**	**0.04**	**0.02**	**0.03**	**-0.05**	**-0.01**	**-0.08**	**-0.12**	**0.08**	**-0.01**	**0.06**
(IV) QUICK REV$_{a,t}$	**-0.03**	0.00	**0.22**	1	**-0.02**	**0.34**	**0.08**	**0.23**	**0.20**	**0.28**	0.00	**0.25**	**0.19**	**0.12**	0.00	**0.37**	-0.01	**0.29**	**0.02**	**0.06**	**-0.02**	**0.07**	**0.04**	**0.08**
(V) ACCURACY$_{a,t}$	**-0.01**	**-0.03**	**-0.11**	**-0.09**	1	**-0.10**	**-0.02**	**-0.03**	**0.01**	**0.03**	**-0.04**	**0.11**	**0.26**	**0.15**	**-0.27**	**0.11**	**0.36**	**-0.14**	**-0.07**	**-0.27**	**-0.31**	**0.09**	**0.02**	**-0.08**
(VI) ln(# REV$_{a,t}$)	**-0.09**	**-0.06**	0.00	**0.36**	0	1	**0.14**	**-0.06**	0.00	**0.02**	**-0.14**	**0.09**	**0.15**	**0.08**	**0.05**	**0.30**	**-0.01**	**0.32**	**0.08**	**0.10**	**0.06**	**0.02**	**0.03**	**0.15**
(VII) DIST TO FIRM$_{a,t}$	**-0.01**	0.00	**-0.07**	**0.06**	**-0.03**	**0.14**	1	**0.01**	**-0.01**	**-0.03**	**-0.06**	**0.08**	**0.11**	**-0.04**	**-0.04**	**0.09**	**-0.03**	**0.18**	**0.09**	**0.10**	**0.09**	**-0.04**	0.00	**0.05**
(VIII) ln(HORIZON$_{a,t}$)	**-0.02**	**-0.04**	**0.01**	**0.22**	**-0.04**	**-0.08**	**0.02**	1	**0.13**	**0.15**	**0.10**	0.01	**-0.08**	**-0.14**	**-0.04**	**0.07**	**-0.05**	**0.05**	**0.05**	**0.08**	**0.05**	**-0.12**	**-0.05**	**-0.05**
(IX) ln(EXP$_{a,t}$)	**0.06**	**0.07**	**0.47**	**0.18**	**-0.06**	**-0.02**	**-0.05**	**0.07**	1	**0.74**	**0.23**	**0.05**	**0.10**	**0.16**	**0.04**	**0.09**	**0.07**	**-0.03**	**-0.07**	**-0.08**	**-0.11**	**0.15**	**0.04**	**0.03**
(X) ln(FIRM EXP$_{a,t}$)	**0.08**	**0.09**	**0.40**	**0.25**	**-0.04**	-0.01	**-0.06**	**0.10**	**0.71**	1	**0.12**	**0.10**	**0.18**	**0.25**	**0.07**	**0.13**	**0.11**	**-0.04**	**-0.10**	**-0.13**	**-0.16**	**0.24**	**0.06**	**0.08**
(XI) ln(# INDUSTRIES$_{a,t}$)	**0.17**	**0.17**	**0.36**	**0.03**	**-0.10**	**-0.12**	**-0.10**	**0.07**	**0.20**	**0.07**	1	**-0.20**	**-0.27**	**-0.27**	**-0.01**	**-0.09**	0.00	**-0.04**	**-0.09**	**0.04**	**0.08**	**-0.06**	**0.10**	**-0.13**
(XII) ln(BROKER SIZE$_{a,t}$)	-0.01	**0.01**	**0.09**	**0.25**	**0.11**	**0.07**	**0.08**	**-0.01**	**0.05**	**0.10**	**-0.19**	1	**0.26**	**0.29**	**-0.02**	**0.11**	**0.05**	0.00	**-0.08**	**-0.11**	**-0.07**	**0.14**	**0.03**	**0.05**
(XIII) ln(ANALYST FOLLOWING$_{a,t}$)	**-0.18**	**-0.14**	**0.05**	**0.17**	**0.24**	**0.14**	**0.12**	**-0.08**	**0.10**	**0.19**	**-0.28**	**0.25**	1	**0.64**	**-0.18**	**0.29**	**0.15**	**0.27**	**-0.05**	**-0.08**	**-0.14**	**0.29**	**-0.05**	**0.15**
