

# Analysts' Institutional Client Catering and Reputation Tradeoff: Strategic Timing of Recommendations

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## Abstract

We examine whether sell-side analysts strategically time their favorable recommendations to cater to institutional investors while preserving analysts' reputational capital. Though prior literature documents that analysts provide more positive recommendations for stocks that are part of their institutional clients' (specifically, mutual funds') portfolios, it does not explicitly address a reputation cost associated with such practice. Using a sample of analysts' recommendations on U.S. firms for the 2002-2017 period, we document a pattern of analysts' recommendations being more optimistic in the last month of a quarter and less optimistic in the beginning month of a quarter. This timing pattern ties to quarterly reporting periods of portfolio managers, with actively managed mutual funds' holdings being affected the most. Analysts with Institutional Investor All-Star ranking do not engage in such stock recommendation timing practices. The market participants seem to believe rosy recommendations issued for stocks with more institutional holdings in the end month of a quarter with more positive cumulative abnormal returns to upgrade and downgrade recommendations, but only those issued by non-star analysts.

*JEL classifications:* G14, G24

*Keywords:* Financial analysts; Analyst recommendations; Institutional catering; Reputation

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## 1. Introduction

Agency problems and conflicts of interest of sell-side analysts have been of great attention to policymakers and academics. It is widely reported that analysts affiliated with investment banks issue more optimistic recommendations to attract future underwriting business (Dugar & Nathan, 1995; Lin & McNichols, 1998; Michaely & Womack, 1999; Loughran & Ritter, 2004). This controversy led to more regulation through establishing firewalls in the investment banks with a clear separation of the research and investment-banking divisions at (brokerage) firms. Analysts may also provide rosy recommendations to maintain a positive relationship with the management of the firms that are subjects of the recommendations (Francis & Philbrick, 1993). Incentives to generate trading commissions are likewise linked to optimistic reports (Hayes, 1998; Irvine, 2001; Jackson, 2005; Cowen, Groyberg, & Healy, 2006). Prior literature also documents that analysts provide overoptimistic biased recommendations on stocks held by mutual funds that have client status with the brokerage (Firth et al., 2013; Mola & Guidolin, 2009; Gu et al., 2013).<sup>1</sup>

However, such biased recommendations may create a cost for analysts in the form of a negative effect on analysts' reputations. For example, the market recognizes such catering activity with muted response to such recommendations (Mola & Guidolin, 2009). Existing literature shows that analysts' reputation is an essential capital and that reputational concerns tend to reduce analysts' opportunistic behavior (Kreps & Wilson, 1982; Milgrom & Roberts, 1982; Fudenberg & Levine, 1989; Benabou & Laroque, 1992). Therefore, a tradeoff exists between catering to institutional clients by providing optimistic recommendations and building a reputation. Jackson (2005) finds that while optimistic analysts generate more short-term trading volume, analysts that

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<sup>1</sup> Please see SEC Investor Publication for more discussion of Potential Conflicts of Interest related to sell-side analysts' recommendations: <https://www.sec.gov/tm/reportspubs/investor-publications/investorpubsanalystshtm.html>

mislead investors have their reputation negatively affected. Even though reputation concerns reduce analysts' opportunistic behavior (Jackson, 2005), some studies show that, on average, analysts' reports are informative but optimistic (Stickel, 1992; Dugar & Nathan, 1995; Womack, 1996; Lin & McNichols, 1998; Michaely & Womack, 1999; Beyer & Guttman, 2011). Thus, analysts may strategically choose how and when to release acquired information (Meng, 2015). For example, Morris (2001) argues that analysts' reputational concerns may discourage truthful communication when they try to avoid being perceived as misaligned with investors.

This study captures the tradeoff between analysts' catering to institutional clients and analysts' reputations by examining whether analysts strategically time their biased optimistic recommendations. While institutional investors would love to have a systematic favorable recommendation on the stocks they hold in their portfolios to improve their portfolios' performance artificially, such recommendations have a material effect when portfolio managers issue quarterly reports to investors. Anecdotal evidence shows that portfolio managers engage in "marking the close" or "portfolio pumping," which is a form of "window dressing" technique, to make their results look better at the end of the quarter (Zweig, 1997; Zweig & McGinty, 2012). Academic studies confirm the presence of such "portfolio pumping" behavior among mutual funds (Carhart et al., 2002) and hedge funds (Ben-David et al., 2013). While the trading activities associated with portfolio pumping are not easily identifiable, they are still illegal. Achieving "portfolio pumping" results through analysts' biased recommendations is a cheaper and technically not illegal way. Thus, we investigate whether analysts cater to the portfolio-pumping behavior of their institutional clients and strategically time their biased recommendations on stocks that are part of institutional investors' portfolios.

We examine whether financial analysts tend to issue biased recommendations in the months when portfolio managers, such as mutual funds and hedge funds, report their performance not to affect these managers' portfolios' values negatively. We expect that not issuing negative recommendations is a more affordable strategy, as it requires only withholding information, than issuing biased positive recommendations, which requires stating untrue information publicly. We further expect analysts reverse the course in the subsequent months and issue more truthful and less optimistic recommendations to preserve their reputation.

