COMMON ANALYST COVERAGE AND

INFORMATION TRANSFERS WITHIN ANALYST PORTFOLIOS

MINGMING JI

PhD

THE HONG KONG POLYTECHNIC UNIVERSITY

2022

The Hong Kong Polytechnic University

School of Accounting and Finance

Common Analyst Coverage and Information Transfers within Analyst Portfolios

Mingming Ji

A thesis submitted in partial fulfilment of the requirements for the degree of

Doctor of Philosophy

May 2022

CERTIFICATE OF ORIGINALITY

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it reproduces no material previously published or written, nor material that has been accepted for the award of any other degree or diploma, except where due acknowledgement has been made in the text.

___________________________ (Signed)

Mingming Ji (Name of student)

Abstract

This paper examines the role of information transfers within an analyst's portfolio in improving analyst forecast accuracy. Given that firms co-covered by the same analyst are economically linked, such linkages captured by common analyst coverage make information on one firm collected and processed by an analyst valuable for the analyst to analyze other firms within the same portfolio. I take management earnings forecasts as the sources of information, and focus on the information transfers from large firms to small firms within analysts' portfolios. Considering the top (bottom) quartile firms in terms of market capitalization in an analyst's portfolio as large (small) firms, I find that there exist information transfers from large firms to small firms. Specifically, I show a positive intra-analyst information spillover effect, that is, the management earnings forecasts issued by large firms can reduce analysts forecast errors on the small firms within the same analyst portfolio. In addition, I find greater spillover effects if the portfolio firm linkages are stronger (captured by common industry and peer analyst coverage), if analysts are more experienced (captured by general and industry-specific experience), and if small firms face greater uncertainty (captured by firm age and analyst dispersion). I also show that the spillover effect is through the information environment mechanism as information asymmetry of small firms is significantly reduced thanks to information spillovers. Finally, I document that the information spillover effect is asymmetric (i.e., there is only large-to-small but no small-to-large information spillovers), and the market reacts positively to analyst forecast revisions with information spillover.

Acknowledgements

First and foremost, I would like to express my deepest gratitude to my chief supervisor Dr. Liangliang Lilian Jiang for her guidance and help in my study and research. Without her persistent help, the goal of my research would not have been achieved. Second, I would like to thank my family for their unreserved love, trust and support. My family shape my personality of independence and spirit of freedom. My research work would not have been achieved without their input. Finally, the financial support from School of Accounting and Finance, and The Hong Kong Polytechnic University is truly appreciated. Without the financial support and research funding, my research could not reach its goal.

Table of Contents

1. Introduction

Financial analysts are important information intermediaries in capital markets. Analysts process private and public information to perform analysis on specific firms they cover, and convey their research outputs to investors via various channels. Existing research on financial analysts mainly focus on their inputs and outputs, as well as the correlation between them. For example, research on analyst inputs studies the external and public information that analysts collect and then utilize. Such information includes firm-specific information (Abarbanell 1991; Lehavy et al. 2011; Gibbons et al. 2020), industry-specific information (Ramnath 2002; Kim et al. 2008; Fairfield et al. 2009), and macroeconomic information (Jennings 1987; Hutton et al. 2012), etc. However, little evidence exists on whether analysts could incorporate information flows within their own portfolio into their forecasts. I fill this gap by investigating information transfers within analyst portfolios captured by common analyst coverage. Specifically, I examine the effect of information spillovers generated by large firms within an analyst's portfolio on the analyst forecasts for the small firms within the same portfolio. I show that the internal, private, and analyst coverage-specific information spillovers can benefit analyst research and improve the quality of analysts' earnings forecasts. Thus, I provide a new information source of analyst research, and document novel evidence on analysts' internal information processing, which is understudied by existing research.

Firms co-covered by the same analyst are economically linked, and such linkage contains information that is useful to both the market and firms themselves, because firms linked by common analyst coverage are fundamentally similar (Ali and Hirshleifer 2019). This linkage can be even stronger than other linkage proxies. As documented by Ali and

Hirshleifer (2019), common analyst coverage is a strong measure of firm linkage, and could unify other firm linkage measures, including common industry and supply chain. Prior research finds that the market captures the linkages among co-covered firms. For example, common analyst coverage can explain stock co-movement (Muslu et al. 2014; Israelsen 2016) and momentum spillover effects (Ali and Hirshleifer 2019). Moreover, common analyst coverage linkage is useful to firms covered by the same analysts. Martens and Sextroh (2021) document the existence of information spillovers behind common analyst coverage by showing that firms are more likely to cite another firm's patents if they are co-covered by the same analyst. That is to say, firms gather information from their peer firms who share the same analysts.

Firm linkages through common analyst coverage can benefit analysts as well, because information on one firm collected and processed by an analyst can be valuable for the analyst to analyze other firms that covered by her. I refer to the above coverage-specific information flow that transfers among firms within analysts' portfolios as "intra-analyst information spillover". Given that analysts collect various information that is useful for equity research, the aforementioned coverage-specific information flow (i.e. intra-analyst information spillovers) could contain abundant information, including but not limited to firm-specific information, industry-specific information, and macroeconomic information. In this study, I explore the role of intra-analyst information spillovers in analyst research, where information flows move from large firms to small firms co-covered by the same analyst.

I focus on the information transfers from large firms to small firms within analysts' portfolios for two reasons. First, large firms provide a broader set of information, and information environment of large firms are more transparent (Collins et al. 1987; Bhushan 1989; Lang and Lundholm 1996; Bonsall et al. 2013; Hann et al. 2019). Thus, it is easier for analysts to collect enough information from large firms, and the information provided by large firms is more credible. Correspondingly, analysts have less access to small firms' information, and are subject to the information limitation of small firms. Thus, I expect that the intra-analyst information spillovers are generated by large firms, and then used in analyst research on small firms. Second, analysts are subject to limited attention (Driskill et al. 2020). They allocate more efforts to large firms than small firms they covered because of career concerns (Harford et al. 2019). It suggests that analysts put more efforts on large firms than small firms. They spend more time in collecting and processing information of large firms, and therefore, are more informed on large firms than small firms. I expect that analysts take this advantage, and apply the information collected from large firms to small firms. Such information could include industry-specific information, supply chain information, macroeconomic information etc. Taken together, information spillovers would benefit analysts' research on small firms because sufficient and transparent information reduces information asymmetry (Healy and Palepu 2001; Shroff et al. 2013), and facilitates analysts to produce more accurate forecasts (Lang and Lundholm 1996) on small firms.

To test the effect of intra-analyst information spillovers, I examine the effect of management earnings forecasts issued by large firms on analyst forecast accuracy of small firms within the same analyst's portfolio. That is, I consider management earnings forecasts issued by large firms as the source of intra-analyst information spillovers. To reduce information asymmetry and communicate with investors, managers disseminate private information through voluntary disclosures, including earnings forecasts (Healy and Palepu 2001). Moreover, management earnings forecasts include a broad set of information, such as firm-specific information (Waymire 1984), intra-industry information (Baginski 1987; Pyo and Lustgarten 1990), and macroeconomic information (Bonsall et al. 2013). The abundant information of management earnings forecasts can be processed by analysts. They then use such information generated by large firms to make forecast on small firms in their portfolios. By using the presence of management earnings forecasts of large firms as a source of information spillovers, I test analyst forecast accuracy on small firms to document the existence of intra-analyst information spillovers from large firms to small firms within analysts' portfolios.

To identify intra-analyst information spillovers, I firstly rank firms covered by analyst *i* in calendar quarter *t* in a descending order of market capitalization, and the top quartile (bottom quartile) firms are considered as large firms (small firms) within the analyst's portfolio. Then, each small firm is assumed to receive information spillovers from all large firms within the portfolio. A small firm is considered as receiving information spillovers if at least one top quartile firm covered by the same analyst issued management earnings forecasts in the previous calendar quarter. I find that intra-analyst information spillovers are negatively associated with analyst absolute forecast errors. That is, the analyst absolute forecast errors reduce by 4.3% with the presence of intra-analyst information spillovers controlling for a set of firm and analyst characteristics. The effect holds with firm fixed effects, analyst fixed effects, and year-quarter fixed effects. In addition, the effect remains when I replace firm and analyst fixed effects by firm-analyst pair fixed effects. By applying firm-analyst pair fixed effects, I take care of unobserved time-invariant analyst-firm specific variables that could impact analyst forecast errors (e.g. analysts' personal interest in covering specific firms).

My findings are robust to alternative measures of the scale of information spillovers. The scale of information spillovers is determined by the number of firms generating information spillovers. Thus, I identify information spillovers by using the top tercile and top quintile (instead of top quartile) market capitalization firms within an analyst's portfolio as the source of management earnings forecasts. I find similar results as my main findings.[1] In addition, I show that my findings are not driven by the effect of top analysts who may be better at utilizing firm linkages and information spillovers, and I still find consistent findings after removing top analysts in terms of their portfolio size and general experiences in making forecasts. Further, I show that the large-to-small information spillover effect are not impacted by subsequent information (i.e. large firms' earnings announcements and small firms' management earnings forecasts), which may correct or cover information of the previous large firms' management earnings forecasts. My findings are also robust to an alternative measure for information spillovers, where I measure information spillovers as the number of firms that issue management earnings forecasts in the previous quarter.

I then perform a series of tests to show the heterogenous effects originated from linkage intensity, analyst experience and firm uncertainty. I find that the effect of information spillovers is stronger when the intensity of linkage among portfolio firms are stronger,

[1] As shown in Harford et al. (2019), institutional holdings and trading volume show a similar pattern as market capitalization in analyst effort allocation. Thus, it's possible that the effect of information spillovers can also be captured by institutional holdings and trading volume. I show that my results are robust if I rank firms by institutional holdings or trading volume in a descending order, and consider large (small) firms as the corresponding top (bottom) quartile firms. The results are reported in Appendix Table 2 and Appendix Table 3, respectively.

when the financial analysts are more experienced, and when small firms suffer from higher uncertainty. I then exploit the mechanism of the information spillover effects I document. If information spillover persists, firms with more informative and accurate analyst forecasts driven by information spillovers should have better information environment in the current and subsequent quarters. I conjecture that analysts benefit from intra-analyst information spillovers by producing more accurate forecasts, which contributes to firms' improved information transparency. Thus, I firstly predict firm level analyst forecast errors using information spillovers, and then examine the effect of the predicted forecast errors on stock illiquidity. My results confirm the above conjecture, where I find a negative correlation between predicted absolute forecast errors and stock illiquidity in the current quarter as well as subsequent three quarters.

I further extend my research to examine the capital market effects of intra-analyst information spillovers. In particular, I investigate market reactions to analyst forecast revisions. Forecast revisions with intra-analyst information spillovers are more informative, and therefore the market is expected to positively respond to the valuable revisions. My results are consistent with my expectations. Next, I document that the intra-analyst information spillover effect is asymmetric. That is, there is only large-to-small, but no small-to-large information spillovers.

Finally, I perform two placebo tests to make sure that my findings are not driven by any random factors, and the information spillover effect only exists when there are such large and small firms as I defined. To address the concerns on endogeneity such as the omitted variable problem, I perform an instrumental variable analysis using the average frequency of past management earnings forecasts issued by large firms as the instrument.

The average frequency of large firms' past management earnings forecasts is correlated with the likelihood of issuing management earnings forecasts in the current quarter and thus the existence of information spillovers, but are not directly related to small firms' forecast accuracy except through the large firms' information spillover channel. Using two-stage least squares estimation, I find that the effect of information spillovers remains.

My research is closely related to certain previous studies. Analysts are documented to incorporate information from peer firms in the same industry in making forecasts. For example, Ramnath (2002) finds that analysts of non-announcing firms react to the first announcer's earnings report in the same industry. Similarly, Hilary and Shen (2013) document that analysts provide more timelier forecasts on non-issuing firms as there are more management forecasts issued by peer firms in the same industry. Both of the two studies focus on information transfers among the same industry, which is different from my study. A more related study is Martens and Sextroh (2021), where they study the information spillovers from analysts to firms. In particular, they find that firms are more likely to cite another firm's patents if they are co-covered by the same analyst. It is consistent with my hypothesis that firms within an analyst's portfolio are economically linked. My research distinguishes from the above studies by examining the information spillovers within analysts' portfolios.

This paper makes several contributions to the literature. First, to the best of my knowledge, this is the first paper that provides the evidence on information originated in analysts' portfolios and internally transferred from large firms to small firms within the portfolios. Existing literature focuses on analysts' information sets like financial statements, media press, and industry and macroeconomic information. However, this paper documents that firms co-covered by the same analyst can generate valuable information sets too. Moreover, the information sets are analyst coverage-specific. The intra-analyst information spillovers identified by common analyst coverage are captured and utilized by analysts, and contribute to analyst information production. The findings in this paper is distinct from studies on information transfers generated by firms from common industries (Hilary and Shen 2013; Brochet et al. 2018), along the same supply chains (Pandit et al. 2011; Guan et al. 2014; Luo and Nagarajan 2015)), and share geographic locations (Parsons et al. 2020), because shared analyst coverage can capture multi-dimentional linkages which is not limited to a specific linkage. More importantly, firm linkages identified by common analyst coverage provide sufficient cross-sectional and time-series variation in information spillovers, which is helpful in explaining the role of information spillovers at analyst level.