(XIV) ln(ASSETS$_{a,t}$)	**0.09**	**0.09**	**0.12**	**0.12**	**0.15**	**0.06**	**-0.04**	**-0.12**	**0.18**	**0.29**	**-0.27**	**0.30**	**0.63**	1	**0.15**	**0.21**	**0.25**	**-0.11**	**-0.24**	**-0.41**	**-0.44**	**0.57**	0.00	**0.17**
(XV) BTM$_{a,t}$	**0.17**	**0.16**	**0.10**	0.01	**-0.28**	**0.02**	**-0.05**	**-0.05**	**0.07**	**0.10**	**0.01**	**-0.03**	**-0.17**	**0.14**	1	**-0.03**	**-0.04**	**-0.06**	**-0.05**	**-0.17**	**0.02**	**0.07**	**0.11**	**0.18**
(XVI) INST OWN$_{a,t}$	**0.03**	**0.05**	0.00	**0.37**	**0.05**	**0.31**	**0.09**	**0.09**	**0.08**	**0.14**	**-0.10**	**0.10**	**0.27**	**0.21**	**-0.02**	1	**0.24**	**0.28**	**-0.02**	**-0.13**	**-0.21**	**0.24**	**0.09**	**0.16**
(XVII) ROA$_{a,t}$	**0.15**	**0.17**	**-0.02**	**-0.03**	**0.37**	**-0.01**	**-0.01**	**-0.05**	**0.05**	**0.09**	**0.01**	**0.02**	**0.13**	**0.09**	**-0.20**	**0.21**	1	**-0.18**	**-0.13**	**-0.54**	**-0.49**	**0.26**	**0.21**	**0.05**
(XVIII) TURN$_{a,t}$	**-0.22**	**-0.18**	**-0.03**	**0.34**	**-0.18**	**0.36**	**0.22**	**0.08**	**-0.03**	**-0.05**	**0.01**	0.00	**0.25**	**-0.14**	**-0.12**	**0.36**	**-0.08**	1	**0.21**	**0.40**	**0.50**	**-0.22**	**-0.03**	**0.11**
(XIX) BUS CONC$_{a,t}$	**-0.15**	**-0.19**	**-0.18**	**-0.08**	0.01	**0.04**	**0.12**	**0.07**	**-0.18**	**-0.21**	**-0.18**	**-0.11**	**-0.06**	**-0.27**	**-0.12**	**-0.07**	**-0.12**	**0.17**	1	**0.20**	**0.18**	**-0.40**	**-0.12**	**-0.06**
(XX) EARN VOL$_{a,t}$	**-0.31**	**-0.28**	**-0.03**	**0.13**	**-0.30**	**0.16**	**0.14**	**0.09**	**-0.05**	**-0.12**	**0.13**	**-0.10**	**-0.05**	**-0.47**	**-0.23**	**-0.04**	**-0.30**	**0.49**	**0.15**	1	**0.57**	**-0.33**	**-0.19**	0.01
(XXI) RET VOL$_{a,t}$	**-0.21**	**-0.20**	**-0.10**	0.01	**-0.30**	**0.08**	**0.12**	**0.04**	**-0.11**	**-0.19**	**0.13**	**-0.10**	**-0.16**	**-0.49**	**-0.02**	**-0.16**	**-0.34**	**0.51**	**0.18**	**0.60**	1	**-0.43**	**-0.09**	**0.01**
(XXII) ln(AGE$_{a,t}$)	**0.28**	**0.28**	**0.15**	**0.11**	**0.07**	**0.03**	**-0.07**	**-0.09**	**0.22**	**0.33**	**-0.05**	**0.16**	**0.29**	**0.59**	**0.13**	**0.30**	**0.21**	**-0.23**	**-0.41**	**-0.35**	**-0.46**	1	**0.06**	**0.15**
(XXIII) HERF$_{a,t}$	**0.26**	**0.31**	**0.02**	**0.04**	0.00	**0.01**	**-0.01**	**-0.06**	**0.07**	**0.07**	**0.17**	**0.02**	**-0.10**	**-0.05**	**0.16**	**0.10**	**0.27**	0.01	**-0.23**	**-0.14**	**-0.02**	**0.06**	1	**0.04**
(XXIV) EARN COMOVE$_{a,t}$	**-0.02**	**-0.01**	**0.08**	**0.07**	**-0.11**	**0.13**	**0.04**	**-0.06**	**0.04**	**0.09**	**-0.10**	**0.05**	**0.14**	**0.18**	**0.21**	**0.14**	0.00	**0.07**	**-0.09**	**-0.02**	0.00	**0.17**	**0.04**	1