We document a pattern in analysts' recommendations and recommendation changes. They tend to be more optimistic in the last month of a quarter and less optimistic in the first month of a quarter. In the univariate analysis, raw and relative recommendations, and revisions, on average, tend to be higher in the end month of a quarter and lower in the beginning month of a quarter. Downgrades tend to be the smallest in March, June, and September, while the most significant downgrades happen in February, May, July, and October. However, the most significant upgrades do not consistently fall on months of a quarter end and occur in May, August, October, and December, consistent with the argument that for analysts issuing overoptimistic information is costlier than withholding negative information. These patterns of analysts' recommendations and updates are similar between firms with institutional holdings in the top and bottom quartile of the sample, yet more pronounced for the sample of actively managed mutual funds.

We confirm the timing pattern of analysts' recommendations in the multivariate analysis. We perform the analysis across all institutional investors' holdings and by institution types: passive index funds and ETFs, mutual funds, hedge funds, banks, and other institutional investors. While we find the monthly patterns in analysts' recommendations and revisions for mutual fund holdings, we do not consistently confirm this pattern among other types of institutional investors' holdings.

An increase in the size of mutual funds' holdings in the stock is associated with more positive recommendations, a lower magnitude of downgrades in the quarter-end month, and the reversal of such strategy in the quarter-beginning month. This timing pattern is present only among analysts that do not have an Institutional Investor All-Star ranking. This finding suggests that analysts with high reputational capital avoid engaging in a timing strategy of issuing biased recommendations as the cost of damaging reputation exceeds the benefits of more business from institutional investor clients.

In general, at any time, all-star ranking analysts receive a more pronounced market reaction to their upgrades and downgrades relative to other analysts. Thus, market participants consider information released by skilled analysts more valuable. However, investors appear to be fooled by timing strategies of biased recommendations of non-star analysts at the end and beginning of a quarter with a more positive response to upgrades and downgrades in the last month of a quarter, based on the sample of all institutional investors' holdings. Thus, such biased recommendations do serve the purpose of "portfolio pumping" of affected institutional investors.

This paper contributes to the extant literature on analysts' forecasts and recommendations. It extends the literature on the optimism and opportunistic behavior of analysts (Dugar & Nathan, 1995; Lin & McNichols, 1998; Michaely & Womack, 1999) and, more specifically, on the client catering and incentives related to the generation of trading revenue by sell-side analysts (Hayes, 1998; Irvine, 2001; Jackson, 2005; Cowen, Groyberg, & Healy, 2006; Gasparino, 2002; Jackson, 2005). Our analysis of the effect of institutional investor ownership of stock on analysts' timing of optimistic recommendations is related to the work of Firth et al. (2013), Gu et al. (2013), and Mola & Guidolin (2009). These studies show that analysts provide more favorable recommendations to stocks held by affiliated mutual funds. Our study differs from the prior

research by looking at the timing strategy of issuing over-optimistic recommendations or withholding pessimistic recommendations and not just the presence of biased favorable recommendations.

In contrast to prior literature, we look at all institutional investors' holdings in the stocks covered by analysts, not just mutual funds. We show that different institutional investors receive a different level of catering with a timing strategy of favorable recommendations on stocks in institutional clients' portfolios. Actively managed mutual funds get the most advantage from the strategy across all measures of favorable recommendations: higher raw and relative recommendations and revisions and a lower magnitude of downgrades. However, we also find that analysts provide smaller downgrades in the last month of a quarter with an increase in all institutional investors' holdings, and banks' holdings specifically. This finding suggests that analysts choose the level of catering based on the needs of their institutional clients to minimize associated reputational costs for analysts.

The study also contributes to the literature on “window dressing” by portfolio managers. Prior studies looked at the direct actions of portfolio managers to improve the reported performance of their portfolios either through risk-shifting behavior (Bollen & Pool, 2008; Huang et al., 2011; Patton & Ramadorai, 2013) or performance manipulation through trading or non-trading activities (Carhart et al., 2002; Bollen & Pool, 2009; Cici, Kempf, & Puetz, 2016; Agarwal, Daniel, & Naik, 2011; Ben-David et al., 2013). Our paper examines the third-party actions, specifically analysts' timed favorable recommendations, that can achieve the same “portfolio pumping” effect as direct actions by portfolio managers. Carhart et al. (2002) argue that if funds “herd” to specific equities, as suggested by Lakonishok, Shleifer, and Vishny (1992), and Grinblatt, Titman, and Wermers (1995), and a few determined fund managers mark up or engage in

manipulative trade activities in some of these securities, then other funds will benefit from the price manipulating activities of these managers. Whilst performance manipulation by portfolio managers is considered illegal by the Securities and Exchange Commission (SEC), analysts' catering to institutional investors can benefit direct clients and other institutions with the same stock holdings and reduce legal and reputational costs for institutional investors.

The over-optimistic recommendations can be recognized by market participants (Mola & Guidolin, 2009) and can hurt analysts' reputation (Jackson, 2005). Thus, the analysts' timing strategy can be an outcome of the tradeoff between catering to institutional clients and preserving analysts' reputation. Hence, our study also contributes to the literature on analysts' reputation. Overall, this study contributes to the literature by combining three strands of research on analysts and institutional investors: studies on (1) biased overoptimistic recommendations, (2) "portfolio pumping" of fund managers, and (3) analysts' reputation. Even though some prior studies examine the strategic release of information by analysts (e.g., Scharfstein & Stein, 1990; Trueman, 1994; Morris, 2001; Guttman, 2010; Meng, 2015), this is the first study that examines analysts' strategies in the setting of institutional clients' relationships and reputation effect.