Second, this paper also contributes to the literature on the role of financial analysts as information intermediaries in capital markets. Though investors could absorb information incorporated in management earnings forecasts from linked firms, I emphasize the importance of financial analysts in my context. Recent studies show that investors face disclosure processing costs, and even public disclosures are costly to be acquired and processed by investors (Blankespoor et al. 2019; Blankespoor et al. 2020). As financial intermediaries, financial analysts are professional in information acquiring, processing, and integrating. Therefore, analysts could provide information that is superior to what other investors could learn from disclosures (Kim and Verrecchia 1994, 1997). Moreover, intra-analyst information spillovers could be neglected by other market participants because of limited attention on firm-specific information (Peng and Xiong 2006) and the lack of skills in processing such information. Therefore, financial analysts contribute to the market not only by capturing intra-analyst information spillovers, but also by integrating the information and improving information transparency.

Finally, this paper adds to the literature on the information contents of management forecasts. Management forecasts are important information provided by corporate executives. The information conveyed through management forecasts, especially earnings forecasts, has been documented to reduce information asymmetry (Pyo and Lustgarten 1990). I provide novel evidence on the role of management earnings forecasts in reducing information asymmetry. I show that intra-analyst information spillovers reduce information asymmetry, which can be seen as information externalities generated by management earnings forecasts.

2. Hypothesis Development

2.1. Firm Linkages and Intra-analyst Information Spillovers

Recent studies on common analyst coverage find that co-covered firms within analysts' portfolio are fundamentally and economically similar (Lee et al. 2016; Ali and Hirshleifer 2019). That is, common analyst coverage can capture the linkages among firms co-covered by the same analysts. Moreover, Lee et al. (2016) find that firm linkages identified by common analyst coverage explain cross-sectional stock returns better than firm linkages identified by common industry. Ali and Hirshleifer (2019) also show that common analyst linkage outperforms other linkage measures, such as common industry, same geographic location, supply chain, and technology similarity, in explaining momentum spillover effects. It implies that common analyst coverage is superior to other linkages among firms, and could unify the linkages identified by traditional linkage measures.

Firm linkages allow information of a linked firm become useful for analysts to forecast other firms in the link loops. For example, analysts can incorporate earnings information of linked firms identified by common industry in revising earnings forecasts on other linked firms (Ramnath 2002), and analysts also absorb earnings information of customer firms in forecasting supplier firms through firm linkages based on supply chain (Guan et al. 2014). The above evidence indicates that firm linkages generate information transfers among linked firms, and analysts utilize the information transfers by capturing the linkages. As a superior firm linkage measurement, common analyst coverage would provide stronger linkages among firms than other measurement (e.g. common industry and supply chain). It also serves as an important channel of information transfers that is useful for analyst research.

I focus on information transfers from large firms to small firms within an analyst's portfolio, and refer such information transfers as intra-analyst information spillovers. The reasons for focusing on the large-to-small information spillovers are twofold. First, large firms have a better information environment and provide more sufficient information than small firms (Collins et al. 1987; Bhushan 1989; Lang and Lundholm 1996). It implies that analysts have more access to transparent, abundant, and credible information of large firms than small firms. In addition, it is also less costly for analysts to gather information from large firms than small firms because of better information environment large firms possess (Frankel et al. 2006; Fischer and Stocken 2010). Therefore, it is more likely to observe large-to-small, rather than small-to-large, intra-analyst information spillovers. Second, analysts are subject to limited attention (Driskill et al. 2020), and tend to allocate more effort on large firms within their portfolios due to career concerns (Harford et al. 2019).

This implies that analysts could subjectively put more effort on processing information from large firms. Naturally, analysts' research outputs on large firms are of better quality than that of small firms within their portfolios (Harford et al. 2019). Therefore, it is more likely for analysts to apply information generated by large firms on small ones, that is, analysts would use such information spillover from large firms to improve their forecasts for the small firms within their portfolios.

2.2. The Source of Intra-analyst Information Spillovers

In this study, I focus on management earnings forecasts issued by large firms within analysts' portfolios, and consider large firms as the source of information spillovers. On the one hand, management earnings forecasts provide important corporate information, which is important for analysts to form expectations on firms' future earnings. Prior research documents that management earnings forecasts influence analyst earnings forecasts (Baginski and Hassell 1990; Cotter et al. 2006; Merkley et al. 2012), and analyst forecast revisions are timelier (Hsu and Wang 2021) and more accurate following management earnings forecasts (Hassell and Jennings 1986; Kim and Song 2015). On the other hand, management earnings forecasts convey not only firm-specific information, but also other valuable information including industry-specific information (Baginski 1987; Pyo and Lustgarten 1990; Kim et al. 2008) and macroeconomic information (Bonsall et al. 2013). For example, Baginski (1987) finds that market reactions on one firm are associated with management earnings forecasts of a similar firm in terms of intra-industry business risk and financial risk. Bonsall et al. (2013) show that management earnings forecasts issued by bellwether firms provide information on macroeconomy. More importantly, prior research documents that analysts also react to management earnings forecasts by revising forecasts and stock recommendations (Baginski and Hassell 1990; Merkley et al. 2012). Therefore, management earnings forecasts issued by large firms within analysts' portfolio can be a source of intra-analyst information spillovers.

I hypothesize that analysts benefit from information spillovers generated by large firms in forecasting earnings of small firms within analysts' portfolios, where information spillovers are originated in management earnings forecasts issued by large firms. I test the above hypothesis by investigating if analyst forecast accuracy on small firms improves when there are information spillovers generated by large firms within analysts' portfolios.

3. Data and Sample

The data used in this study is mainly constructed from individual analyst quarterly earnings forecasts and management earnings guidance data of Institutional Broker Estimate System (I/B/E/S) detail history file. In addition, I get firm financial data from Center for Research in Security Prices (CRSP) and Compustat, and institutional holding data from the Thomson 13F file. My sample period spans from 1998 to 2019. I start from 1998 because I/B/E/S releases regular management guidance since 1998 (Chuk et al. 2013; Hsu and Wang 2021).

To construct my sample, I firstly identify an analyst's portfolio by keeping unique firms covered by the analyst in a calendar quarter. Following prior studies (Kumar et al. 2021), I only keep the latest analyst forecast before earnings announcement dates. Then, I rank firms in the analyst's portfolio by market capitalization measured at the end of the previous calendar quarter in descending order. The top quartile firms are considered as large firms, and the bottom quartile firms are considered as small firms. I expect that small firms would receive information spillovers generated by large firms within the same analyst's portfolio.

I define information spillovers as a dummy variable that equals one if there is at least one large firm issues management earnings forecasts in the previous quarter, and zero otherwise. Each small firm is expected to receive information spillovers from all corresponding large firms within an analyst's portfolio. Figure 1 illustrates my conjecture of intra-analyst information spillovers in detail. Assume there are eight firms in the analyst's portfolio, and I rank firms in descending order by market capitalization (firm A to firm H). Management earnings forecasts issued by either firm A or firm B would be incorporated by the analysts when making forecasts for firm G and firm H. As a result, I expect that the forecast accuracy for both firm G and firm H improves.

My measure for the quality of analyst forecasts is analyst absolute forecast errors, which is based on analysts' quarterly EPS forecasts and actual EPS. Specifically, the analyst absolute forecast errors (*Abs_FE*) is measured as the absolute difference between analyst EPS forecast and actual EPS scaled by the stock price at the end of the previous quarter. I construct a set of control variables that are documented to impact analyst forecast behavior, including firm size (*Size*), measured as the natural logarithm of market capitalization; analyst coverage (*Analyst_Cover*), measured as the natural logarithm of the number of analysts covering a firm; institutional holdings (*Inst_Holdings*), measured as institutional ownership ratio; profitability (*Profitability*), measured as income before extraordinary items scaled by total assets; earnings volatility (*Earn_Volatility*), measured as the standard deviation of ROA in the past four quarters; past returns (*Past_Returns*), measured as buy-and-hold abnormal returns through the previous quarter; management guidance issued by a small firm (*Self_Guidance*), measured as an indicator variable that equals one if a bottom quartile firm issued at least one management earnings forecast in the previous quarter, and zero otherwise. Apart from controlling the above firm characteristics, I also include analyst characteristic variables. I control for analyst forecast horizon (*Forecast_Horizon*), measured as the natural logarithm of the number of days between analyst forecast dates and earnings announcement dates; industry complexity (*Indu_Complexity*), measured as the number of two-digit SIC industries covered by an analyst; analyst portfolio size (*Portfolio_Size*), measured as the natural logarithm of the number of firms covered by an analyst; analyst firm-specific experience (*Firm-Expert*), measured as an indicator variable that equals one if the number of months since an analyst covered a firm is ranked in the top quintile of my sample, and zero otherwise; resources available to analysts (*Top_Broker*), measured as an indicator variable that equals one if an analyst works in a top quintile brokerage house based on the number of analysts employed, and zero otherwise. Detailed variable definitions can be seen in Table A1 in Appendix.

Table 1 provides the summary statistics on the variables used in the baseline regression. There are 4,595 unique analysts, and 4,136 unique small firms covered by the 85,681 observations. The mean of *Abs_FE* is 0.555 with a standard deviation 1.179. In addition, there are around 60.1% analyst firm-quarter observations receive information spillovers from large firms in my sample. Figure 2 plots the average absolute forecast errors by *Info_Spillover* across year-quarters from 1998Q1 to 2019Q4, where the average absolute forecast errors are the quarterly averaged *Abs_FE*. As can be seen in Figure 2a, the average absolute forecast errors with information spillovers are lower than that without information spillovers on average. It suggests that analysts produce more accurate earnings forecasts when there are information spillovers within analysts' portfolio. Moreover, it's not surprising that the average absolute forecast errors increase sharply since the beginning of the 2008 financial crisis. It's intuitive that the macroeconomic uncertainty brings difficulty in forecasting, and increases analyst forecast errors. Figure 2b plots the difference between the average absolute forecast errors without and with information spillovers across year-quarters. In general, the difference is positive across my sample period, which implies that analyst earnings forecasts perform better with information spillovers. More importantly, I can see that the difference in the average absolute forecast errors reaches a peak around the 2008 financial crisis. It suggests that intra-analyst information spillover plays a more important role in analyst forecasting as it provides more information contents when macroeconomic uncertainty is greater than other time.

4. Methods and Results

4.1. Baseline Results

To estimate the effect of information spillovers on analyst forecast errors, I estimate the following regression model.

$$AbsFE_{i,j,t} = \beta_0 + \beta_1 \cdot InfoSpillover_{i,j,t-1} + \omega \cdot X + \epsilon_{i,j,t} \tag{1}$$

The dependent variable is $Abs\_FE_{i,j,t}$ which denotes analyst i's absolute forecast errors for firm j in quarter t. The main explanatory variable is $Info\_Spillover_{i,j,t-1}$, which is an indicator variable that equals one if there is at least one management earnings forecast issued by large firms in quarter $t-1$ received by a small firm j within analyst i's portfolio, and zero otherwise. X represents a set of control variables, including firm size (*Size*), analyst coverage (*Analyst_Cover*), institutional holdings (*Inst_Holdings*), profitability (*Profitability*), earnings volatility (*Earn_Volatility*), past returns (*Past_Returns*), management guidance issued by a small firm (*Self_Guidance*), analyst forecast horizon

(*Forecast_Horizon*), industry complexity (*Indu_Complexity*), analyst portfolio size (*Portfolio_Size*), analyst firm-specific experience (*Firm-Expert*), resources available to analysts (*Top_Broker*). Detailed variable definitions can be seen Table A1 in Appendix.

The baseline regression results are presented in Table 2. Column 1 presents the OLS regression results without controlling for any fixed effects. The coefficient on *Info_Spillover* is negative and significant, indicating that information spillovers from large firms to small firms within an analyst portfolio help reduce analyst forecast errors on small firms. To take care of unobserved time-invariant firm and analyst-specific variables, I include firm fixed effects, analyst fixed effects, and year-quarter fixed effects in column 2. The effect of information spillovers remains negative and significant.

Though I have controlled firm and analyst fixed effects, there could be unobserved within firm-analyst pair variables that drive my findings. For example, analysts' personal interest on a specific firm, analysts' costs of covering a specific firm, and analysts' capability of forecasting a specific firm could affect my findings. To mitigate the above concern, I include firm-analyst pair fixed effects into the baseline model, and the estimated results are presented in column 3 of Table 2. The evidence confirms my previous findings. The coefficient on *Info_Spillover* is -0.043, which represents that one standard deviation (0.490) increase in *Info_Spillover* is associated with 2.11% decrease on analyst forecast errors. The above results indicate that there exist information spillovers within analysts' portfolio, and such information spillovers improve analyst forecast accuracy by providing analysts with information sets from co-covered firms that are useful for forecasting. To illustrate the economic magnitude of the effect of information spillovers, I compare it to the effects of other determinants of forecast accuracy controlled in the regression. The effect of information spillovers on forecast accuracy is around 0.31 times the effect of *Inst_Holdings* (6.84%), 0.5 times the effect of *Self_Guidance* (4.36%), 1.40 times the effect of *Forecast_Horizon* (1.51%). Moreover, the effect of information spillovers on analyst forecast errors is comparable to the effect of other factors studied in previous studies, including conference calls (Kimbrough, 2005), non-financial disclosures (Dhaliwal, D. S., et al.,2012), cultural diversity (Merkley, K., et al., 2020) etc.

4.2. Robustness Tests

To reinforce the preceding inferences, I conduct several additional tests including using alternative information spillover classifications, addressing the dominant effect by top analysts, excluding the effects of the timing of large firms' earnings announcements and small firms' management earnings forecasts, and using an alternative measure for *Info_Spillover*.