TABLE 3
Number of Firms Followed Regression Results

This table includes all analyst-year observations from 1994 to 2011 with sufficient data to calculate the dependent and independent variables. The dependent variable is the natural logarithm of the number of firms followed by analyst *a* during year *t* (*ln(# FIRMS FOLL$_{a,t}$))*. All variables are defined in Appendix A. Analyst, industry, and year fixed effects are included as additional independent variables (unreported). Standard errors are clustered by analyst. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

	[1]	[2]	[3]	[4]
INTERCEPT	0.611***	0.590***	0.577***	0.558***
	(8.404)	(8.168)	(7.933)	(7.710)
DIST 10$_{a,t}$	-0.102***		-0.065***	
	(-5.682)		(-3.047)	
# FIRMS 100$_{a,t}$		-0.079***		-0.041*
		(-4.298)		(-1.921)
*DIST 10$_{a,t}$ * HIGH EARN VOL$_{a,t}$*			-0.065***	
			(-3.421)	
*# FIRMS 100$_{a,t}$ * HIGH EARN VOL$_{a,t}$*				-0.067***
				(-3.435)
Analyst Variables:				
DIST TO FIRM$_{a,t}$	-0.046***	-0.046***	-0.047***	-0.047***
	(-3.235)	(-3.294)	(-3.308)	(-3.366)
ln(HORIZON$_{a,t}$)	-0.014**	-0.014**	-0.015**	-0.014**
	(-2.253)	(-2.247)	(-2.367)	(-2.351)
ln(EXP$_{a,t}$)	0.124***	0.124***	0.123***	0.124***
	(28.208)	(28.255)	(28.159)	(28.212)
ln(FIRM EXP$_{a,t}$)	0.008***	0.008***	0.008***	0.008***
	(3.352)	(3.343)	(3.307)	(3.293)
ln(# INDUSTRIES$_{a,t}$)	0.662***	0.662***	0.661***	0.660***
	(54.953)	(54.874)	(55.033)	(54.950)
ln(BROKER SIZE$_{a,t}$)	0.063***	0.063***	0.063***	0.063***
	(10.174)	(10.158)	(10.219)	(10.208)
Firm Variables:				
ln(ANALYST FOLLOWING$_{a,t}$)	0.033**	0.035**	0.030**	0.031**
	(2.230)	(2.367)	(2.014)	(2.131)
ln(ASSETS$_{a,t}$)	0.015**	0.015**	0.019***	0.019***
	(2.190)	(2.264)	(2.795)	(2.881)
BTM$_{a,t}$	0.007	0.007	0.007	0.006
	(0.490)	(0.508)	(0.458)	(0.447)
INST OWN$_{a,t}$	-0.003	-0.003	0.001	0.001
	(-0.132)	(-0.126)	(0.033)	(0.041)
ROA$_{a,t}$	-0.191***	-0.193***	-0.174***	-0.177***
	(-5.917)	(-5.970)	(-5.550)	(-5.630)
TURN$_{a,t}$	0.002	0.002	0.001	0.001
	(0.630)	(0.661)	(0.278)	(0.296)
BUS CONC$_{a,t}$	0.198***	0.198***	0.191***	0.190***
	(4.240)	(4.225)	(4.091)	(4.063)
EARN VOL$_{a,t}$	0.033	0.046		
	(0.258)	(0.361)		
HIGH EARN VOL$_{a,t}$			0.077***	0.079***
			(6.272)	(6.264)
RET VOL$_{a,t}$	-0.256***	-0.252***	-0.300***	-0.299***
	(-3.259)	(-3.209)	(-3.853)	(-3.828)
ln(AGE$_{a,t}$)	-0.202	-0.243	-0.250	-0.293
	(-0.786)	(-0.943)	(-0.973)	(-1.139)
HERF$_{a,t}$	-0.342**	-0.350**	-0.331**	-0.341**
	(-2.063)	(-2.114)	(-2.000)	(-2.060)
EARN COMOVE$_{a,t}$	0.083***	0.084***	0.077***	0.078***
	(3.472)	(3.521)	(3.212)	(3.266)
#OBS	51,523	51,523	51,523	51,523
Adjusted R^2	0.759	0.759	0.760	0.760
F-test: *DISTANCE$_{a,t}$ + DISTANCE$_{a,t}$ * HIGH EARN VOL$_{a,t}$ = 0*				
Coefficient			-0.130***	-0.108***
p-value			(0.000)	(0.000)