The rest of the paper is organized as follows: Section 2 develops hypotheses. Section 3 describes the data and sample selection. Section 4 reports the study's empirical results, and Section 5 concludes.

## **2. Hypotheses**

Prior literature looks at the timing of analysts' forecasts as an outcome of analysts' rational decisions to compete for clients' demand for their research. A couple of theories predict that more capable or informed analysts provide earlier forecasts, which are also linked to better-quality



reports. The reputation-herding theory argues that more capable agents act earlier and base their estimates on their private information, whereas less capable agents subsequently herd as they seek to hide their low ability (Scharfstein & Stein, 1990; Trueman, 1994). The tradeoff theory predicts that analysts with a higher precision of initial private information tend to forecast earlier, and analysts with a higher learning ability tend to forecast later (Guttman, 2010). Several empirical studies confirm the theories' predictions that more capable or informed analysts issue their forecasts earlier (Cooper et al., 2001; Shroff et al., 2013; Keskek et al., 2014).

However, these theories do not consider the presence of a conflict of interest between analysts and different clientele consuming their research, as well as the management of the firms or fund managers that hold those firms' stocks that analysts follow. While sell-side analysts supply their research and recommendations to a wide range of consumers, analysts rate hedge funds and mutual funds as their most important clients and retail brokerage clients as least important (Brown et al., 2014). These preferences come from additional services that brokerage houses that employ the analysts provide to institutional investors, such as underwriting and trading businesses.<sup>2</sup> This suggests that most analysts focus on addressing the needs of large, institutional investors, rather than the needs of small, individual investors (De Franco et al., 2007).

Chiu et al. (2021) add an institutional investor's attention to a firm as a factor influencing the timeliness of the analysts' forecasts for that firm. Their findings suggest that responsiveness to

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<sup>2</sup> Even though industry reforms of the early 2000s tried to separate the underwriting and commission-generating business of brokerages from activities of sell-side analysts to address agency problems between analysts and clients, some industry participants believe that the industry changed in form but not in substance. For example, Jack Grubman (2013) says that prior to reforms, an underwriting banker and a research analyst would have a single meeting with the management to generate underwriting business, and now, it would be two separate meetings.

Analysts' compensation is also tied to the brokerage house's underwriting business or trading commissions. According to an analysts' survey conducted by Brown et al. (2014), 44% of analysts say their success at generating those activities is particularly important to their compensation.

institutional attention (based on abnormal Bloomberg news search activity on earnings announcement days) influences the production of the analyst research and analysts' career outcomes.

Mola and Guidolin (2009) and Firth et al. (2013) show that sell-side analysts cater to affiliated mutual funds by providing higher coverage and more favorable and biased recommendations. They show that larger holdings by these institutional investors are associated with more favorable stock recommendations from affiliated analysts. However, Firth et al. (2013) also show that this favorable recommendation bias toward a client's existing portfolio stocks is mitigated if the stock is highly visible to other mutual fund investors. At the same time, Mola and Guidolin (2012) show that analysts' optimism about stocks held by affiliated mutual funds declined after 2002. Thus, the conflict of interest between agents consuming the analysts' reports (institutional versus retail investors) or providing information for those reports, i.e., firms, should prevent the analysts from continuously providing biased recommendations. According to Brown et al. (2014) survey, the most important determinants of an analyst's career success (and compensation) are industry knowledge and analyst rankings or broker votes.<sup>3</sup> Thus, analysts need to walk a balancing act of pleasing their institutional clients and maintaining their professional integrity and reputation.

Bonini et al. (2011) show in a theoretical model that collective reputation plays a role in determining analysts' behavior independently of their individual reputation. The authors show that truthful revelation is more likely to occur when there is more uncertainty on the average ability of analysts as a group. However, they also show that an increase in collective reputation always

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<sup>3</sup> The least important is the accuracy and timeliness of the analyst's earnings forecasts.

makes truthful revelation more difficult to achieve. However, the authors recognize that analysts care about individual reputation (Leone & Wu, 2007; Fang & Yasuda, 2009). Better-quality analysts should have more incentives to reveal information accurately and fully even when the market's collective view of the industry is low. That brings us to a separating equilibrium of high-quality/reputation analysts, i.e., all-star analysts, being less likely to engage in catering activities than non-star analysts.

Anecdotal evidence shows that some fund managers get involved in the practice known as "marking the close" or "portfolio pumping," which is a form of "window dressing," a term for a variety of techniques employed by asset managers to make their results look better at the end of the quarter (Zweig & McGinty, 2012).<sup>4</sup> Academic studies confirm such behaviors of window dressing among portfolio managers (Bollen & Pool, 2008; Huang et al., 2011; Patton & Ramadorai, 2013; Carhart et al., 2002; Bollen & Pool, 2009; Cici, Kempf, & Puetz, 2016; Agarwal, Daniel, & Naik, 2011; Ben-David et al., 2013). Analysts may address their affiliated institutional client desire to window dressing during reporting periods, i.e., the end of the quarter, by providing biased optimistic recommendations only during the last month of a quarter and reversing their recommendations to unbiased ones the following month.