First, to show that my results are not driven by the classifications of information spillovers, I allow variations in the scale of information spillovers within analysts' portfolio, by identifying intra-portfolio information spillovers generated by the top quintile and the top tercile firms. Then, the bottom tercile (quintile) small firms would have a larger (smaller) scale of information spillovers generated by the top tercile (quintile) large firms within analysts' portfolio. My sample enlarges (shrinks) when I identify information spillovers based on the top and bottom tercile (quintile) firms within analysts' portfolio. The results for the scale of information spillovers are presented in Panel A of Table 3. Column 1 of Panel A presents the results for identifying information spillovers from the top tercile firms to a bottom tercile firm. By including more large firms as information spillover sources, my sample has enlarged to 113,394 observations. I find a similar effect of information spillovers on analyst forecast errors, and the magnitude of the coefficient are comparable to that of the coefficient from the baseline regression results. Column 2 of Panel A reports the results for identifying information spillovers from the top quintile firms to a bottom quintile firm. Because the sources of information spillovers shrink, it is not surprising that I have a smaller sample with 67,129 observations. I find that the effect of information spillovers remains negative and significant. These results provide support to my baseline finding that information spillovers through management earnings forecasts within an analyst portfolio help improve analyst forecast accuracy.

Second, one potential concern with the information spillover impact is that the effects are limited to top analysts and the portfolios they follow. For example, only top analysts' portfolios imply firm linkages, and generate information spillovers from large firms to small firms. That is, my results could be driven by only information spillovers generated by portfolios of top analysts. To alleviate the above concern, I perform a robustness test where I exclude top analysts, based on their portfolio size or general experience, from my sample. I report the results in Panel B of Table 3. The first column in Panel B shows that the effect of information spillovers remains significant when analysts with the top decile portfolio size in each quarter are removed from my sample. Similarly, the second column in Panel B confirms that my findings keep unchanged upon removing analysts with the top decile general experience in each quarter from my sample. Taken the results in Panel B together, I show that my baseline findings are robust to considering the effect of top analysts.

Third, in considering that the information contained in large firms' management earnings forecasts can be corrected or covered by subsequently released information, and my findings can be driven by the latest information rather than large firms' information spillovers, I consider two types of such subsequent information, large firms' earnings announcements and small firms' management earnings forecasts issued after those of large firms. On the one hand, large firms' earnings announcements can include useful information that can be used by analysts to correct their expectations formed based on the previous large firms' management earnings announcements. To mitigate the concern on the effect of large firms' management earnings announcements, I perform a robustness test, where I remove those observations with large firms' earnings announcements following their earnings forecasts. The results are reported in column 1 of Panel C. I can see that my sample size drops from 85,681 to 77,796, leading to a loss of 7,885 (9.2%) observations. The coefficient on *Info_Spillover* is still negative and significant, implying that my findings are not affected by large firms' earnings announcements. On the other hand, given that large and small firms within an analyst portfolio are linked to each other, small firms' management earnings forecasts following those of large firms, can cover the information that is useful to forecast small firms contained in large firms' management earnings forecasts. Then, my findings can be driven by small firms' subsequent management earnings forecasts. To reduce such concern, I remove those observations where large firms' management earnings forecasts are followed by small firms', and the results are reported in column 2 of Panel C. I find that the sample size drops to 66,634, with a negative and significant coefficient on *Info_Spillover*. In general, the evidence in Table 3 shows that my inference is not affected by subsequent information that may correct or cover the information conveyed by the previous large firms' management earnings forecasts.

Finally, I confirm my main finding by using an alternative measure for information spillovers generate by large firms. Specifically, I measure information spillovers as the number of large firms that issue management earnings forecasts (*Info_Spillover_2*) in the previous quarter. I report the results in Panel D of Table 3. I find a negative and significant information spillover effect on small firms' analyst absolute forecast errors. It tells that my finding is robust to the alternative measure for information spillovers.

4.3. Gauge the Economic Impact Using Instrumental Variable Analysis

Although my findings are not very likely to suffer from reverse causality problem because small firm's analyst forecasts tend to have little influence on large firms' management earnings forecasts, the effect may be still due to some omitted variables. For example, analysts' time varying efforts or interests on specific firms could impact the role of information spillover transfers and thus impact forecast accuracy. To further address the concerns on the endogeneity problem caused by omitted variables, I perform an instrumental variable analysis. Specifically, I use the averaged frequency of management earnings forecasts issued by the top quartile firms in the past 12 quarters before the previous quarter with a one-year interval (i.e. quarters [t-17, t-6]) as an instrument (*Past_Guidance*).[2] To satisfy the exclusion restriction, the average frequency of past management earnings forecasts issued by large firms over the past years should be positively correlated with the probability of issuing management earnings forecasts by a specific large firm in the current quarter. In addition, the frequency (instead of content) of managerial forecasts within quarter [t-17, t-6] should not directly affect the analyst forecast

[2] My results are robust if I use the frequency of management earnings forecasts issued by the top quartile firms within quarter [t-13, t-2] (i.e. the past 12 quarters before the previous quarter).

accuracy towards small firms, but through the channel of large firms' managerial forecasts on earnings. In other words, *Past_Guidance* is positively correlated with *Info_Spillover*, but does not directly affect the dependent variable in my test. While recognizing concerns about the exclusion restriction, I include this test as an additional robustness test of the overall results and estimated economic effects of information spillovers.

I perform the instrumental variable analysis by running a two-stage least squares (2SLS) estimation. The results are reported in Table A5. The first-stage regression results in column 1 show that the coefficient on *Past_Guidance* is positive and significant, indicating that a higher average frequency of past management earnings forecasts is associated with a higher probability of issuing management earnings forecasts in the current quarter by large firms. In the second-stage regression (column 2), the coefficient on *Info_Spillover* retains negative and significant. The economic magnitude is not only comparable but becomes larger than that of the baseline results. The coefficient on *Info_Spillover* is -0.153, suggesting that one standard deviation (0.490) increase in *Info_Spillover* is associated with 7.5% decrease on analyst forecast errors.

5. Heterogeneous Effects

I next examine whether the impact of information spillovers from large firms on analyst forecasts on small firms varies across different analyst portfolios or different small firms in a predictable manner. Specifically, I continue my study by examining the effect of linkage intensity among the linked firms, the effect of analyst general and industry-specific experience, and the effect of information uncertainty of small firms on the association between information spillovers and analyst forecast errors.

5.1. Linkage Intensity

My main finding is built on the theory that co-covered firms within analysts' portfolio share fundamental similarities, and thus information spillovers generated by large firms play a role in reducing analyst forecast errors of small firms. Then, it is reasonable to predict that the linkage intensity between large firms and small firms within analysts' portfolio matters for the impact of information spillover. That is, the effect of information spillovers is lager (smaller) when the linkage intensity is stronger (weaker). Thus, I consider the linkage is intensified if two firms are linked with common analyst coverage plus a traditional linkage such as common industry.

Firms in the same industry are similar in business environment, macroeconomic conditions, and technologies (Hilary and Shen 2013). Moreover, market participants incorporate information originating from industry peers into stock valuation. For example, Ramnath (2002) finds that investors and analysts following a non-announcing firm reacts to the first earnings announcement in the industry. Therefore, I expect that information spillovers are more useful for analysts if the linked firms are also in the same industry, so that the effect of information spillovers on analyst forecast accuracy will be stronger. In Table 4, I split my sample based on the linkage intensity between a small firm and the corresponding large firms within analysts' portfolio. In the first two columns of Table 4, I split the sample based on linkage intensity, i.e. whether these firms share a common industry (i.e. with the same two-digit SIC industry code). As seen, compared to firms with weak linkages (column 2), the coefficient on *Info_Spillover* is negative and significant for firms with strong linkages (column 1). These results are consistent with my expectation.

As a second proxy for linkage intensity, I investigate the number of analysts covering both the small firm and large firm pair in a quarter. I consider there is a stronger linkage intensity if there are more than one analyst covering the linked firm-pair in a quarter. More analysts covering the same linked firms implies that the two firms are closely related and share more information flows. I present results in columns 3 and 4 of Table 4, and find that the effect of information spillovers exists only when there is at least one other analyst covering the linked firms. Overall, the results reported in Table 6 suggest that the effect of information spillovers is stronger when the linkage intensity among the linked firms is stronger. Finally, I also investigate the effect of linkage intensity in terms of geographic distance between a small firm and the corresponding large firms. I consider firms with a closer geographic distance are more intensively linked to each other. The results are reported in Table A4 in Appendix, and I find that the effect of information spillovers only remains negative and significant when the linkage intensity among firms is strong, i.e. close geographic distance.

5.2. Analyst Experience

Analysts' capability in capturing and processing the information conveyed by the spillovers is another channel that may affect the link between information spillover and analyst forecast accuracy. Analysts with more general experience, such as skills and knowledge in making forecasts are more capable of utilizing information spillovers. Analyst general experience improves with time. It is positively associated with analyst tenure and performance (Clement 1999). Prior research shows that analyst forecast accuracy improves with the increase in analysts' general experience (Clement 1999; Jacob et al. 1999). Therefore, I expect that there is a stronger effect of information spillovers on analyst forecast when analysts have more general experience.

To test my conjecture, I split the sample based on analysts' general experience, which is defined as the number of months since an analyst appears in I/B/E/S database. Column 1 (column 2) of Table 5 presents the results where analysts' general experience is above (below) the sample median. I can see that the coefficient on *Info_Spillover* is negative and significant in column 1 but insignificant in column 2, which is consistent with my prediction.

Then, I repeat the above subsample analysis, but split the sample based on the median of analyst industry-specific experience. Analysts' industry experience plays a similar role as general experience. Analysts with more industry-specific experience have better ability and expertise to learn and integrate industry-level information. I expect that analysts with more industry-specific experience make better use of information spillovers, and produce more accurate earnings forecasts. I define analysts' industry-specific experience as the number of months since an analyst covers the industry that the small firm belongs to, and the results are reported in columns 3 and 4 of Table 5. I can see that the coefficient on *Info_Spillover* is negative and significant (insignificant) in column 3 (column 4), where analysts possess more (less) industry-specific experience. Overall, the results presented in Table 5 tell that the impact of information spillover on small firm forecasts varies by analyst experience.

5.3. Firm Uncertainty

Firm uncertainty reduces information availability, because it is difficult for analysts to produce forecasts. For example, Zhang (2006a) finds that analyst forecasts and subsequent forecast revisions are more biased as information uncertainty exacerbates, because firm uncertainty makes stock valuation more difficult. It is not surprising that analysts would try to seek other information sources that could provide additional information under uncertainty. Clement et al. (2011) show that as disagreement among analysts and firm uncertainty increase, analysts would learn more from their peers' forecast revisions. The importance of information spillovers highlights during firm uncertainty because it can be used by analysts as an additional and external information source. I therefore hypothesize that analysts have more incentives to extract information from additional sources when facing higher firm uncertainty. In this section, I explore the role of firm uncertainty on the effect of information spillovers on analyst forecast accuracy.

Following prior studies, I use firm age and analyst forecast dispersion to proxy for firm uncertainty (Mikhail et al. 1999; Zhang 2006b; Mansi et al. 2010). Firm age measures the history of firms, and older firms have more information available to investors (Barry and Brown 1985). I define firm age as the number of months since a firm appears in Compustat database. Analyst forecast dispersion is widely used by prior studies to proxy for analyst disagreement on the uncertainty of future earnings (Diether et al. 2002; De Franco et al. 2011; Cookson and Niessner 2019). I measure analyst forecast dispersion as the standard deviation of analyst forecasts made within 90 days prior to earnings announcements. I perform the subsample analysis based on firm uncertainty in Table 6, with firm uncertainty above (below) the sample median in columns 1 and 3 (columns 2 and 4).

I find that the effect of information spillover holds when a firm is younger (column 1) and experiences higher analyst forecast dispersion (column 3). The results are consistent with my expectation that analysts have more incentives to seek additional information, and there is a stronger effect of information spillovers when a firm is small and when its uncertainty is high.

6. Mechanism: Improvement on Information Environment

My baseline analysis suggests that the impact of information spillovers is through the mechanism that information environment improves that helps analysts better able to make forecast on small firms. If information spillover persists, firms with more informative and accurate analyst forecasts driven by information spillovers should have better information environment in the current and subsequent quarters. To prove the above prediction, I use stock illiquidity to proxy for information asymmetry, and estimate the regression model as follows:

$$Illiquidity_{j,t} = \beta_0 + \beta_1 Avg\widehat{\_Abs}\_FE + \boldsymbol{\sigma}\cdot\boldsymbol{X} + Firm\ FE + Year\text{-}Quarter\ FE + \epsilon_{j,t} \quad (2)$$

The dependent variable is stock illiquidity in the current quarter (*Illiquidity*), which is based on Amihud (2002) illiquidity measure. I compute *Illiquidity* as the natural logarithm of one plus the daily average of Amihud (2002) illiquidity through the quarter. The key independent variable ($Avg\widehat{\_Abs}\_FE$) is the estimated firm level absolute forecast errors from my baseline regression (1). That is, I firstly compute the estimated absolute forecast errors ($A\widehat{bs\_F}E$) from the baseline regression, and then take average at firm level to compute the average absolute forecast errors for each firm in a quarter. Following prior literature, I include a set of control variables that are documented to impact stock illiquidity, including firm size (*Size*), trading volume (*Trading_Volume*), analyst coverage (*Analyst_Cover*), firm age (*Firm_Age*), share price (*Share_Price*), institutional holdings (*Inst_Holdings*), profitability (*Profitability*), market to book ratio (*MB*), leverage (*Leverage*), earnings volatility (*Earn_Volatility*), and past stock returns (*Past_Returns*).

Detailed variable definitions can be seen in Table A1 in Appendix. In addition, I include firm fixed effects and year-quarter fixed effects in the model.