TABLE 4
Accuracy Regression Results

This table includes all analyst-year observations from 1994 to 2011 with sufficient data to calculate the dependent and independent variables. The dependent variable is the average accuracy of analyst *a* at time *t*, calculated as the mean of $-1*|Forecasted\ EPS_{a,i,t} - Actual\ EPS_{i,t}|/Price_{i,t-1}$ for all *i* firms in analyst *a*'s portfolio at time *t* ($ACCURACY_{a,t}$). All variables are defined in Appendix A. Analyst, industry, and year fixed effects are included as additional independent variables (unreported). Standard errors are clustered by analyst. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

	[1]	[2]	[3]	[4]
INTERCEPT	-0.073	-0.065	-0.117*	-0.102*
	(-1.235)	(-1.087)	(-1.957)	(-1.716)
$DIST\ 10_{a,t}$	-0.024*		0.021	
	(-1.712)		(1.405)	
$\#\ FIRMS\ 100_{a,t}$		-0.044***		-0.009
		(-3.056)		(-0.587)
$DIST\ 10_{a,t} * HIGH\ EARN\ VOL_{a,t}$			-0.085***	
			(-5.205)	
$\#\ FIRMS\ 100_{a,t} * HIGH\ EARN\ VOL_{a,t}$				-0.066***
				(-4.068)
Analyst Variables:				
$DIST\ TO\ FIRM_{a,t}$	-0.008	-0.007	-0.010	-0.008
	(-0.811)	(-0.656)	(-0.960)	(-0.775)
$ln(HORIZON_{a,t})$	-0.034***	-0.034***	-0.034***	-0.033***
	(-5.762)	(-5.751)	(-5.734)	(-5.698)
$ln(EXP_{a,t})$	-0.003	-0.003	-0.003	-0.003
	(-0.714)	(-0.727)	(-0.760)	(-0.774)
$ln(FIRM\ EXP_{a,t})$	-0.001	-0.001	-0.001	-0.001
	(-0.576)	(-0.551)	(-0.481)	(-0.451)
$ln(\#\ INDUSTRIES_{a,t})$	-0.013*	-0.013	-0.010	-0.009
	(-1.665)	(-1.580)	(-1.181)	(-1.093)
$ln(BROKER\ SIZE_{a,t})$	0.000	0.000	0.000	0.000
	(0.063)	(0.060)	(0.062)	(0.091)
Firm Variables:				
$ln(ANALYST\ FOLLOWING_{a,t})$	0.171***	0.171***	0.170***	0.171***
	(13.620)	(13.639)	(13.585)	(13.603)
$ln(ASSETS_{a,t})$	-0.015***	-0.016***	-0.014***	-0.015***
	(-2.906)	(-2.973)	(-2.717)	(-2.801)
$BTM_{a,t}$	-0.285***	-0.285***	-0.278***	-0.277***
	(-16.634)	(-16.618)	(-16.216)	(-16.190)
$INST\ OWN_{a,t}$	0.098***	0.098***	0.108***	0.108***
	(4.614)	(4.615)	(5.146)	(5.148)
$ROA_{a,t}$	0.417***	0.418***	0.494***	0.495***
	(11.648)	(11.688)	(14.122)	(14.148)
$TURN_{a,t}$	0.012***	0.011***	0.010***	0.010***
	(3.212)	(3.159)	(2.909)	(2.867)
$BUS\ CONC_{a,t}$	-0.107***	-0.106***	-0.111***	-0.110***
	(-2.841)	(-2.818)	(-2.953)	(-2.911)
$EARN\ VOL_{a,t}$	-1.255***	-1.263***		
	(-8.849)	(-8.913)		
$HIGH\ EARN\ VOL_{a,t}$			-0.015	-0.025***
			(-1.573)	(-2.580)
$RET\ VOL_{a,t}$	-1.947***	-1.945***	-2.011***	-2.013***
	(-20.543)	(-20.553)	(-21.653)	(-21.679)
$ln(AGE_{a,t})$	-0.848***	-0.837***	-0.911***	-0.895***
	(-4.294)	(-4.245)	(-4.632)	(-4.556)
$HERF_{a,t}$	0.316***	0.334***	0.333***	0.351***
	(2.612)	(2.767)	(2.770)	(2.930)
$EARN\ COMOVE_{a,t}$	-0.085***	-0.085***	-0.089***	-0.089***
	(-3.930)	(-3.928)	(-4.117)	(-4.098)
#OBS	51,523	51,523	51,523	51,523
Adjusted R^2	0.552	0.552	0.552	0.552
F-test: $DISTANCE_{a,t} + DISTANCE_{a,t} * HIGH\ EARN\ VOL_{a,t} = 0$				
Coefficient			-0.064***	-0.075***
p-value			(0.000)	(0.000)