Thus, our main research question is whether, due to agency problems of having corporate clients associated with a brokerage firm, financial analysts avoid issuing negative (or issue more optimistic) recommendations in the last month of the calendar quarter when portfolio managers, such as hedge funds and mutual funds, report their performance, and reverse the course in the

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<sup>4</sup> Some forms of window dressing, such as selling losing stocks right before reporting quarter-end holdings to investors, are perfectly legal. However, regulators say marking the close violates prohibitions on deceptive trading in the federal securities laws.

subsequent months. Our formal hypothesis addresses the content of analysts' reports related to the timing of biased recommendations and is as follows:

*Hypothesis 1. Brokerage analysts issue less pessimistic (more optimistic) recommendations on stocks with more institutional holdings during the last month of a calendar quarter and revert their recommendations the following month.*

In the experimental setting, Hirst et al. (1995) show that, while recognizing that analysts affiliated with investment banking provide more favorable recommendations than nonaffiliated ones, investors do not differentiate their assessment of the stocks with favorable recommendations between the analysts' types. However, when faced with a negative report, investors assess the company's performance as less favorable if the report is issued by an investment-banking analyst than by a noninvestment-banking analyst. While recognizing the analysts' catering behavior toward their institutional clients, investors punish negative reports issued by analysts with a conflict of interest and remain indifferent to positive reports. Therefore, we expect that the analysts' timing strategy of favorable recommendations will be more common in the form of reduced downgrades than over-optimistic recommendations. To preserve their reputation, analysts will be more inclined to withhold negative information than overstate positive information. Thus, our sub-hypothesis for Hypothesis 1 is as follows:

*Hypothesis 1.2. Brokerage analysts issue smaller-magnitude downgrades, avoid issuing more extensive upgrades on stocks with more institutional holdings during the last month of a calendar quarter and revert their recommendations the following month.*

As analysts cater to different institutional clients with different reporting requirements and portfolio strategies, such as hedge funds, mutual funds, pension funds, endowments, and insurance

companies, we expect variation in the intensity of seasonal bias of analysts' recommendations. Given that analysts rank hedge funds as their top priority clients, followed by mutual funds (Brown et al., 2014), we expect to observe more seasonal bias in analysts' recommendations for firms with more holdings by hedge funds and mutual funds than other categories of institutional investors, with the least effect for passive portfolio holdings, such as index funds and ETFs. Our next hypothesis is a modified hypothesis 1, controlling for the type of institutional holdings, and is as follows:

*Hypothesis 2. Brokerage analysts issue less pessimistic (more optimistic) recommendations on stocks with more hedge funds and mutual funds' holdings but not passive portfolio holdings, such as index funds and ETFs, during the last month of a calendar quarter and revert their recommendations the following month.*

Given that investors perceive downgrades issued by analysts with a conflict of interest as worse than downgrades issued by unaffiliated analysts and treat upgrades issued by both types of analysts equally (Hirst et al., 1995), we expect differential use of favorable recommendations across different institutional investors. Specifically, even if catering analysts emphasize their effort on stocks with high ownership by actively managed portfolios that are subject to mandatory reporting, such as mutual funds, analysts would issue smaller-magnitude downgrades for all actively managed institutional investors. However, they would increase upgrades only for mutual funds' holdings. Thus, our sub-hypothesis for Hypothesis 2 is as follows:

*Hypothesis 2.2. Brokerage analysts issue smaller-magnitude downgrades but bigger upgrades on stocks with only bigger hedge and mutual funds' holdings during the last month of a calendar quarter and revert their recommendations the following month.*

The most critical determinants of an analyst's career success (and compensation) are industry knowledge and analyst rankings or broker votes (Brown et al., 2014). Thus, analysts should care about sustaining their earned good reputation. Existing literature shows that analysts' reputation is a significant capital and reputational concerns tend to reduce analysts' opportunistic behavior (Kreps & Wilson, 1982; Milgrom & Roberts, 1982; Fudenberg & Levine, 1989; Benabou & Laroque, 1992). Analysts with a better reputation have greater long-term benefits to lose. A theory predicts that better reputation analysts are more likely to refrain from opportunism in the short run (Benabou & Laroque, 1992; Morgan & Stocken, 2003; Jackson, 2005). Fang and Yasuda (2009) show that a personal analyst's reputation is an effective disciplinary device against conflicts of interest. Thus, analysts with substantial reputational capital, such as analysts with an Institutional Investor All-star ranking, would not engage in institutional client catering activity as the cost of doing it would outweigh the benefits. Our next hypothesis is as follows:

*Hypothesis 3 Brokerage analysts without all-star ranking issue less pessimistic (more optimistic) recommendations on stocks with more institutional holdings during the last month of a calendar quarter and revert their recommendations the following month, but analysts with all-star ranking do not engage in such practice.*

Market participants generally respond to analysts' recommendations (Stickel, 1992). Market participants also recognize the presence of a conflict of interest between analysts and their brokerage houses with differential responses to recommendations issued by affiliated and unaffiliated analysts (Hirst et al., 1995). The theory (Benabou & Laroque, 1992; Morgan & Stocken, 2003; Jackson, 2005) and empirical findings (Jackson, 2005; Fang & Yasuda, 2009) show that analysts are likely to refrain from opportunistic behavior in the short run with an increase in analysts' reputation. However, investors cannot easily recognize the timing strategy, especially if

it is based on withholding of negative information. Thus, even reputable analysts may engage in the timing strategy if the benefits exceed the costs on the reputation. If the market participants do not recognize the analysts' timing strategy, the price response to the end-of-the-quarter recommendations should be as informative as any other month recommendations. However, if investors recognize the timing strategy, the price response to the end-of-the-quarter recommendations should be muted, especially for non-all-star analysts. Thus, it is an empirical question of whether the analysts' timing strategy of their opportunistic recommendations has a material effect on the stock prices. Thus, our final hypothesis is stated in the null form:

*Hypothesis 4. The market price response to analysts' recommendations is unaffected by the calendar month of the recommendation issuance.*

### **3. Data and Sample**

We construct the sample on the individual analyst level using data from I/B/E/S Academic, Thompson Refinitiv, Compustat, and CRSP databases. The I/B/E/S Detail Recommendations database covers the data on analysts' buy-sell-hold recommendations for a stock, identifying the analysts and the brokerage house the analysts work for. The I/B/E/S Detail Estimate database contains forecasts for U.S. and international firms' earnings, cash flows, and other critical financial items (Wharton Research Data Services). We limit our study period to January 2002 to December 2017.<sup>5</sup> The entire sample contains 464,663 analyst-firm recommendations. We focus our analysis on U.S. firms.

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<sup>5</sup> We start with entire period of 1993 – 2020 available in the datasets. However, we document changes in analysts' recommendations for firms with institutional holdings in bottom and top sample quartile across different time periods. In the period prior to 2001, firms with higher institutional holdings received higher percentage of "Strong Buy" and "Buy" recommendations, and lower percentage of "Hold," "Underperform," and "Sell" recommendations, more upgrade and fewer downgrades than the firms with lower institutional holdings. These differences reversed in the subperiod of 2001-2010, and even more so in the 2011-2020 period. We explain this finding with implementation of

The primary dependent variables used in the analysis include the analyst's raw and relative recommendations, revisions, upgrades, and downgrades for a stock. Raw recommendations are recorded recommendations with an assigned numeric value from 1 (Strong Buy) to 5 (Sell). We reverse the numeric value of the recommendations to make the analysis friendlier to interpret. In other words, in our sample, raw recommendations ( $Raw_{i,j,t}$ ) have a value of 1 for "Sell," 2 for "Underperform," 4 for "Buy," and 5 for "Strong Buy," as in Firth et al. (2013). Numeric value 3 (Hold) remains unchanged. After cleaning the sample and merging the datasets, we get 303,159 analyst-firm recommendations.

Relative recommendations measure analyst optimism compared to consensus recommendations ( $Relrecom_{i,j,t}$ ). We calculate relative recommendations as the difference between the analyst's recommendation and the market consensus (Mola & Guidolin, 2009). Market consensus refers to the average recommendation assigned by all analysts to stock  $j$  in a particular month  $t$ . We calculate the relative recommendation as the initial (unadjusted) raw recommendation minus the market consensus and then reverse the result by multiplying by (-1). If a relative recommendation is positive (negative), the analyst reports a more (less) favorable recommendation compared to the consensus. For instance, if the analyst's raw recommendation is "Buy" (numeric value 2) and the market consensus is 2.5, the analyst's relative recommendation is 0.5, representing a more optimistic recommendation than a consensus.

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a number of regulations around that time, such as Regulation of Fair Disclosure of 2001 and its amendment to remove exemption for Credit Rating Agencies of 2010, and changes in exchange rule NYSE Rule 472 and NASD Rule 2210 aimed at the separation of investment banking and research and improved dissemination of public information among market participants (<https://www.sec.gov/rules/sro/34-47110.htm>). Links to Regulation Fair Disclosure <https://www.sec.gov/rules/final/33-7881.htm> and its amendment <https://www.sec.gov/rules/final/2010/33-9146fr.pdf>. To address the current regulatory environment, we start our sample period from 2002. Our sample of Institutional Investor All-star analyst ranking is available through 2017.



We use the continuous value of relative recommendations and construct two additional variables for relative recommendations, following Firth et al. (2013). First, we construct a three-level variable of relative recommendation (*Relrecom\_ordinal*) with the value of -1, 0, and 1 for the raw recommendations below, equal, and above consensus, respectively. The final sample contains 302,120 relative recommendations after merging the initial sample of the analyst-level raw recommendations with the consensus recommendations.

As an alternative measure of recommendation, we use the revision (*Revision<sub>i,j,t</sub>*), constructed as a three-level variable with the value of -1, 0, and 1. A revision is equal to -1 if the analyst downgrades the recommendation for the stock ( $Raw_{i,j,t} < Raw_{i,j,t-1}$ ) or if the analyst reiterates “Sell.” Similarly, a revision is equal to 1 if the analyst upgrades the recommendation for the stock ( $Raw_{i,j,t} > Raw_{i,j,t-1}$ ) or if the analyst reiterates “Strong Buy.” A revision is equal to 0 if the analyst reiterates his or her prior recommendation, except if the prior recommendation was “Strong Buy” or “Sell.” The sample contains 313,066 analyst-firm-revision observations.

Finally, we separately examine the subsamples with the upgrades (74,253 observations) and downgrades (88,786 observations) as dependent variables. These variables are constructed as the difference between the current analyst recommendation and the prior recommendation for a particular stock. For easier interpretation of the results, we use an absolute value of the downgrade (the magnitude of downgrades) in the analysis.

We proxy for the institutional clientele catering to the proportion of institutional holdings in the stock. The Thompson Refinitiv Institutional (13f) Holdings database is the primary source of our data on institutional ownership of U.S. firms, which provides the holdings data of

institutions of different managers' types on a quarterly frequency.<sup>6</sup> The database assigns the managers into five types: (1) banks and trusts, (2) insurance companies, (3) investment companies, (4) professional investment advisors, and (5) other managers, such as pension funds and university endowments. In this paper, we test the hypotheses using the institutional holdings of all types of managers, as well as focusing on the holdings of actively managed mutual funds and hedge funds. Additionally, we run an analysis using the holdings of banks and trusts (type 1), and other institutional holdings (type 5).