Column 1 of Table 7 presents the results for stock illiquidity. The coefficient on $Avg\widehat{\_Abs}\_FE$ is positive and significant, which indicates that average absolute forecast errors induced by information spillovers is positively associated with the contemporaneous stock illiquidity. It suggests that the improvement of analyst forecast accuracy induced by information spillovers reduces information asymmetry and make information environment more transparent. Columns 2-4 of Table 7 repeat the above analysis by replacing the dependent variable with stock illiquidity in the subsequent three quarters (i.e. quarter *t+1*, *t+2*, *t+3*). In general, I find similar results that support my conjecture on information environment improvement.

7. Market Reactions

In this section, I examine the stock market reactions to analyst forecast revisions. Investors are able to learn about analyst forecast quality, and react to forecast revisions based on their evaluation (Chen et al. 2005; Hugon and Muslu 2010). While information spillovers are gradually incorporated into analyst forecasts, investors would expect that analysts are making more valuable and accurate forecasts. Thus, if the market responds to the effect of information spillovers, there would be a stronger market reaction on analyst forecasts revisions with information spillovers. In addition, the market would react to revisions if small firms issued management earnings forecasts in the previous quarter (i.e. *SelfGuidance* = 1), because these revisions following management earnings forecasts are also valuable (Hassell and Jennings 1986). To test this conjecture, I estimate the regression model specified as follows.

$$CAR_{i,j,t} = \beta_0 + \beta_1 InfoSpillover_{i,j,t-1} \times Revision_{i,j.t}$$
$$+ \beta_2 SelfGuidance_{i,j,t-1} \times Revision_{i,j.t}$$
$$+ \beta_3 InfoSpillover_{i,j,t-1} + \beta_4 SelfGuidance_{i,j,t-1}$$
$$+ \beta_5 Revision_{i,j,t} + \Omega \cdot X$$
$$+ Firm\text{-}Analyst\ FE + Year\text{-}Quarter\ FE + \epsilon_{i,j,t} \quad (3)$$

The dependent variable is the cumulative abnormal returns over a three-day window centered on analyst forecast revision date. The variables of interest are the interaction terms of information spillover with forecast revisions (*Info_Spillover* × *Revision*) and with management earnings forecasts issued by firm *j* in quarter *t-1* (*Info_Spillover* × *Self_Guidance*). Forecast revision (*Revision*) is defined as the difference between the new forecast and the previous forecast scaled by the stock price at the end of the previous quarter. A positive (negative) *Revision* denotes an upward (downward) forecast revision. *X* represents a set of control variables defined in the baseline regression model (1). I also include firm fixed effects and year-quarter fixed effects in the model.

Table 8 reports the results of market reactions on analyst forecast revisions. I firstly include the interaction term *Revision* × *Info_Spillover* and *Self_Guidance* × *Info_Spillover* in columns 1 and 2, respectively. Then, I include both interaction terms in column 3. Throughout the three regressions, the coefficients on *Revision* are positive and significant, suggesting that the market reacts positively (negatively) to upward (downward) revisions. Moreover, I find that the interaction terms *Revision* × *Info_Spillover* and *Self_Guidance* × *Info_Spillover* are positively significant too. It implies that the market reacts stronger to revisions with the presence of information spillover. It also confirms my prediction that investors are able to observe the effect of information spillovers, and they value the informative forecast revisions made by analysts when there are information spillovers.

8. Additional Tests

8.1. Small-to-large Information Spillovers

My analyses so far document the effect of large-to-small information spillovers, where analyst forecasts on a small firm benefit from within-portfolio large firms' management earnings forecasts. A natural question is whether such spillover effects are symmetric. That is, whether there exists a small-to-large information spillover effects, where analyst learn from small firms' management earnings forecasts, and provide more accurate forecasts on large firms. In this section, I exploit the opposite side of my main findings by examining the effect of management earnings forecasts issued by small firms on a large firm's analyst forecast errors.

To test the small-to-large information spillovers, I estimate equation (1), but compute *Abs_FE* as an analyst's absolute forecast errors on a large firm ranked in the top quartile of her portfolio, and *Info_Spillover* as a dummy variable that takes the value of one if at least one within-portfolio small firm issues management earnings forecasts, and zero otherwise. All control variables are then computed with respect to large firms rather than small firms. Table 9 presents the results of the OLS regression for analyst absolute forecast errors on large firms. It can be seen that the coefficient on *Info_Spillover* is insignificant across the three columns, suggesting that there is no evidence on the existence of small-to-large information spillovers. Given that the information only transfers from large firms to small firms within an analyst portfolio rather than the opposite direction, the information spillover effect I document is asymmetric. The asymmetric information spillover effect is consistent with my hypothesis for two reasons. First, small firms' relatively low information quality limits the application of small firms' information (i.e. management earnings forecasts) on forecasting large firms. Moreover, it's difficult for analysts to collect and process additional information to validate the credibility of small firms' management earnings forecasts subject to small firms' information environment. Second, analysts' strategic efforts allocation can lead to insufficient use of small firms' management earnings forecasts, which contains abundant sets of information. Then, analyst forecasts on large firms would not benefit from small firms' management earnings forecasts. In general, I provide evidence showing that the information spillover effect is asymmetric between large and small firms within an analyst portfolio, and there is no small-to-large information spillovers.

8.2. Placebo tests

In this section, I perform two placebo tests to further document the large-to-small information spillover effect. Specifically, I firstly show that the documented large-to-small information spillover effect is not driven by any random factors. I then provide evidence showing that there is an increase in analyst absolute forecast errors when small firms cannot receive information spillovers from large firms, consistent with the existence of large-to-small information spillover effect.

To mitigate the concern that my findings are driven by a random and unknown factor rather than information spillovers, I randomly select a firm outside an analyst portfolio, which has market capitalization comparable to the top quartile firms in the analyst's portfolio. I then measure "information spillover" using the management earnings forecasts issued from this random firm instead of the large firms from the same analyst portfolio. I do such replacement for the entire sample and repeatedly estimate the baseline regression for 500 times. If there are some unknown mechanisms drive my results, then I am likely to find that *Info_Spillover* in the placebo test also has an effect on analyst forecast accuracy. I plot the frequency and Kernel density estimates of coefficients on *Info_Spillover* from this placebo test in Figure 3. As seen, the distribution of the coefficients on *Info_Spillover* is centered at 0, and the Kernel density estimates are symmetrically and bell-shaped distributed. The absolute value of the baseline estimates on *Info_Spillover* (0.043) is also significantly larger than the coefficients obtained from the placebo test. This result provides no evidence that the improvement in analyst forecast accuracy is driven by any random and unknown factors.

Next, I perform another placebo test, where I compare analyst forecast errors on small firms with and without within-portfolio large firms as the source of information spillovers. In particular, I include out-of-sample analysts who cover a within-sample small firm in a quarter, but such a "small" firm is ranked above the bottom quartile, into my sample. Then, such a "small" firm cannot receive information spillovers from large firms since it's not ranked in the bottom quartile within an analyst portfolio in accordance with my hypothesis. I define *Small_No_Info* as a dummy variable that takes the value of one if a small firm is ranked above the bottom quartile within an analyst portfolio (i.e. There is no large firm serving as the source of information spillovers). I estimate equation (1) by replacing the explanatory variable with *Small_No_Info*, and the results are presented in Table 10. My observations increase from 85,681 to 157,023, where 71,342 observations are contributed by out-of-sample analyst-firm-quarter observations. As can be seen in Table 10, the coefficient on *Small_No_Info* is positive and significant in both column 1 and 2, suggesting that analyst absolute forecast errors are larger when a “small” firm cannot receive information spillovers from large firms. That is, analysts perform worse on such “small” firms when they are not small enough in analyst portfolios. The above results provide further supporting evidence on my main findings, which show the existence of large-to-small information spillover effect.

9. Conclusion

This paper provides novel evidence on the role of intra-analyst information spillovers on analyst forecast accuracy. Analysts capture the information sets generated by large firms, and incorporate the information in making forecasts for small firms within their portfolios. The underlying logic is that co-covered firms within analysts’ portfolio are fundamentally related. Thus, common analyst coverage identifies firm linkages among the top quartile and bottom firms within analysts’ portfolio, and information spillovers generated by large firms would be useful for analysts to make forecasts for small firms. I provide consistent evidence that analysts take advantage of the information spillovers generated by large firms within their portfolio, and produce more accurate forecasts on the corresponding small firms. Moreover, intra-analyst information spillover plays a more important role in reducing analyst forecast errors when the linkage among the linked firms is stronger, analysts are more experienced, and there is more firm uncertainty.

I show that intra-analyst information spillover improves analyst forecast accuracy through the channel of mitigating information asymmetry of small firms, which is proxied by stock illiquidity. I show that the information environment improves not only in the current quarter but also in the subsequent three quarters.

The market reacts to intra-analyst information spillovers, and I observe more pronounced market reactions to forecast revisions with information spillovers. It suggests that the market values the effect of information spillovers, as well as the corresponding more accurate forecast revisions made by analysts. Finally, I find that intra-analyst information spillover not only improves individual analysts' forecast accuracy, but also benefit all analysts in terms of reducing analyst consensus forecast errors.

References

Abarbanell, J. S. 1991. Do Analysts Earnings Forecasts Incorporate Information in Prior Stock-Price Changes. *Journal of Accounting & Economics* 14 (2):147-165.

Ali, U., and D. Hirshleifer. 2019. Shared analyst coverage: Unifying momentum spillover effects. *Journal of Financial Economics*.

Amihud, Y. 2002. Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets* 5 (1):31-56.

Baginski, S. P. 1987. Intraindustry Information Transfers Associated with Management Forecasts of Earnings. *Journal of Accounting Research* 25 (2):196-216.

Baginski, S. P., and J. M. Hassell. 1990. The Market Interpretation of Management Earnings Forecasts as a Predictor of Subsequent Financial Analyst Forecast Revision. *Accounting Review* 65 (1):175-190.

Barry, C. B., and S. J. Brown. 1985. Differential Information and Security Market Equilibrium. *Journal of Financial and Quantitative Analysis* 20 (4):407-422.

Bhushan, R. 1989. Firm Characteristics and Analyst Following. *Journal of Accounting & Economics* 11 (2-3):255-274.

Blankespoor, E., E. deHaan, and I. Marinovic. 2020. Disclosure processing costs, investors' information choice, and equity market outcomes: A review. *Journal of Accounting and Economics* 70 (2-3):101344.

Blankespoor, E., E. D. Dehaan, J. Wertz, and C. Zhu. 2019. Why Do Individual Investors Disregard Accounting Information? The Roles of Information Awareness and Acquisition Costs. *Journal of Accounting Research* 57 (1):53-84.

Bonsall, S. B., Z. Bozanic, and P. E. Fischer. 2013. What Do Management Earnings Forecasts Convey About the Macroeconomy? *Journal of Accounting Research* 51 (2):225-266.

Brochet, F., K. Kolev, and A. Lerman. 2018. Information transfer and conference calls. *Review of Accounting Studies* 23 (3):907-957.

Chen, Q., J. Francis, and W. Jiang. 2005. Investor learning about analyst predictive ability. *Journal of Accounting and Economics* 39 (1):3-24.

Chuk, E., D. Matsumoto, and G. S. Miller. 2013. Assessing methods of identifying management forecasts: CIG vs. researcher collected. *Journal of Accounting and Economics* 55 (1):23-42.

Clement, M. B. 1999. Analyst forecast accuracy: Do ability, resources, and portfolio complexity matter? *Journal of Accounting & Economics* 27 (3):285-303.

Clement, M. B., J. Hales, and Y. Xue. 2011. Understanding analysts' use of stock returns and other analysts' revisions when forecasting earnings. *Journal of Accounting and Economics* 51 (3):279-299.

Collins, D. W., S. P. Kothari, and J. D. Rayburn. 1987. Firm Size and the Information-Content of Prices with Respect to Earnings. *Journal of Accounting & Economics* 9 (2):111-138.

Cookson, J. A., and M. Niessner. 2019. Why Don't We Agree? Evidence from a Social Network of Investors. *The Journal of Finance* 75 (1):173-228.

Cotter, J., I. Tuna, and P. D. Wysocki. 2006. Expectations management and beatable targets: How do analysts react to explicit earnings guidance? *Contemporary Accounting Research* 23 (3):593-624.

De Franco, G. U. S., S. P. Kothari, and R. S. Verdi. 2011. The Benefits of Financial Statement Comparability. *Journal of Accounting Research* 49 (4):895-931.

Diether, K. B., C. J. Malloy, and A. Scherbina. 2002. Differences of opinion and the cross section of stock returns. *Journal of Finance* 57 (5):2113-2141.

Driskill, M., M. P. Kirk, and J. W. Tucker. 2020. Concurrent Earnings Announcements and Analysts' Information Production. *The Accounting Review* 95 (1):165-189.

Fairfield, P. M., S. Ramnath, and T. L. Yohn. 2009. Do Industry-Level Analyses Improve Forecasts of Financial Performance? *Journal of Accounting Research* 47 (1):147-178.

Fischer, P. E., and P. C. Stocken. 2010. Analyst Information Acquisition and Communication. *Accounting Review* 85 (6):1985-2009.

Frankel, R., S. P. Kothari, and J. Weber. 2006. Determinants of the informativeness of analyst research. *Journal of Accounting & Economics* 41 (1-2):29-54.

Gibbons, B., P. Iliev, and J. Kalodimos. 2020. Analyst Information Acquisition via EDGAR. *Management Science*.

Guan, Y., M. H. F. Wong, and Y. Zhang. 2014. Analyst following along the supply chain. *Review of Accounting Studies* 20 (1):210-241.

Hann, R. N., H. Kim, and Y. Zheng. 2019. Intra-industry information transfers: evidence from changes in implied volatility around earnings announcements. Review of Accounting Studies 24 (3):927-971.