TABLE 5

Timeliness of Forecast Revisions Regression Results

This table includes all analyst-year observations from 1994 to 2011 with sufficient data to calculate the dependent and independent variables. The dependent variable is the percentage of quarters in which analyst *a* issues a forecast on the day of or the day after the earnings announcement date for all firms the analyst covers at time *t* ($QUICK\ REV_{a,t}$). All variables are defined in Appendix A. Analyst, industry, and year fixed effects are included as additional independent variables (unreported). Standard errors are clustered by analyst. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

	[1]	[2]	[3]	[4]
INTERCEPT	-0.407***	-0.414***	-0.418***	-0.424***
	(-12.399)	(-12.628)	(-12.764)	(-12.978)
$DIST\ 10_{a,t}$	-0.016**		-0.003	
	(-2.102)		(-0.341)	
$\#\ FIRMS\ 100_{a,t}$		-0.006		0.007
		(-0.823)		(0.783)
$DIST\ 10_{a,t}$ * $HIGH\ EARN\ VOL_{a,t}$			-0.024**	
			(-2.529)	
$\#\ FIRMS\ 100_{a,t}$ * $HIGH\ EARN\ VOL_{a,t}$				-0.025***
				(-2.655)
Analyst Variables:				
$DIST\ TO\ FIRM_{a,t}$	-0.006	-0.006	-0.006	-0.007
	(-0.959)	(-1.059)	(-1.016)	(-1.116)
$ln(HORIZON_{a,t})$	0.048***	0.048***	0.048***	0.048***
	(13.943)	(13.931)	(13.898)	(13.894)
$ln(EXP_{a,t})$	-0.001	-0.001	-0.001	-0.001
	(-0.468)	(-0.423)	(-0.512)	(-0.466)
$ln(FIRM\ EXP_{a,t})$	0.028***	0.028***	0.028***	0.027***
	(25.394)	(25.366)	(25.391)	(25.353)
$ln(\#\ INDUSTRIES_{a,t})$	0.033***	0.033***	0.033***	0.033***
	(6.526)	(6.468)	(6.474)	(6.412)
$ln(BROKER\ SIZE_{a,t})$	0.040***	0.040***	0.040***	0.040***
	(13.472)	(13.468)	(13.488)	(13.492)
Firm Variables:				
$ln(ANALYST\ FOLLOWING_{a,t})$	0.006	0.006	0.005	0.005
	(0.942)	(1.010)	(0.803)	(0.850)
$ln(ASSETS_{a,t})$	0.001	0.001	0.002	0.002
	(0.268)	(0.333)	(0.618)	(0.696)
$BTM_{a,t}$	0.001	0.001	0.001	0.001
	(0.144)	(0.127)	(0.149)	(0.109)
$INST\ OWN_{a,t}$	0.016	0.016	0.017	0.017
	(1.421)	(1.423)	(1.554)	(1.559)
$ROA_{a,t}$	-0.030*	-0.030*	-0.023	-0.024
	(-1.791)	(-1.832)	(-1.413)	(-1.469)
$TURN_{a,t}$	0.005***	0.005***	0.004***	0.005***
	(2.925)	(2.968)	(2.726)	(2.755)
$BUS\ CONC_{a,t}$	-0.010	-0.010	-0.012	-0.013
	(-0.479)	(-0.495)	(-0.584)	(-0.611)
$EARN\ VOL_{a,t}$	-0.035	-0.030		
	(-0.528)	(-0.453)		
$HIGH\ EARN\ VOL_{a,t}$			0.021***	0.022***
			(3.516)	(3.614)
$RET\ VOL_{a,t}$	-0.009	-0.009	-0.022	-0.023
	(-0.232)	(-0.222)	(-0.556)	(-0.566)
$ln(AGE_{a,t})$	-0.174	-0.185	-0.189*	-0.202*
	(-1.536)	(-1.640)	(-1.672)	(-1.789)
$HERF_{a,t}$	0.095	0.089	0.098	0.091
	(1.284)	(1.200)	(1.326)	(1.235)
$EARN\ COMOVE_{a,t}$	0.045***	0.045***	0.043***	0.043***
	(3.787)	(3.807)	(3.647)	(3.670)
#OBS	51,523	51,523	51,523	51,523
Adjusted R^2	0.613	0.613	0.613	0.613
F-test: $DISTANCE_{a,t} + DISTANCE_{a,t} * HIGH\ EARN\ VOL_{a,t} = 0$				
Coefficient			-0.027***	-0.018**
p-value			(0.002)	(0.046)