For our baseline tests, we aggregate the institutional holdings for each firm for each quarter by summing the number of shares owned by each institution and dividing it by the total number of shares outstanding ( $InstHold_{jt}$ ). All institutional holdings exceeding 100% are replaced with 100% ownership. In the analysis, we utilize institutional holdings lagged for one quarter. The change in institutional holdings is the change in the aggregated number of shares in institutional ownership in the previous quarter to the total number of shares outstanding in that quarter ( $Change_{jt}$ ). We expect a positive association between institutional holdings and analyst optimism.

We examine the analysts' timing strategy to provide favorable recommendations, which can be an outcome of the tradeoff between catering to institutional clients and preserving analysts' reputations. We argue that institutional ownership significantly affects the optimism of recommendations provided by the analysts after controlling for the firm characteristics. However, institutional holdings of different managers' types may affect the analysts' timing strategy differently.

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<sup>6</sup> Form 13F for general institutional holdings covers the quarter-end holdings of all institutional investment managers with the investment discretion over \$100 million in Section 13(f) securities. Securities in Section 13(f) include publicly traded equity, as well as convertible bonds and options (Agarwal et al., 2013).

Institutional ownership of index mutual funds and ETFs, which are passive investment portfolios, should not significantly affect the analysts' recommendation timing strategy. To check this assumption, we identify index mutual fund and ETF holdings using the CRSP Mutual Funds database. We follow Agapova and Kaprielyan (2022) to identify the index mutual funds and ETFs. The CRSP Mutual Funds database contains the identifier for index funds (INDEX\_FUND\_FLAG), with the flag "D" identifying pure index funds. Additionally, we manually identify index funds based on the specific words in the fund names, based on the methodology of Schwartz (2012). We flag the fund as an index if the fund name contains the following: "ind," "index," "idx," "s&p," "Russell 1000," "Russell 2000," "Nasdaq," "NYSE," "Dow," "Select 500," "Select 20," "Select 25," "Wilshire 2500," "Wilshire 4500," "1000," "5000," and "titans." We exclude the flag of the index fund if the name contains the words "enhanced," "infl," or "managed," or the fund has INDEX\_FUND\_FLAG of "B" or "E."

The CRSP Mutual Funds database also contains the identifier for the ETFs and ETNs. In addition, we identify the ETFs if the fund contains the following in the name: "iShare," "SPDR," "ETF," "ETN," and "streettracks." Then, we follow the steps discussed above to identify the index ETFs. After identifying the index mutual funds and ETFs, we aggregate the number of shares of each firm (using PERMNO) held by index funds each quarter and subtract this volume from the total number of shares held by institutional investors in the Thompson S34 (13f) Holdings database.

To test hypothesis 2, we identify institutional holdings of mutual funds, hedge funds, and other institutional types of managers by using the TYPECODE variable in the Thompson Refinitiv CDA/Spectrum S34 (13f) Holdings database. The Thompson Refinitiv CDA/Spectrum S34 (13f) Holdings database contains information about the types of managers filing institutional stock

holdings. However, the manager type classification is not reliable starting the last quarter of 1998, when many types were identified as “endowments and others” (5). To fix this issue, we follow Kojien and Yogo (2019) and manually identify correct manager types starting in 1998.<sup>7</sup> After manually correcting the manager’s types, the banks and insurance companies are assigned to codes 1 and 2, respectively, and investment companies and professional investment advisors to codes 3 and 4. Pension funds, endowments, and other managers are assigned to type code 5.

We identify the actively managed mutual fund holdings using the CRSP Mutual Funds database after excluding holdings of index funds, ETFs, ETNs, and money market mutual fund holdings. We classify funds as money market funds if their NAV is equal to 1 and the CRSP’s objective is IM, IMM, or IFM (Agapova & Kaprielyan, 2022). For the identification of hedge funds among all institutional holdings in the Thompson Refinitiv CDA/Spectrum S34 (13f) Holdings database, we use the list of hedge funds identified by Agarwal, Ruenzi, and Weigert (2017)

We manually collected the data on an Institutional Investor all-star ranking using the publications of All-America Research Team Rankings in the Institutional Investor magazine. Every year, the Institutional Investor magazine conducts a survey among qualified market participants that determines the best-in-class sell-side research teams across the US and publishes the results in the October issue. Most issues provide us with the first, second, and third places in

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<sup>7</sup> For managers available before the last quarter of 1998, we replace the incorrect code type after December 1998 with the correct one identified before this date. If the manager code type changes over time, we use the most recent one. For instance, if the manager existed prior to 1998 and changed the code type before December 1998, we identify the code type based on the most recent code type before December 1998. Similarly, if the manager did not exist prior to December 1998, we identify the code type based on the most recent one. We also assign the code 1 to all managers containing “bank” in their name, code 2 to all managers containing “insurance” in their name, and code 5 to all managers that we can identify as pension funds and university endowments based on the manager’s name.

each sector, as well as the runners-up. We use the prior year's winners and runners-ups to identify the star status in a particular year ( $Star_{it}$ ).