Harford, J., F. Jiang, R. Wang, and F. Xie. 2019. Analyst Career Concerns, Effort Allocation, and Firms' Information Environment. *The Review of Financial Studies* 32 (6):2179-2224.

Hassell, J. M., and R. H. Jennings. 1986. Relative Forecast Accuracy and the Timing of Earnings Forecast Announcements. *Accounting Review* 61 (1):58-75.

Healy, P. M., and K. G. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting & Economics* 31 (1-3):405-440.

Hilary, G., and R. Shen. 2013. The Role of Analysts in Intra-Industry Information Transfer. *The Accounting Review* 88 (4):1265-1287.

Hsu, C., and R. Wang. 2021. Bundled Earnings Guidance and Analysts' Forecast Revisions†. *Contemporary Accounting Research*.

Hugon, A., and V. Muslu. 2010. Market demand for conservative analysts. *Journal of Accounting and Economics* 50 (1):42-57.

Hutton, A. P., L. F. Lee, and S. Z. Shu. 2012. Do Managers Always Know Better? The Relative Accuracy of Management and Analyst Forecasts. *Journal of Accounting Research* 50 (5):1217-1244.

Israelsen, R. D. 2016. Does Common Analyst Coverage Explain Excess Comovement? *Journal of Financial and Quantitative Analysis* 51 (4):1193-1229.

Jacob, J., T. Z. Lys, and M. A. Neale. 1999. Expertise in forecasting performance of security analysts. *Journal of Accounting & Economics* 28 (1):51-82.

Jennings, R. 1987. Unsystematic Security Price Movements, Management Earnings Forecasts, and Revisions in Consensus Analyst Earnings Forecasts. *Journal of Accounting Research* 25 (1):90-110.

Kim, O., and R. E. Verrecchia. 1994. Market Liquidity and Volume around Earnings Announcements. *Journal of Accounting & Economics* 17 (1-2):41-67.

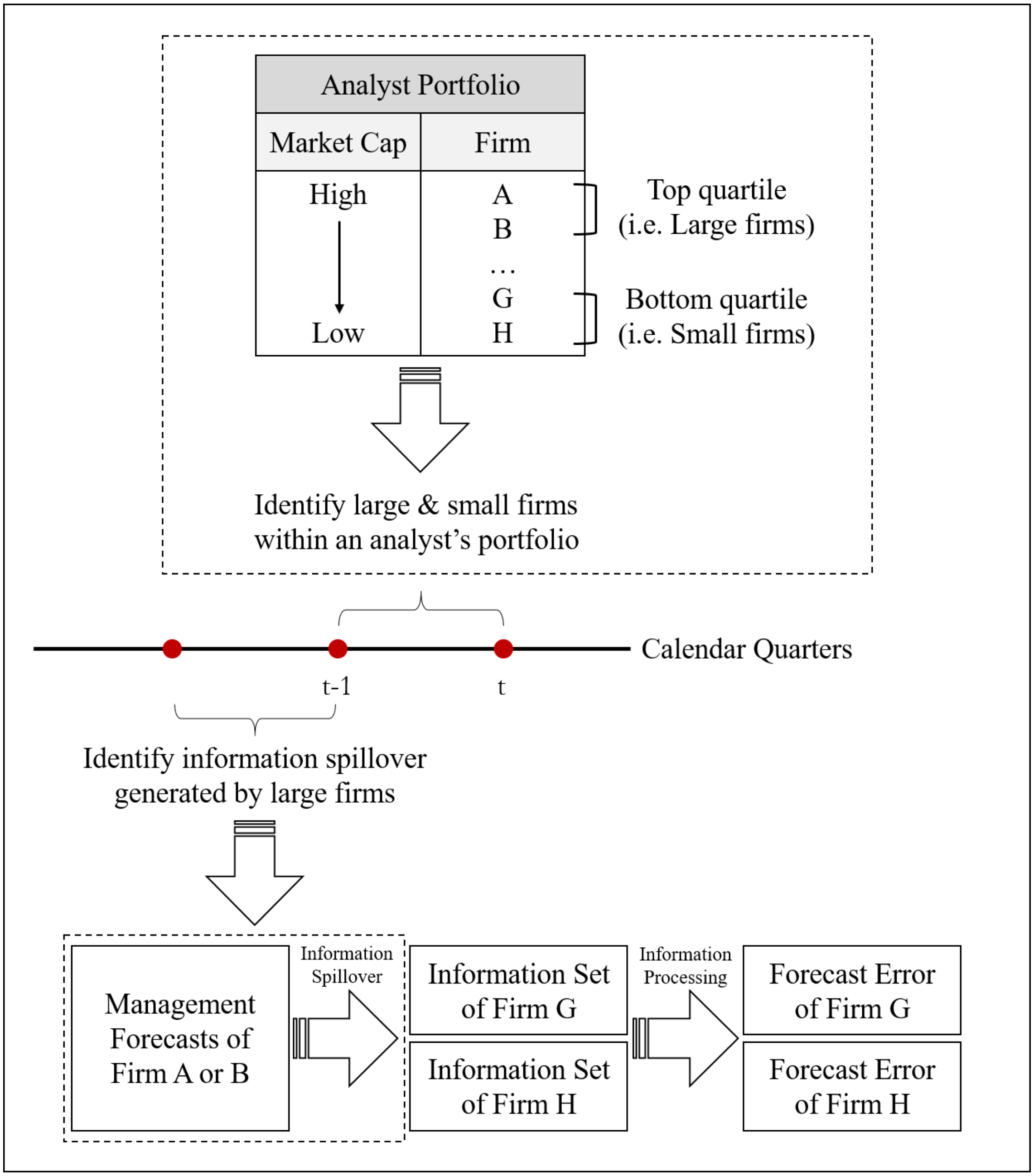
———. 1997. Pre-announcement and event-period private information. *Journal of Accounting & Economics* 24 (3):395-419.
Kim, Y., M. Lacina, and M. S. Park. 2008. Positive and Negative Information Transfers from Management Forecasts. *Journal of Accounting Research* 46 (4):885-908.
Kim, Y., and M. Song. 2015. Management Earnings Forecasts and Value of Analyst Forecast Revisions. Management Science 61 (7):1663-1683.
Kumar, A., V. Rantala, and R. Xu. 2021. Social learning and analyst behavior. *Journal of Financial Economics*.
Lang, M. H., and R. J. Lundholm. 1996. Corporate disclosure policy and analyst behavior. *Accounting Review* 71 (4):467-492.
Lee, C., P. Ma, and C. C. Wang. 2016. The search for peer firms: When do crowds provide wisdom? *Harvard Business School Accounting & Management Unit Working Paper* (15-032):14-46.
Lehavy, R., F. Li, and K. Merkley. 2011. The Effect of Annual Report Readability on Analyst Following and the Properties of Their Earnings Forecasts. *Accounting Review* 86 (3):1087-1115.
Luo, S., and N. J. Nagarajan. 2015. Information Complementarities and Supply Chain Analysts. The Accounting Review 90 (5):1995-2029.
Mansi, S. A., W. F. Maxwell, and D. P. Miller. 2010. Analyst forecast characteristics and the cost of debt. *Review of Accounting Studies* 16 (1):116-142.
Martens, T. I. M., and C. J. Sextroh. 2021. Analyst Coverage Overlaps and Interfirm Information Spillovers. *Journal of Accounting Research* 59 (4):1425-1480.
Merkley, K. J., L. S. Bamber, and T. E. Christensen. 2012. Detailed management earnings forecasts: do analysts listen? *Review of Accounting Studies* 18 (2):479-521.
Mikhail, M. B., B. R. Walther, and R. H. Willis. 1999. Does forecast accuracy matter to security analysts? *Accounting Review* 74 (2):185-200.
Muslu, V., M. Rebello, and Y. Xu. 2014. Sell-Side Analyst Research and Stock Comovement. *Journal of Accounting Research* 52 (4):911-954.
Pandit, S., C. E. Wasley, and T. Zach. 2011. Information Externalities along the Supply Chain: The Economic Determinants of Suppliers' Stock Price Reaction to Their Customers' Earnings Announcements*. *Contemporary Accounting Research* 28 (4):1304-1343.
Parsons, C. A., R. Sabbatucci, S. Titman, and A. Karolyi. 2020. Geographic Lead-Lag Effects. The Review of Financial Studies 33 (10):4721-4770.
Peng, L., and W. Xiong. 2006. Investor attention, overconfidence and category learning. *Journal of Financial Economics* 80 (3):563-602.
Pyo, Y. I., and S. Lustgarten. 1990. Differential Intraindustry Information-Transfer Associated with Management Earnings Forecasts. *Journal of Accounting & Economics* 13 (4):365-379.
Ramnath, S. 2002. Investor and analyst reactions to earnings announcements of related firms: An empirical analysis. *Journal of Accounting Research* 40 (5):1351-1376.
Shroff, N., A. X. Sun, H. D. White, and W. Zhang. 2013. Voluntary Disclosure and Information Asymmetry: Evidence from the 2005 Securities Offering Reform. *Journal of Accounting Research* 51 (5):1299-1345.
Waymire, G. 1984. Additional Evidence on the Information-Content of Management Earnings Forecasts. *Journal of Accounting Research* 22 (2):703-718.

Zhang, X. F. 2006a. Information uncertainty and analyst forecast behavior. *Contemporary Accounting Research* 23 (2):565-590.

———. 2006b. Information Uncertainty and Stock Returns. *Journal of Finance* 61 (1):105-136.

FIGURE 1

Information Spillover within Analysts' Portfolios



This figure illustrates the intra-portfolio information spillover from large firms to small firms within analysts' portfolio through the management earnings forecast. All firms are ranked in the descending order of market capitalization. Firm A and firm B (firm G and firm H) are the top (bottom) quartile firms in analysts' portfolio. I consider firm A and firm B as large firms, and firm G and firm H as small firms. Management earnings forecast generated by either firm A or firm B is the information spillover source to firm G or H. Analysts would benefit from the information spillovers when processing the information, to produce more accurate forecasts on firm G and H.

FIGURE 2a

Average Absolute Forecast Error Over 1998Q1 – 2019Q4

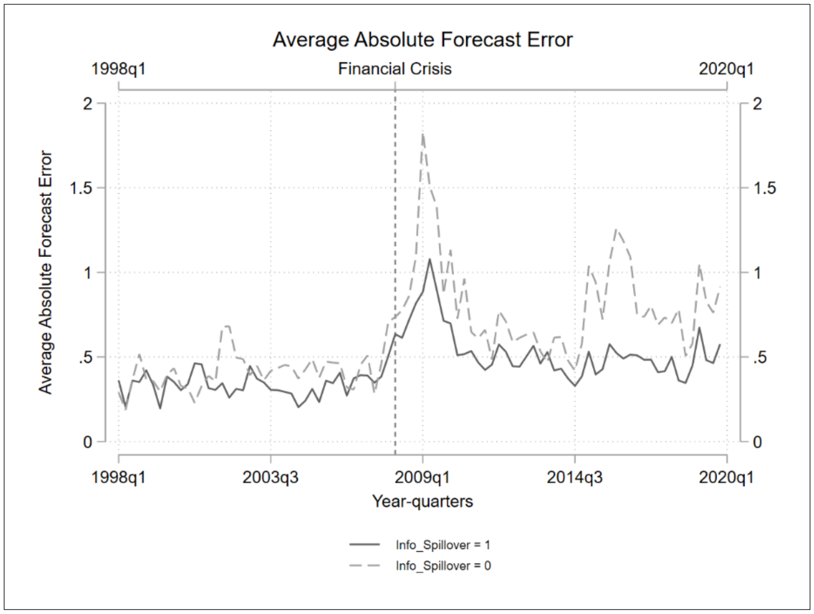


FIGURE 2b

Difference in Average Absolute Forecast Error Over 1998Q1 – 2019Q4

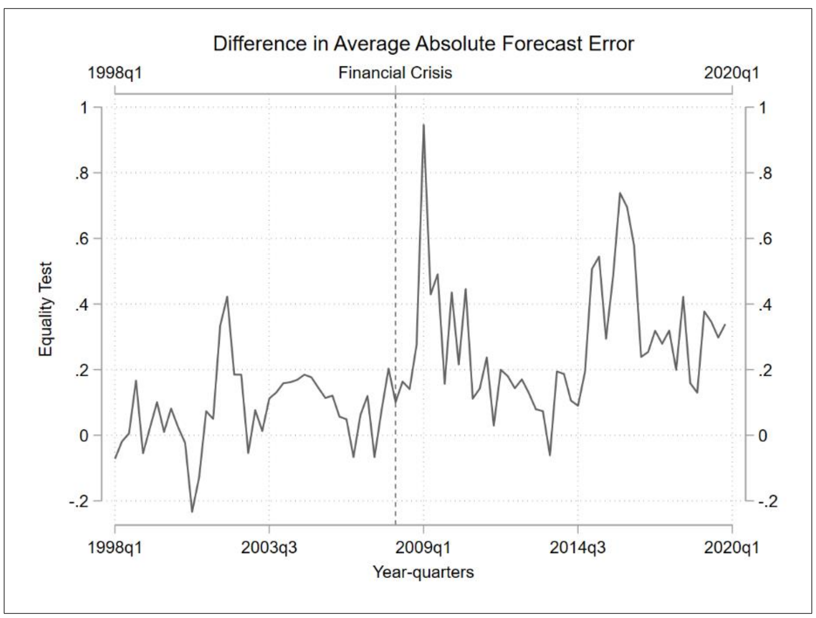
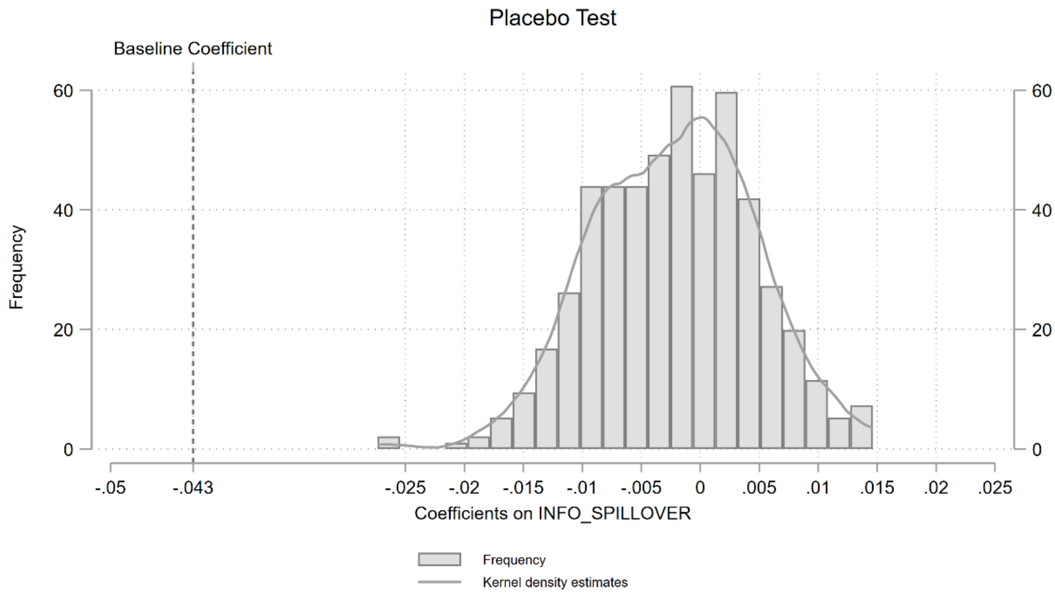