TABLE 6

Number of Forecast Revisions Regression Results

This table includes all analyst-year observations from 1994 to 2011 with sufficient data to calculate the dependent and independent variables. The dependent variable is the natural logarithm of the average number of quarterly forecast revisions per firm provided by analyst *a* in year *t* ($ln(\# REV_{a,t})$). All variables are defined in Appendix A. Analyst, industry, and year fixed effects are included as additional independent variables (unreported). Standard errors are clustered by analyst. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

	[1]	[2]	[3]	[4]
INTERCEPT	1.800***	1.792***	1.796***	1.788***
	(37.250)	(37.183)	(37.167)	(37.063)
$DIST\ 10_{a,t}$	-0.029**		-0.012	
	(-2.573)		(-0.924)	
$\#\ FIRMS\ 100_{a,t}$		-0.019*		-0.000
		(-1.728)		(-0.018)
$DIST\ 10_{a,t}$ * $HIGH\ EARN\ VOL_{a,t}$			-0.033**	
			(-2.544)	
$\#\ FIRMS\ 100_{a,t}$ * $HIGH\ EARN\ VOL_{a,t}$				-0.038***
				(-2.885)
Analyst Variables:				
$DIST\ TO\ FIRM_{a,t}$	0.029***	0.029***	0.029***	0.028***
	(3.204)	(3.145)	(3.166)	(3.105)
$ln(HORIZON_{a,t})$	-0.082***	-0.082***	-0.082***	-0.082***
	(-17.124)	(-17.121)	(-17.163)	(-17.156)
$ln(EXP_{a,t})$	-0.003	-0.003	-0.003	-0.003
	(-1.008)	(-0.970)	(-1.002)	(-0.962)
$ln(FIRM\ EXP_{a,t})$	0.002	0.002	0.002	0.002
	(1.065)	(1.058)	(1.024)	(1.010)
$ln(\#\ INDUSTRIES_{a,t})$	-0.048***	-0.049***	-0.049***	-0.049***
	(-6.563)	(-6.597)	(-6.646)	(-6.686)
$ln(BROKER\ SIZE_{a,t})$	0.007	0.007	0.007	0.007
	(1.617)	(1.610)	(1.576)	(1.572)
Firm Variables:				
$ln(ANALYST\ FOLLOWING_{a,t})$	0.004	0.005	0.003	0.004
	(0.441)	(0.509)	(0.359)	(0.403)
$ln(ASSETS_{a,t})$	0.005	0.006	0.006	0.006
	(1.291)	(1.338)	(1.367)	(1.435)
$BTM_{a,t}$	0.026***	0.026***	0.024**	0.024**
	(2.633)	(2.632)	(2.458)	(2.430)
$INST\ OWN_{a,t}$	0.019	0.019	0.018	0.018
	(1.227)	(1.230)	(1.170)	(1.179)
$ROA_{a,t}$	0.013	0.012	0.005	0.004
	(0.532)	(0.498)	(0.222)	(0.184)
$TURN_{a,t}$	0.016***	0.016***	0.016***	0.016***
	(7.049)	(7.067)	(7.030)	(7.026)
$BUS\ CONC_{a,t}$	0.055*	0.054*	0.053*	0.052*
	(1.811)	(1.804)	(1.743)	(1.718)
$EARN\ VOL_{a,t}$	0.166*	0.171*		
	(1.835)	(1.895)		
$HIGH\ EARN\ VOL_{a,t}$			0.027***	0.030***
			(3.218)	(3.527)
$RET\ VOL_{a,t}$	0.236***	0.237***	0.243***	0.243***
	(4.204)	(4.222)	(4.366)	(4.361)
$ln(AGE_{a,t})$	0.075	0.061	0.066	0.048
	(0.455)	(0.368)	(0.402)	(0.293)
$HERF_{a,t}$	-0.144	-0.149	-0.148	-0.153
	(-1.358)	(-1.402)	(-1.389)	(-1.440)
$EARN\ COMOVE_{a,t}$	0.034**	0.034**	0.034**	0.034**
	(2.056)	(2.078)	(2.038)	(2.060)
#OBS	51,523	51,523	51,523	51,523
Adjusted R^2	0.683	0.683	0.683	0.683
F-test: $DISTANCE_{a,t} + DISTANCE_{a,t} * HIGH\ EARN\ VOL_{a,t} = 0$				
Coefficient			-0.045***	-0.038***
p-value			(0.000)	(0.002)