We control for the firm, brokerage house, and analyst characteristics in the analysis. The Compustat (quarterly and annual) and CRSP (monthly) databases are primary sources for the data on the firm-level controls. We exclude the firm observations with negative or missing total assets and negative sales and stockholders' equity. If the sales and net income data are not available on the quarterly basis, we use the annual values and "quarterize" them (divide by four).

Firm characteristics, such as size, profitability, leverage, and Tobin's Q ratio, affect analyst recommendations (Mola & Guidolin, 2009; Firth et al., 2013). The firm size is measured with the natural logarithm of the firm market value at the end of the quarter ( $logMV_{it}$ ). As an alternative proxy for the firm size, we use the accounting measure of the firm size calculated as the natural logarithm of end-of-quarter total assets ( $Size_{it}$ ). The results are quantitatively the same, and we do not report them for brevity.

A firm's profitability is the net income over the total assets ( $ROA_{it}$ ) and the revenue-to-asset ratio, i.e., asset turnover ( $Assetturn_{it}$ ). The leverage ratio is long-term debt divided by the book value of equity ( $Leverage_{it}$ ). Tobin's Q defines the relation between a firm's market and intrinsic value and is used as a proxy for the firm's intrinsic value. We calculate it as the ratio of total assets minus the book value of equity plus the market value of equity all over total assets ( $Tobin_{it}$ ). Alternatively, we use the market-to-book ratio as another proxy for the firm value.<sup>8</sup> Stock turnover ( $Turnover_{it}$ ), a proxy for stock liquidity, is the average daily trading volume of shares in

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<sup>8</sup> The results with the market-to-book ratio as a proxy for the firm intrinsic value are quantitatively the same and not tabulated.

the previous month divided by the average number of shares outstanding in that month. These data are from the CRSP Security Daily database. All firm characteristics are winsorized at a 1% and 99% level and lagged by one quarter.

The firm's systematic and idiosyncratic risk levels may affect analyst coverage and sentiment about the stock. Therefore, we use the beta, idiosyncratic volatility, and firm excess return (alpha) as controls in the analysis, which we calculate using the Beta Suite by WRDS. Beta represents the systematic risk of the firm, calculated for one year preceding the month of interest ( $Beta_{it}$ ). The firm's idiosyncratic volatility ( $Ivol_{it}$ ) is calculated as the standard deviation of the error term from the market model, calculated for one year preceding the month of interest (Agapova & Volkov, 2019). The excess return is the daily excess return from the CAPM model.

To control for information asymmetry, we calculate the analyst forecast errors using the current-quarter EPS forecasts and the actual EPS available in the I/B/E/S database ( $Frcsterr_{i,j,t}$ ). We follow Abarbanell and Lehavy (2003) and find forecast errors as actual EPS minus the consensus current-quarter earnings forecast scaled by the previous end-quarter price and multiplied by 100. Forecast errors' data are highly skewed, and we winsorize the variable at a 1% level to mitigate the possible effect of outliers on the results. We also control for the number of analysts covering the stock in a given year ( $Analysts\_stock_{i,j,t}$ ) as the logarithm of one plus the number of analysts covering the stock.<sup>9</sup>

The brokerage house characteristics used in the analysis include the brokerage firm's size ( $Broker\_size_{i,j,t}$ ) and busyness ( $Broker\_busyness_{i,j,t}$ ). We calculate a brokerage firm's size as the

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<sup>9</sup> In the unreported tests, we use the number of analysts covering the stock in a given month and quarter and get qualitatively equivalent results.

number of analysts reporting in the brokerage firm during a calendar year and take the logarithm of one plus this value. A brokerage firm's busyness is the number of analysts reporting in the brokerage firm each month, scaled by the brokerage size in a given year.

We use the analyst seniority ( $Senior_{i,j,t}$ ) and concentration ( $Concentration_{i,j,t}$ ) to control for analyst characteristics. We also control for the number of analysts covering the firm in a given month ( $Analysts\_stock_{it}$ ). Analyst seniority is the number of quarters since the analyst first appeared in the I/B/E/S Detail Recommendations database (as in Firth et al., 2013). Analyst concentration is the number of different industries, measured as a two-digit SIC code, the analyst covers each month. All these characteristics are normalized by taking the logarithms of one plus the variable's value.

In the paper, we also examine the market reaction to the upgrades and downgrades in different periods (beginning vs. end of the quarter) for the stock with different levels of institutional ownership. As a dependent variable, we use cumulative abnormal returns (CAR) with the (-1, +1) window around the recommendation's announcement dates. We calculate CAR utilizing the Eventus tool and using the market model with the value weighted CRSP portfolio as a benchmark. An estimation window is (-301, -46) days before the recommendation announcement dates. We use the following trading day if the announcement date is a calendar date with no trading. For robustness check, we also run the models using CAR (-2, +2) and CAR (-5, +5) but do not tabulate the results to preserve the space.