Figure 2a illustrates the average analyst absolute forecast error over 1998q1-2019q4 with or without the presence of information spillovers. The solid curve represents the average analyst forecast forecast error with information spillovers from large firms, and the dashed curve represents the average analyst forecast errors without information spillovers from large firm. The average absolute forecast error is defined as the sample average of the absolute value of the difference between analysts' quarterly EPS forecasts and actual EPS scaled by stock price at the end of the previous quarter and multiplied by 100. Figure 2b plots the differences of the average absolute forecast error without and with the presence of information spillovers over 1998q1-2019q4.

FIGURE 3

The Distribution of Coefficients from Placebo Test



This figure illustrates the frequency and Kernel density estimates of coefficients on *Info_Spillover* from the placebo test, where the baseline regression is repeated 500 times. Information spillovers (*Info_Spillover*) is defined as a dummy variable that equals one if at least one large firm in an analyst's portfolio issues management earnings forecast (i.e. EPS forecast), and zero otherwise. The placebo test is performed by replacing the top quartile firms in analysts' portfolio by a randomly selected firm of similar size but outside the analyst portfolio in quarter t.

TABLE 1

Summary Statistics of Variables Used in Baseline Regression

	(1) N	(2) Mean	(3) SD	(4) P25	(5) P50	(6) P75
Abs_FE	85,681	0.555	1.179	0.066	0.189	0.509
Info_Spillover	85,681	0.601	0.490	0.000	1.000	1.000
Size	85,681	7.042	1.135	6.250	7.012	7.788
Analyst_Cover	85,681	8.619	1.397	7.713	8.698	9.625
Inst_Holdings	85,681	0.743	0.284	0.605	0.811	0.940
Profitability	85,681	0.005	0.033	0.000	0.007	0.018
Earn_Volatility	85,681	0.016	0.025	0.004	0.008	0.018
Past_Returns	85,681	-0.017	0.214	-0.142	-0.024	0.093
Self_Guidance	85,681	0.340	0.474	0.000	0.000	1.000
Forecast_Horizon	85,681	2.750	0.836	2.398	2.890	3.296
Indu_Complexity	85,681	0.951	0.642	0.693	1.099	1.386
Portfolio_Size	85,681	2.469	0.457	2.197	2.485	2.773
Firm_Expert	85,681	0.198	0.398	0.000	0.000	0.000
Top_Broker	85,681	0.177	0.382	0.000	0.000	0.000

This table reports the summary statistics of key variables. See Table A1 in Appendix for variable definitions.

TABLE 2

Analyst Absolute Forecast Error and Information Spillover

Dependent Variable	(1) *Abs_FE*	(2) *Abs_FE*	(3) *Abs_FE*
Info_Spillover	-0.067***	-0.043***	-0.043***
	(-7.92)	(-3.62)	(-2.90)
Size	-0.286***	-0.703***	-0.785***
	(-66.84)	(-75.97)	(-32.45)
Analyst_Cover	-0.234***	-0.223***	-0.173***
	(-67.41)	(-22.61)	(-10.28)
Inst_Holdings	-0.110***	-0.238***	-0.241***
	(-8.05)	(-10.91)	(-5.61)
Profitability	-4.188***	-2.063***	-1.601***
	(-33.87)	(-14.01)	(-6.47)
Earn_Volatility	7.234***	2.401***	1.523***
	(43.53)	(12.97)	(4.20)
Past_Returns	-0.514***	-0.237***	-0.147***
	(-29.43)	(-13.91)	(-6.42)
Self_Guidance	-0.208***	-0.091***	-0.092***
	(-24.13)	(-7.47)	(-6.44)
Forecast_Horizon	0.027***	0.020***	0.018***
	(6.03)	(4.43)	(3.44)
Indu_Complexity	0.020***	0.006	-0.004
	(3.14)	(0.45)	(-0.18)
Portfolio_Size	-0.016*	-0.053***	-0.049**
	(-1.94)	(-3.47)	(-2.22)
Firm_Expert	0.016*	-0.003	-0.019
	(1.70)	(-0.26)	(-0.89)
Top_Broker	-0.003	-0.018	0.011
	(-0.28)	(-1.21)	(0.57)
Observations	85,681	85,681	85,681
Adjusted R-squared	0.163	0.390	0.418
Firm Fixed Effects	No	Yes	No
Analyst Fixed Effects	No	Yes	No
Year-quarter Fixed Effects	No	Yes	Yes
Firm-analyst Fixed Effects	No	No	Yes

This table presents the OLS regression results for the effect of information spillovers (*Info_Spillover*) on analyst absolute forecast error (*Abs_FE*). *Abs_FE* is defined as the absolute value of the difference between an analyst's quarterly EPS forecast and actual EPS scaled by stock price at the end of the previous quarter and multiplied by 100. *Info_Spillover* is a dummy variable that equals one if at least one large firm in analysts' portfolio issues management earnings forecast (i.e. EPS forecast) in the previous quarter, and zero otherwise. See Table A1 in Appendix for detailed variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

TABLE 3

Robustness Tests

Panel A: Variation in the Scale of Information Spillovers

	(1)	(2)
Dependent Variable	*Abs_FE*	*Abs_FE*
Info_Spillover_1	-0.032***	-0.030*
	(-2.72)	(-1.73)
Observations	113,395	67,129
Adjusted R-squared	0.409	0.419
Control Variables	Yes	Yes
Year-quarter Fixed Effects	Yes	Yes
Firm-analyst Fixed Effects	Yes	Yes

Panel B: Considering the Effect of Top Analysts

	(1)	(2)
Dependent Variable	*Abs_FE*	*Abs_FE*
Info_Spillover	-0.039**	-0.037**
	(-2.52)	(-2.40)
Observations	78,275	77,443
Adjusted R-squared	0.416	0.418
Control Variables	Yes	Yes
Year-quarter Fixed Effects	Yes	Yes
Firm-analyst Fixed Effects	Yes	Yes

Panel C: Considering the Timing of Earnings Announcements and Management Forecasts

	(1)	(2)
Dependent Variable	*Abs_FE*	*Abs_FE*
Info_Spillover	-0.041***	-0.048***
	(-2.61)	(-2.88)
Observations	77,796	66,634
Adjusted R-squared	0.419	0.417
Control Variables	Yes	Yes
Year-quarter Fixed Effects	Yes	Yes
Firm-analyst Fixed Effects	Yes	Yes

Panel D: An Alternative Measure for *Info_Spillover*

	(1)
Dependent Variable	*Abs_FE*
Info_Spillover_2	-0.020***
	(-3.28)
Observations	85,681
Adjusted R-squared	0.418

(continued on next page)

Panel D: An Alternative Measure for *Info_Spillover* (continued)	
Control Variables	Yes
Year-quarter Fixed Effects	Yes
Firm-analyst Fixed Effects	Yes

This table reports the results of robustness tests on the effect of information spillovers (*Info_Spillover*) on analyst absolute forecast error (*Abs_FE*). Panel A shows the results allowing a variation of the scale of information spillovers, where I identify information spillovers from the top tercile (quintile) firms to the bottom tercile (quintile) firms in an analyst portfolio in column 1 (column 2). Panel B show the results considering the effect of top analysts, where I remove the top decile analysts in terms of portfolio size (column 1) and general experience (column 2) from my sample, respectively. Panel C shows the results considering the timing of earnings announcements of large firms and management earnings forecasts, where I remove observations if a large firm's management earnings announcement is located between its management earnings forecast and a small firm's analyst forecast (column 1) and if a large firm's management earnings forecast is followed by a small firm's management earnings forecast (column 2). Panel D shows the results of measuring information spillovers as the number of large firms issuing management earnings forecasts in an analyst portfolio (*Info_Spillover_2*). The dependent variable is absolute forecast error (*Abs_FE*), defined as the absolute value of the difference between an analyst's quarterly EPS forecast and actual EPS scaled by stock price at the end of the previous quarter and multiplied by 100. The variable of interest is information spillovers (*Info_Spillover*), which is a dummy variable that equals one if at least one top tercile (quintile) market capitalization firm in analysts' portfolio issues management earnings forecasts (i.e. EPS forecast) in the previous quarter, and zero otherwise. See Table A1 in Appendix for variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

TABLE 4

The Effect of Linkage Intensity

	(1)	(2)	(3)	(4)
	Common Industry		*Same Analyst Coverage*	
	Strong	*Weak*	*Strong*	*Weak*
Dependent Variable	*Abs_FE*	*Abs_FE*	*Abs_FE*	*Abs_FE*
Info_Spillover	-0.073***	-0.034	-0.039**	-0.046
	(-3.14)	(-1.56)	(-2.22)	(-1.47)
Size	-0.837***	-0.727***	-0.832***	-0.610***
	(-22.24)	(-23.19)	(-28.85)	(-13.59)
Analyst_Cover	-0.168***	-0.161***	-0.197***	-0.124***
	(-6.33)	(-7.46)	(-9.25)	(-3.73)
Inst_Holdings	-0.379***	-0.143***	-0.310***	-0.108
	(-4.92)	(-2.86)	(-5.82)	(-1.16)
Profitability	-1.452***	-1.250***	-1.614***	-1.675***
	(-3.99)	(-3.71)	(-5.61)	(-2.98)
Earn_Volatility	2.066***	0.840	2.143***	-0.622
	(3.82)	(1.61)	(4.95)	(-0.85)
Past_Returns	-0.188***	-0.100***	-0.092***	-0.269***
	(-5.06)	(-3.35)	(-3.29)	(-6.10)
Self_Guidance	-0.051**	-0.114***	-0.109***	-0.051**
	(-2.52)	(-6.35)	(-6.25)	(-2.02)
Forecast_Horizon	0.009	0.020***	0.023***	-0.001
	(0.96)	(3.09)	(3.60)	(-0.11)
Indu_Complexity	0.043	-0.084**	-0.006	-0.058
	(1.48)	(-2.56)	(-0.23)	(-1.14)
Portfolio_Size	-0.060*	-0.039	-0.056**	-0.085*
	(-1.86)	(-1.22)	(-2.11)	(-1.75)
Firm_Expert	-0.036	-0.019	-0.024	-0.038
	(-1.07)	(-0.70)	(-1.00)	(-0.90)
Top_Broker	0.024	-0.028	0.030	-0.020
	(0.86)	(-1.07)	(1.34)	(-0.37)
Observations	39,174	46,507	63,439	22,242
Adjusted R-squared	0.426	0.443	0.421	0.444
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes
Firm-analyst Fixed Effects	Yes	Yes	Yes	Yes

This table presents the subsample analysis on the effect of information spillovers (*Info_Spillover*) on analyst absolute forecast error (*Abs_FE*) based on the linkage intensity. The linkage intensity is proxied by *Common Industry* (column 1 and column 2) and *Same Analyst Coverage* (Column 3 and Column 4). The linkage intensity between small firm *j* and the corresponding large firms are considered as *Strong* if they share the same two-digit SIC industry (*Common Industry*), or they are co-covered by other analysts except analyst *i* (*Same Analyst Coverage*) or *Weak* if otherwise. The dependent variable is absolute forecast error (*Abs_FE*), and the independent variable is information spillovers (*Info_Spillover*). See Table A1 in Appendix for variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