TABLE 7

Industry Firm Mentions in Conference Calls Regression Results

This table includes all firm-year observations from 2002 to 2011 with sufficient data to calculate the dependent and independent variables. The dependent variable in Column 1 is an indicator variable equal to 1 if firm *i* mentions firm *j* in any of its conference calls during year *t* ($MENTION_{i,j,t}$). In Column 2 (3), the dependent variable is an indicator variable equal to 1 if the managers (analysts) mention firm *j* first during any of firm *i*'s conference calls during year *t* ($MENTION\ (MGR\ FIRST_{i,j,t})$ and $MENTION\ (ANAL\ FIRST_{i,j,t})$). The independent variable of interest is the rank (between 0 and 9, divided by 9) of the distance between firm *i* and firm *j* in year *t* ($DISTANCE_{i,j,t}$). All variables are defined in Appendix A. Year and industry fixed effects are included as additional independent variables (unreported). Standard errors are clustered by firm *i-j* combinations. All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

	[1]	[2]	[3]
	$MENTION_{i,j,t}$	$MENTION\ (MGR\ FIRST)_{i,j,t}$	$MENTION\ (ANAL\ FIRST)_{i,j,t}$
INTERCEPT	-13.499***	-13.562***	-15.945***
	(-55.060)	(-48.850)	(-38.363)
$DISTANCE_{i,j,t}$	-0.286***	-0.283***	-0.221***
	(-6.414)	(-5.664)	(-3.110)
$ln(ASSETS_{i,t})$	0.047***	0.024*	0.106***
	(3.855)	(1.763)	(5.028)
$ln(ASSETS_{j,t})$	0.725***	0.750***	0.633***
	(54.974)	(49.680)	(29.155)
$BTM_{i,t}$	0.034	0.036	0.024
	(1.279)	(1.165)	(0.509)
$BTM_{j,t}$	-0.306***	-0.313***	-0.258***
	(-8.853)	(-7.872)	(-4.257)
$INST\ OWN_{i,t}$	-0.074	-0.089	0.068
	(-1.400)	(-1.464)	(0.794)
$INST\ OWN_{j,t}$	-0.828***	-0.869***	-0.610***
	(-16.761)	(-15.364)	(-7.449)
$ROA_{i,t}$	0.005	-0.026	0.248
	(0.075)	(-0.320)	(1.555)
$ROA_{j,t}$	-0.020	0.084	-0.201
	(-0.189)	(0.675)	(-0.912)
$TURN_{i,t}$	-0.296	-0.059	-1.084
	(-0.418)	(-0.074)	(-0.884)
$TURN_{j,t}$	-1.824**	-2.671***	1.805
	(-2.293)	(-2.878)	(1.466)
$BUS\ CONC_{i,t}$	0.058	-0.085	0.451***
	(0.634)	(-0.818)	(3.044)
$BUS\ CONC_{j,t}$	0.732***	0.747***	0.801***
	(8.600)	(7.932)	(5.339)
$EARN\ VOL_{i,t}$	0.679***	0.718***	0.516
	(3.030)	(2.914)	(1.074)
$EARN\ VOL_{j,t}$	0.612**	0.821***	-0.125
	(2.293)	(2.703)	(-0.224)
$RET\ VOL_{i,t}$	-0.187	-0.232	-0.062
	(-1.101)	(-1.196)	(-0.177)
$RET\ VOL_{j,t}$	0.100	0.152	0.057
	(0.483)	(0.644)	(0.143)
$ln(AGE_{i,t})$	-0.018	-0.057**	0.082**
	(-0.736)	(-1.993)	(1.986)
$ln(AGE_{j,t})$	0.182***	0.187***	0.134***
	(6.735)	(6.179)	(2.933)
$ln(ANAL\ FOLL_{i,t})$	0.011	0.014	-0.011
	(0.531)	(0.562)	(-0.290)
$ln(ANAL\ FOLL_{j,t})$	0.205***	0.188***	0.236***
	(9.082)	(7.358)	(5.889)
$COMPETITOR_{i,j,t}$	1.111***	1.048***	1.227***
	(38.068)	(31.584)	(23.666)
$EARN\ COMOVE_{i,j,t}$	0.048*	0.027	0.106**
	(1.800)	(0.882)	(2.142)
$SHARED\ ANALYST_{i,j,t}$	1.024***	0.930***	1.386***
	(31.282)	(24.875)	(22.149)
#OBS	2,377,240	2,377,240	2,377,240
Pseudo R^2	0.299	0.290	0.260