TABLE 5

The Effect of Analyst Experience

	(1)	(2)	(3)	(4)
	General Experience		*Industry Experience*	
	High	*Low*	*High*	*Low*
Dependent Variable	*Abs_FE*	*Abs_FE*	*Abs_FE*	*Abs_FE*
Info_Spillover	-0.068***	-0.016	-0.080***	-0.014
	(-3.05)	(-0.74)	(-2.89)	(-0.77)
Size	-0.784***	-0.841***	-0.817***	-0.813***
	(-22.93)	(-22.35)	(-21.51)	(-24.89)
Analyst_Cover	-0.190***	-0.150***	-0.206***	-0.153***
	(-7.89)	(-5.63)	(-7.17)	(-6.88)
Inst_Holdings	-0.205***	-0.269***	-0.270***	-0.216***
	(-3.30)	(-4.07)	(-3.89)	(-3.61)
Profitability	-1.381***	-1.459***	-1.768***	-1.050***
	(-3.73)	(-4.29)	(-4.78)	(-3.00)
Earn_Volatility	1.783***	1.333***	1.845***	0.754
	(3.17)	(2.69)	(3.13)	(1.52)
Past_Returns	-0.127***	-0.130***	-0.129***	-0.110***
	(-3.76)	(-3.93)	(-3.47)	(-3.79)
Self_Guidance	-0.081***	-0.095***	-0.085***	-0.069***
	(-4.24)	(-4.12)	(-3.70)	(-4.26)
Forecast_Horizon	0.027***	0.007	0.012	0.019***
	(3.61)	(0.95)	(1.41)	(2.83)
Indu_Complexity	-0.040	0.015	0.010	-0.021
	(-1.38)	(0.41)	(0.29)	(-0.70)
Portfolio_Size	-0.057*	-0.057	-0.115***	-0.018
	(-1.90)	(-1.61)	(-3.12)	(-0.60)
Firm_Expert	0.019	-0.079**	0.044	-0.113***
	(0.70)	(-2.15)	(1.44)	(-3.20)
Top_Broker	-0.027	0.063**	0.009	0.012
	(-1.00)	(2.15)	(0.29)	(0.45)
Observations	42,668	43,013	37,148	48,533
Adjusted R-squared	0.394	0.447	0.411	0.434
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes
Firm-analyst Fixed Effects	Yes	Yes	Yes	Yes

This table presents the subsample analysis on the effect of information spillovers (*Info_Spillover*) on analyst absolute forecast error (*Abs_FE*) based on analyst experience. Analyst experience is proxied by *General Experience* (column 1 and column 2) and *Industry Experience* (column 3 and column 4). *General Experience* is considered as *High* if the number of months since an analyst appears in I/B/E/S is above the sample median, and *Low* otherwise. *Industry Experience* is considered as *High* if the number of months since an analyst covers the two-digit SIC industry of firm *j* is above the sample median, and *Low* otherwise. The dependent variable is absolute forecast errors (*Abs_FE*), and the independent variable is information spillovers (*Info_Spillover*). See Table A1 in Appendix for variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

TABLE 6
The Effect of Firm Uncertainty

	(1)	(2)	(3)	(4)
	Firm Age		*Analyst Dispersion*	
	Young	*Old*	*High*	*Low*
Dependent Variable	*Abs_FE*	*Abs_FE*	*Abs_FE*	*Abs_FE*
Info_Spillover	-0.058***	-0.026	-0.082***	-0.010
	(-2.90)	(-1.13)	(-2.75)	(-1.06)
Size	-0.770***	-0.818***	-1.094***	-0.209***
	(-22.62)	(-23.54)	(-31.19)	(-19.24)
Analyst_Cover	-0.125***	-0.199***	-0.283***	-0.031**
	(-5.48)	(-8.41)	(-8.92)	(-2.43)
Inst_Holdings	-0.404***	-0.157***	-0.369***	-0.061**
	(-5.88)	(-2.80)	(-4.93)	(-2.57)
Profitability	-0.765**	-2.616***	-1.828***	-0.333
	(-2.27)	(-7.09)	(-5.19)	(-1.48)
Earn_Volatility	1.552***	1.498***	1.591***	0.489
	(3.18)	(2.72)	(3.04)	(1.47)
Past_Returns	-0.172***	-0.096**	-0.153***	-0.045***
	(-6.02)	(-2.51)	(-3.76)	(-2.89)
Self_Guidance	-0.067***	-0.116***	-0.160***	-0.026***
	(-3.63)	(-5.38)	(-4.72)	(-3.43)
Forecast_Horizon	0.003	0.035***	0.036***	0.009***
	(0.35)	(4.84)	(3.24)	(2.69)
Indu_Complexity	-0.014	-0.001	0.013	-0.009
	(-0.46)	(-0.01)	(0.30)	(-0.80)
Portfolio_Size	-0.048	-0.061*	-0.099**	-0.025*
	(-1.47)	(-1.96)	(-2.30)	(-1.81)
Firm_Expert	-0.088**	0.001	-0.005	-0.001
	(-2.49)	(0.03)	(-0.12)	(-0.08)
Top_Broker	0.006	0.023	0.037	0.012
	(0.18)	(0.93)	(0.96)	(1.20)
Observations	42,279	43,402	41,656	44,025
Adjusted R-squared	0.397	0.443	0.390	0.499
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes
Firm-analyst Fixed Effects	Yes	Yes	Yes	Yes

This table presents the subsample analysis on the effect of information spillovers (*Info_Spillover*) on analyst absolute forecast error (*Abs_FE*) based on firm uncertainty. Firm uncertainty is proxied by *Firm Age* (column 1 and column 2) and *Analyst Forecast Dispersion* (column 3 and column 4). Younger firms and firms with higher analyst forecast dispersion are considered as related to higher uncertainty. Firms are *Young* if the number of months since they appear in Compustat is below the sample median, and *Old* otherwise. *Analyst forecast dispersion* is *High* if the standard deviation of analysts EPS forecasts within 90 days prior to current earnings announcement date is above the sample median, and *Low* otherwise. The dependent variable is absolute forecast errors (*Abs_FE*), and the independent variable is information spillovers (*Info_Spillover*). See Table A1 in Appendix for variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

TABLE 7

Information Spillover and Stock Illiquidity

Dependent Variable	(1) $Illiquidity_t$	(2) $Illiquidity_{t+1}$	(3) $Illiquidity_{t+2}$	(4) $Illiquidity_{t+3}$
$Avg\_\widehat{Abs}\_FE$	0.267***	0.331***	0.441***	0.590***
	(3.52)	(3.51)	(3.60)	(3.60)
Size	-0.104	-0.313**	-0.381**	-0.368**
	(-0.87)	(-2.26)	(-2.52)	(-2.05)
Trading_Volume	-1.026***	-0.880***	-0.830***	-0.854***
	(-15.56)	(-12.06)	(-10.07)	(-8.67)
Analyst_Cover	-0.034	-0.053	-0.018	-0.032
	(-0.58)	(-0.72)	(-0.21)	(-0.29)
Firm_Age	-0.625***	-0.569***	-0.616***	-0.531**
	(-4.68)	(-3.88)	(-3.42)	(-2.47)
Share_Price	0.227*	0.217	0.249	0.284
	(1.84)	(1.50)	(1.45)	(1.27)
Inst_Holdings	-0.252**	-0.240*	-0.246	-0.181
	(-2.13)	(-1.75)	(-1.51)	(-0.87)
Profitability	-0.440	-1.037	-1.268	-2.332
	(-0.55)	(-1.07)	(-0.92)	(-1.22)
MB	-0.009	-0.011	-0.018*	-0.027**
	(-1.42)	(-1.26)	(-1.72)	(-2.22)
Leverage	0.305	0.251	0.412	0.606
	(1.29)	(0.87)	(1.13)	(1.33)
Earn_Volatility	-0.610	-2.535*	-4.015**	-5.655**
	(-0.56)	(-1.92)	(-2.17)	(-2.40)
Past_Returns	-0.610***	-0.600***	-0.794***	-0.916***
	(-8.24)	(-7.06)	(-7.57)	(-7.14)
Observations	39,452	39,452	39,452	39,452
Adjusted R-squared	0.728	0.708	0.699	0.677
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year-quarter Fixed Effects	Yes	Yes	Yes	Yes

This table reports the analysis on the impact of information spillovers on stock illiquidity. The dependent variable is *illiquidity* in quarter *t*, *t+1*, *t+2*, and *t+3*, where *illiquidity* is measured by Amihud (2002) illiquidity measure. The variable of interest is the firm level predicted absolute forecast error ($Avg\_\widehat{Abs}\_FE$), which is the predicted absolute forecast error (*Abs_FE*) from the baseline regression (1) and averaged at firm level. Control variables in this regression include firm size (*Size*), trading volume (*Trading_Volume*), analyst coverage (*Analyst_Cover*), firm age (*Firm_Age*), share price (*Share_Price*), institutional holdings (*Inst_Holdings*), profitability (*Profitability*), market to book ratio (*MB*), leverage (*Leverage*), earnings volatility (*Earn_Volatility*), past stock returns (*Past_Returns*). See Table A1 in Appendix for variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

TABLE 8

Market Reactions to Analyst Forecast Revisions

Dependent Variable	(1) *CAR*	(2) *CAR*	(3) *CAR*
*Info_Spillover * Revision*	1.029***		0.615***
	(6.50)		(3.99)
*Self_Guidance * Revision*		2.109***	1.896***
		(6.51)	(5.81)
Revision	0.753***	0.857***	0.597***
	(8.75)	(11.56)	(6.91)
Info_Spillover	0.244*	-0.050	0.125
	(1.94)	(-0.40)	(1.00)
Self_Guidance	-0.428***	0.247	0.172
	(-2.93)	(1.48)	(1.04)
Observations	67,427	67,427	67,427
Adjusted R-squared	0.148	0.155	0.156
Control Variables	Yes	Yes	Yes
Year-quarter Fixed Effects	Yes	Yes	Yes
Firm-analyst Fixed Effects	Yes	Yes	Yes

This table reports the regression results for market reactions to analyst forecast revisions. The dependent variable is cumulative three-day abnormal return (*CAR*) centered on analyst forecast revision dates. Analyst forecast revision (*Revision*) is defined as the difference between analyst *i*'s revised forecast in quarter *t* and the previous forecast scaled by stock price at the end of the previous quarter. *Info_Spillover* is a dummy variable that equals one if at least one large firm in analysts' portfolio issues management earnings forecasts (i.e. EPS forecast) in the previous quarter, and zero otherwise. *Self_Guidance* is a dummy variable that equals one if firm *j* issues management earnings forecasts in the previous quarter, and zero otherwise. See Table A1 in Appendix for variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

TABLE 9

Analyst Absolute Forecast Error and Small-to-large Information Spillovers

	(1)	(2)	(3)
	Terciles	Quartiles	Quintiles
Dependent Variable	*Abs _FE*	*Abs _FE*	*Abs _FE*
Info_Spillover	-0.003	-0.006	-0.002
	(-0.72)	(-1.49)	(-0.43)
Size	-0.168***	-0.155***	-0.147***
	(-25.33)	(-22.32)	(-19.81)
Analyst_Cover	-0.073***	-0.068***	-0.060***
	(-13.12)	(-11.62)	(-8.84)
Inst_Holdings	-0.048***	-0.039**	-0.046**
	(-3.13)	(-2.46)	(-2.45)
Profitability	-0.448***	-0.383***	-0.281***
	(-6.17)	(-4.90)	(-3.35)
Earn_Volatility	0.433***	0.385***	0.379***
	(4.01)	(3.35)	(2.93)
Past_Returns	-0.069***	-0.061***	-0.064***
	(-8.17)	(-6.51)	(-6.11)
Self_Guidance	-0.029***	-0.033***	-0.035***
	(-6.85)	(-7.42)	(-6.75)
Forecast_Horizon	0.006***	0.006***	0.007***
	(4.67)	(4.39)	(5.09)
Indu_Complexity	0.006	0.003	0.002
	(1.15)	(0.68)	(0.27)
Portfolio_Size	-0.001	-0.004	-0.007
	(-0.11)	(-0.73)	(-1.18)
Firm_Expert	-0.007	-0.009	-0.018**
	(-1.18)	(-1.38)	(-2.35)
Top_Broker	0.003	0.003	0.003
	(0.73)	(0.50)	(0.47)
Observations	100,254	79,853	59,694
Adjusted R-squared	0.370	0.381	0.385
Year-quarter Fixed Effects	Yes	Yes	Yes
Firm-analyst Fixed Effects	Yes	Yes	Yes

This table presents the analysis on the effect of small-to-large information spillovers on analyst absolute forecast error, where I investigate whether small firms' management earnings forecasts benefit analyst forecasts on the corresponding large firms in an analyst portfolio. *Abs_FE* is defined as the absolute value of the difference between an analyst's quarterly EPS forecast and actual EPS scaled by stock price at the end of the previous quarter and multiplied by 100. *Info_Spillover* is a dummy variable that equals one if at least one small firm in an analyst portfolio issues management earnings forecast (i.e. EPS forecast) in the previous quarter, and zero otherwise. All control variables are accordingly computed with respect to large firms. See Table A1 in Appendix for detailed variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

TABLE 10

Placebo Test: Analyst Absolute Forecast Error with and without Large Firms as the Source of Information Spillovers

	(1)	(2)
Dependent Variable	Abs_FE	Abs_FE
Small_No_Info	0.027***	0.022***
	(4.99)	(2.70)
Size	-0.524***	-0.573***
	(-102.59)	(-43.86)
Analyst_Cover	-0.197***	-0.168***
	(-36.16)	(-16.88)
Inst_Holdings	-0.152***	-0.147***
	(-12.68)	(-6.70)
Profitability	-1.397***	-1.156***
	(-16.33)	(-8.37)
Earn_Volatility	2.113***	1.535***
	(18.32)	(7.13)
Past_Returns	-0.174***	-0.119***
	(-17.53)	(-8.90)
Self_Guidance	-0.078***	-0.074***
	(-11.59)	(-8.55)
Forecast_Horizon	0.014***	0.014***
	(5.84)	(5.05)
Indu_Complexity	0.012*	0.004
	(1.72)	(0.32)
Portfolio_Size	-0.018**	-0.017
	(-2.23)	(-1.47)
Firm_Expert	-0.012*	-0.030**
	(-1.96)	(-2.53)
Top_Broker	-0.007	0.005
	(-0.90)	(0.43)
Observations	157,023	157,023
Adjusted R-squared	0.384	0.401
Firm Fixed Effects	Yes	No
Analyst Fixed Effects	Yes	No
Year-quarter Fixed Effects	Yes	Yes
Firm-analyst Fixed Effects	No	Yes

This table reports the results on a placebo test, where I compare analyst absolute forecast error on small firms with and without large firms as the source of information spillovers. Specifically, I include out-of-sample analysts for each firm-quarter, where the small firms are not ranked in the bottom quartile in the analyst portfolios. *Abs_FE* is defined as the absolute value of the difference between an analyst's quarterly EPS forecast and actual EPS scaled by stock price at the end of the previous quarter and multiplied by 100. *Small_No_Info* is a dummy variable that equals one if a small firm is not ranked in the bottom quartile of an analyst portfolio, and zero otherwise. See Table A1 in Appendix for detailed variable definitions. t-statistics are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Appendix

Table A1: Variable Definitions

Variables	Definition
Abs_FE	Absolute forecast error, measured as the absolute value of the difference between an analyst's quarterly EPS forecast and actual EPS scaled by stock price at the end of the previous quarter and multiplied by 100
Info_Spillover	Information spillover, measured as a dummy variable that equals one if at least one large firm in an analyst's portfolio issues management earnings forecast (i.e. EPS forecast), and zero otherwise
Analyst_Cover	Analyst coverage, measured as the number of analysts that follow a specific firm scaled by total assets and multiplied by 1 million
$Avg\_\widehat{Abs}\_FE$	Predicted firm level absolute forecast error, measured as the predicted value of *Abs_FE* averaged to firm level
CAR	Cumulative abnormal return, measured as the three-day CRSP value-weighted market-adjusted cumulative abnormal return
Earn_Volatility	Earnings volatility, measured as the standard deviation of earnings in the past four quarters, where earnings is measured as income before extraordinary items scaled by total assets
Firm_Age	Firm age, measured as the natural logarithm of one plus the number of months since a firm appears in Compustat
Firm_Expert	Firm-specific analyst experience, measured as a dummy variable that equals one if an analyst's firm-specific experience (measured as the number of months since an analyst followed the firm) is in top quintile in a quarter, and zero otherwise
Forecast_Horizon	Analyst forecast horizon, measured as the natural logarithm of the number of days between an analyst's forecast date and actual EPS announcement date
$Illiquidity_{t,\ t+1,\ t+2,\ t+3}$	Illiquidity, measured as the natural logarithm of one plus averaged Amihud (2002) daily illiquidity measure through a quarter. Amihud (2002) illiquidity is measured as the ratio of absolute daily stock returns multiplied by 1 million scaled by dollar trading volume
Indu_Complexity	Industry complexity, measured as the natural logarithm of the number of two-digit SIC industries followed by an analyst in a quarter
Info_Spillover_1	Information spillover, measured as a dummy variable that equals one if at least one large firm (i.e. the top tercile or top quintile market capitalization firms) in an analyst's portfolio issues management earnings forecast (i.e. EPS forecast), and zero otherwise

Info_Spillover_2	An alternative measure for information spillover, measured as the number of large firms in an analyst's portfolio issuing management earnings forecasts (i.e. EPS forecast)
Inst_Holdings	Institutional holdings, measured as the ratio of shares held by institutional investors over shares outstanding
Leverage	Leverage, measured as total liabilities scaled by total assets
MB	Market-to-book ratio, measured as market value of equity over book value of equity
Past_Guidance	The frequency of past management earnings forecasts, measured as the quarterly average number of management earnings forecasts issued by large firms in the past [-3,-1] years before the previous quarter
Past_Returns	Past returns, measured as buy-and-hold abnormal returns during the previous quarter
Portfolio_Size	Analysts' portfolio size, measured as the natural logarithm of the number of firms followed by an analyst in a quarter
Profitability	Profitability, measured as income before extraordinary items scaled by total assets
Revision	Analyst forecast revision, measured as the difference between an analyst's revised forecast and the previous forecast scaled by stock price at the end of the previous quarter
Small_No_Info	A dummy variable that equals one if a "small" firm is ranked above the bottom quartile within an analyst portfolio w.r.t. market capitalization, and zero otherwise
Self_Guidance	A dummy variable that equals one if there is at least one management earnings forecast (i.e. EPS forecast) issued by firm *j* in the previous quarter, and zero otherwise
Share_Price	Share price, measured as the natural logarithm of stock price at the end of the previous quarter
Size	Firm size, measured as the natural logarithm of market capitalization at the end of the previous quarter
Top_Broker	Top broker, measured as a dummy variable that equals one if an analyst works in a top quintile broker w.r.t. to broker size, where broker size is measured as the number of analysts employed by a broker, and zero otherwise
Trading_Volume	Trading volume, measured as the natural logarithm of average dollar trading volume in the previous quarter

Table A2: Identifying Information Spillover by Institutional Ownership

Dependent Variable	(1) *Abs_FE*	(2) *Abs_FE*	(3) *Abs_FE*
Info_Spillover	-0.060***	-0.028**	-0.034**
	(-6.85)	(-2.35)	(-2.14)
Size	-0.282***	-0.709***	-0.806***
	(-69.73)	(-77.17)	(-32.27)
Analyst_Cover	-0.245***	-0.237***	-0.196***
	(-68.84)	(-23.73)	(-10.98)
Inst_Holdings	-0.098***	-0.246***	-0.273***
	(-7.99)	(-11.42)	(-6.63)
Profitability	-4.140***	-2.213***	-1.816***
	(-32.92)	(-14.77)	(-7.10)
Earn_Volatility	7.085***	2.430***	1.713***
	(42.13)	(12.93)	(4.27)
Past_Returns	-0.538***	-0.245***	-0.150***
	(-30.28)	(-14.19)	(-6.62)
Self_Guidance	-0.202***	-0.092***	-0.086***
	(-23.29)	(-7.46)	(-5.97)
Forecast_Horizon	0.023***	0.020***	0.021***
	(5.13)	(4.42)	(3.96)
Indu_Complexity	0.038***	0.006	-0.003
	(6.01)	(0.48)	(-0.14)
Portfolio_Size	-0.026***	-0.055***	-0.066***
	(-3.05)	(-3.56)	(-2.89)
Firm_Expert	0.001	0.001	0.005
	(0.07)	(0.10)	(0.21)
Top_Broker	-0.003	-0.009	0.002
	(-0.26)	(-0.57)	(0.08)
Observations	82,220	82,220	82,220
Adjusted R-squared	0.162	0.401	0.425
Firm Fixed Effect	No	Yes	No
Analyst Fixed Effect	No	Yes	No
Year-quarter Fixed Effects	No	Yes	Yes
Firm-analyst Fixed Effects	No	No	Yes

This table presents OLS regression results for the effect of information spillovers (*Info_Spillover*) on analyst absolute forecast error (*Abs_FE*). *Abs_FE* is defined as the absolute value of the difference between an analyst's quarterly EPS forecast and actual EPS scaled by stock price at the end of the previous quarter and multiplied by 100. *Info_Spillover* is a dummy variable that equals one if at least one large firm, in terms of institutional ownership, in analysts' portfolio issues management earnings forecast (i.e. EPS forecast) in the previous quarter, and zero otherwise. See Table A1 in Appendix for detailed variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A3: Identifying Information Spillover by Trading Volume

	(1)	(2)	(3)
Dependent Variable	*Abs_FE*	*Abs_FE*	*Abs_FE*
Info_Spillover	-0.077***	-0.016*	-0.018*
	(-11.22)	(-1.68)	(-1.65)
Size	-0.220***	-0.536***	-0.614***
	(-64.64)	(-69.48)	(-30.59)
Analyst_Cover	-0.169***	-0.174***	-0.145***
	(-57.96)	(-21.28)	(-9.75)
Inst_Holdings	-0.109***	-0.155***	-0.145***
	(-9.78)	(-8.38)	(-3.96)
Profitability	-3.281***	-1.700***	-1.268***
	(-29.56)	(-12.82)	(-5.63)
Earn_Volatility	6.375***	2.102***	1.392***
	(43.95)	(12.95)	(4.26)
Past_Returns	-0.437***	-0.184***	-0.112***
	(-26.32)	(-11.44)	(-5.39)
Self_Guidance	-0.173***	-0.061***	-0.061***
	(-24.72)	(-5.91)	(-5.46)
Forecast_Horizon	0.021***	0.009**	0.008*
	(5.89)	(2.33)	(1.84)
Indu_Complexity	0.012**	0.002	-0.023
	(2.36)	(0.21)	(-1.31)
Portfolio_Size	-0.018***	-0.022*	-0.018
	(-2.66)	(-1.75)	(-1.00)
Firm_Expert	0.004	0.015*	0.011
	(0.50)	(1.65)	(0.60)
Top_Broker	-0.006	-0.013	0.008
	(-0.73)	(-1.09)	(0.48)
Observations	77,806	77,806	77,806
Adjusted R-squared	0.162	0.396	0.414
Firm Fixed Effect	No	Yes	No
Analyst Fixed Effect	No	Yes	No
Year-quarter Fixed Effects	No	Yes	Yes
Firm-analyst Fixed Effects	No	No	Yes

This table presents OLS regression results for the effect of information spillovers (*Info_Spillover*) on analyst absolute forecast error (*Abs_FE*). *Abs_FE* is defined as the absolute value of the difference between an analyst's quarterly EPS forecast and actual EPS scaled by stock price at the end of the previous quarter and multiplied by 100. *Info_Spillover* is a dummy variable that equals one if at least one large firm, in terms of trading volume, in analysts' portfolio issues management earnings forecast (i.e. EPS forecast) in the previous quarter, and zero otherwise. See Table A1 in Appendix for detailed variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A4: The Effect of Linkage Intensity

	(1)	(2)
	Geographic Distance	
	Strong	*Weak*
Dependent Variable	*Abs_FE*	*Abs_FE*
Info_Spillover	-0.041*	-0.030
	(-1.81)	(-1.35)
Size	-0.881***	-0.678***
	(-25.01)	(-20.94)
Analyst_Cover	-0.180***	-0.196***
	(-7.67)	(-7.87)
Inst_Holdings	-0.292***	-0.143**
	(-4.68)	(-2.36)
Profitability	-1.964***	-0.709*
	(-5.66)	(-1.93)
Earn_Volatility	2.809***	-0.705
	(5.36)	(-1.32)
Past_Returns	-0.139***	-0.120***
	(-4.01)	(-3.78)
Self_Guidance	-0.059***	-0.120***
	(-3.21)	(-6.01)
Forecast_Horizon	0.024***	0.013*
	(2.85)	(1.90)
Indu_Complexity	-0.019	-0.005
	(-0.60)	(-0.16)
Portfolio_Size	-0.057	-0.054*
	(-1.64)	(-1.88)
Firm_Expert	-0.002	-0.038
	(-0.05)	(-1.29)
Top_Broker	0.030	-0.014
	(1.01)	(-0.54)
Observations	42,370	43,311
Adjusted R-squared	0.429	0.419
Year-quarter Fixed Effects	Yes	Yes
Firm-analyst Fixed Effects	Yes	Yes

This table presents the subsample analysis on the effect of information spillovers (*Info_Spillover*) on analyst absolute forecast error (*Abs_FE*) based on the linkage intensity. The linkage intensity is proxied by *Geographic Distance* between a small firm and the corresponding large firms. The linkage intensity between small firm *j* and the corresponding large firms are considered as *Strong* if the averaged geographic distance is below the sample median or *Weak* if otherwise. The dependent variable is absolute forecast error (*Abs_FE*), and the independent variable is information spillovers (*Info_Spillover*). See Table A1 in Appendix for variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A5: Instrumental Variable Estimation

	(1)	(2)
	First-stage	*Second-stage*
Dependent Variable	*Info_Spillover*	*Abs_FE*
Info_Spillover		-0.153**
		(-2.39)
Past_Guidance	0.130***	
	(35.34)	
Size	0.007*	-0.785***
	(1.79)	(-32.49)
Analyst_Cover	0.004	-0.173***
	(0.79)	(-10.25)
Inst_Holdings	-0.028***	-0.244***
	(-3.38)	(-5.66)
Profitability	0.064	-1.596***
	(1.49)	(-6.45)
Earn_Volatility	0.025	1.522***
	(0.41)	(4.20)
Past_Returns	-0.009*	-0.148***
	(-1.69)	(-6.45)
Self_Guidance	0.009*	-0.090***
	(1.90)	(-6.34)
Forecast_Horizon	-0.002	0.018***
	(-1.34)	(3.40)
Indu_Complexity	0.019***	-0.002
	(2.80)	(-0.08)
Portfolio_Size	0.220***	-0.024
	(28.33)	(-0.90)
Firm_Expert	0.013*	-0.017
	(1.80)	(-0.83)
Top_Broker	-0.006	0.011
	(-0.84)	(0.55)
Observations	85,681	85,681
Year-quarter Fixed Effects	Yes	Yes
Firm-analyst Fixed Effects	Yes	Yes

This table presents the 2SLS regression results of the effect of information spillovers (*Info_Spillover*) on analyst absolute forecast error (*Abs_FE*). The instrument for *Info_Spillover* is *Past_Guidance*, which is defined as the quarterly average number of management earnings forecasts issued by large firms within quarter [t-17, t-6] (i.e. the past 12 quarters before the previous quarter with a one-year interval). The first-stage result is reported in column 1, and the second-stage result is reported in column 2. See Table A1 in Appendix for variable definitions. *t-statistics* are in parenthesis with standard errors clustered at the firm-analyst level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.