TABLE 8

Analyst Coverage Initiation Regression Results

This table includes all analyst-firm-year observations from 1994 to 2010 in which the firm's headquarters location in period *t* is greater than 100 miles from its headquarters location in period *t-1*. Analysts-firm pairings for year *t* include all potential matches between the analyst and all firms from industries covered by the analyst in year *t-1*. The dependent variable is an ordered analyst coverage variable equal to 2 if analyst *j* follows firm *i* in year *t* and does not follow firm *i* in year *t-1*; equal to 1 if analyst *j* follows firm *i* in both year *t* and in year *t-1*; equal to 0 if analyst *j* does not follow firm *i* in either year *t* or in year *t-1*; and equal to -1 if analyst *j* does not follow firm *i* in year *t* but does follow firm *i* in year *t-1*. The independent variables of interest are $\Delta DIST10_{i,t}$ and $\Delta \# \ FIRMS\ 100_{i,t}$, defined as the change in the $DIST\ 10_{i,t}$ and $\#\ FIRMS\ 100_{i,t}$ variables, respectively. All variables are defined in Appendix A. Year and industry fixed effects are included as additional independent variables (unreported). All continuous variables are winsorized at the 1% and 99% levels. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

	[1]	[2]	[3]	[4]
INTERCEPT1	-2.151***	-2.146***	-2.159***	-2.142***
	(-17.579)	(-17.534)	(-17.535)	(-17.452)
INTERCEPT2	2.513***	2.519***	2.503***	2.520***
	(20.591)	(20.628)	(20.404)	(20.579)
INTERCEPT3	3.390***	3.396***	3.381***	3.398***
	(27.236)	(27.260)	(26.992)	(27.180)
$\Delta DIST10_{i,t}$	-0.058*		-0.111**	
	(-1.660)		(-2.176)	
$\Delta \#\ FIRMS\ 100_{i,t}$		-0.075**		-0.121**
		(-2.155)		(-2.336)
$\Delta DIST10_{i,t}$ * $HIGH\ EARN\ VOL_{i,t}$			0.112	
			(1.526)	
$\Delta \#\ FIRMS\ 100_{i,t}$ * $HIGH\ EARN\ VOL_{i,t}$				0.083
				(1.194)
$\Delta ln(ASSETS_{i,t})$	0.125***	0.129***	0.125***	0.126***
	(4.309)	(4.450)	(4.181)	(4.247)
$\Delta SP500_{i,t}$	0.446***	0.438***	0.465***	0.460***
	(3.287)	(3.226)	(3.426)	(3.386)
$\Delta ln(ANALYST\ FOLLOWING_{i,t})$	0.014	0.013	0.009	0.009
	(0.431)	(0.412)	(0.280)	(0.269)
$\Delta ln(VOLUME_{i,t})$	-0.003	-0.001	-0.004	-0.001
	(-0.161)	(-0.047)	(-0.233)	(-0.051)
$\Delta RET_{i,t}$	-0.014	-0.014	-0.012	-0.013
	(-1.295)	(-1.372)	(-1.123)	(-1.178)
$\Delta BTM_{i,t}$	-0.056**	-0.060***	-0.049**	-0.054**
	(-2.475)	(-2.602)	(-2.075)	(-2.269)
$\Delta INST\ OWN_{i,t}$	0.171***	0.173***	0.155**	0.157**
	(2.640)	(2.677)	(2.419)	(2.452)
$\Delta DIST\ TO\ FIRM_{a,i,t}$	0.014	0.013	0.025	0.024
	(0.409)	(0.379)	(0.721)	(0.692)
$REL\ EXP_{a,t}$	-0.047***	-0.047***	-0.045***	-0.045***
	(-3.998)	(-3.998)	(-3.780)	(-3.796)
$\Delta ln(BROKER\ SIZE_{a,t})$	0.038	0.038	0.037	0.037
	(1.294)	(1.288)	(1.271)	(1.268)
$\#\ FIRMS\ FOLL_{a,t}$	0.049***	0.049***	0.048***	0.048***
	(15.748)	(15.753)	(15.699)	(15.708)
$\#\ FIRMS\ FOLL_{a,t}^2$	-0.001***	-0.001***	-0.001***	-0.001***
	(-10.164)	(-10.160)	(-10.131)	(-10.127)
$BFOLL_{a,t}$	2.442***	2.440***	2.437***	2.434***
	(46.553)	(46.470)	(46.437)	(46.349)
$DEPART_{a,t}$	0.311***	0.311***	0.307***	0.307***
	(4.642)	(4.638)	(4.592)	(4.588)
$PRIMARY\ INDUSTRY_{a,i,t}$	0.384***	0.384***	0.384***	0.384***
	(15.801)	(15.795)	(15.797)	(15.791)
$HIGH\ EARN\ VOL_{i,t}$			-0.117***	-0.106**
			(-2.670)	(-2.405)
#OBS	55,158	55,158	54,834	54,834
Pseudo R^2	0.135	0.135	0.136	0.136