Panel A of Table 1 provides summary statistics of the analyst recommendations. We observe that analyst recommendations are, on average, optimistic, with a mean (median) of 3.539 (3). "Strong Buy" and "Buy" recommendations represent, on average, 46.122%, while

“Underperform” and “Sell” recommendations only 9.114%. These observations are in line with the existing research (e.g., Mola & Guidolin, 2009; Firth et al., 2012; Gu et al., 2013) on analyst optimism. Panel B of Table 1 presents the percentage of the institutional holdings and changes in holdings for all and by type of institutional investors. A stock’s average (median) institutional ownership is 0.71 (0.77). Index funds and ETFs, on average, hold 4% of the stock, actively managed mutual funds – 12%, hedge funds – 14%, professional advisers – 27%, banks and trusts – 11%, insurance companies – 3%, and other institutions – 15%. Panel C of Table 1 details the summary statistics for the firm characteristics, including the size, profitability, leverage, liquidity, and risk characteristics. Panel D of Table 1 reports the summary of the brokerage house and analyst characteristics. On average, an analyst covers around three firms in a given month (calculated as  $\exp(1.527)-1$ ) from approximately three different industries (based on a two-digit SIC code). Average analyst seniority is 17.45 quarters (calculated as  $\exp(2.915)-1$ ). The average percentage of analysts with an Institutional Investor all-star ranking is 10.4%.

<Insert Table 1 here>

## **4. Empirical Analysis**

### *4.1. Patterns in Analysts’ recommendations – univariate analysis*

Table 2 reports the univariate analysis of institutional holdings and analyst recommendations for the whole sample and by type of institutional investors’ holdings. We examine differences in the means of main variables of interest for the institutional holdings’ first and fourth quartiles. The difference in the means of all variables is significantly different from zero in the whole sample, except for *Buy*, *Relative recommendations dummy*, and *Revision*. What is surprising and contrasting to prior literature results is that based on univariate analysis, there is



no indication of more favorable recommendations for stocks with larger institutional holdings. The same observation of no preferential treatment for larger holdings holds across all types of institutional investors. The only exception is smaller downgrades with an increase in institutional holding among index funds and ETFs. There is no difference in the level of downgrade among mutual funds and other institutional holdings.

<Insert Table 2 here>

Table 3 Panel A presents the correlation coefficients of our analysts' recommendation variables with the level of institutional holdings in a stock receiving the recommendations for all holdings and by type of the institution. While most coefficients are statistically significant at a 5-percent level, they are all at zero economic significance. Thus, the first glance at the catering activities through favorable recommendations does not provide much support, which is not in line with prior literature findings. Panel B of Table 3 provides the correlation coefficients of our control variables. None of the variables have a high enough coefficient to create a multicollinearity problem in our multivariate models.

<Insert Table 3 here>

Next, we examine the timing patterns of analysts' recommendations tied to portfolio managers' reporting periods at the end of a quarter. Figure 1 provides evidence of a pattern in analysts' recommendations and recommendations updates (revisions, upgrades, and downgrades). Analysts tend to be more optimistic in the last month of the quarter and less optimistic in the first month. On average, raw and relative recommendations and revisions tend to be more favorable in March, June, September, and December and less favorable in January, April, July, and October. Downgrades have the smallest magnitude in January, June, and September, while the most

significant downgrades happen in March, June (for the firms with institutional holdings in the bottom quartile), October, and November (for the firms with institutional holdings in the upper quartile). However, the largest upgrades do not consistently fall on months of a quarter-end and occur in April, May, August, and October for the firms with institutional holdings in the bottom quartile and March, April, September, and December for the firms with institutional holdings in the upper quartile. This pattern is consistent with the argument that for analysts issuing overoptimistic information is costlier than withholding negative information. These patterns of analysts' recommendations and updates are similar between firms with institutional holdings in the top and bottom quartile of the sample, yet more pronounced for the sample of actively managed mutual funds.

<Insert Figure1 here>

Next, we perform the difference-in-difference analysis of the main variables of interest: raw, recommendation, relative recommendations, revision, upgrade, and downgrade, in the months of the end of the quarter versus the months of the beginning of the quarter for the stock with large versus small institutional ownership (for all institutional holdings and separately for actively managed mutual funds' holdings). Table 4 reports the results. We observe significant differences in means of Raw Recommendations between the end of the quarter versus the beginning of the quarter for the large and small institutional holdings and relative recommendations and revisions for large holdings in the whole sample, consistent with the favorable recommendation timing strategy. In the sample of the mutual funds' holdings, the favorable recommendation timing strategy pattern is even more pronounced across all variables except upgrades. The difference between the end versus the beginning of the quarter for the stock with large versus small

institutional holdings is significant for all variables in the mutual funds' holdings sample and relative recommendations and revisions for all institutional holdings.

<Insert Table 4 here>

The results of the univariate analysis provide some support of the prediction that the analysts time their recommendations to be more optimistic around the time of fund managers' reporting on the performance. To control for confounding effects of firm, and analyst characteristics, we perform a multivariate analysis in the next section.

#### 4.2. *Timing of analysts' recommendations – multivariate analysis*

To examine whether the analysts time their optimistic recommendations for a stock with higher institutional ownership in the months of portfolio managers' reporting on their performance, we construct the end-of-quarter indicator equal to one if the recommendation is announced in March, June, September, and December and zero otherwise (*End\_qtr<sub>t</sub>*). Similarly, we construct the beginning-of-quarter indicator equal to one if the recommendation is announced in January, April, July, and October and zero otherwise (*Begin\_qtr<sub>t</sub>*). The variables of interest are these indicators' interaction terms with the prior quarter's institutional holdings.

To test hypothesis 1 on strategic timing of analysts' recommendations for stocks held by institutional investors, we estimate the following baseline empirical model:

$$Y_{i,j,t} = f(\alpha + \beta_1 End_{qtr_t} + \beta_2 Begin_{qtr_t} + \beta_3 End_{qtr_t} * Insthold_{j,t-1} + \beta_4 Begin_{qtr_t} * Insthold_{j,t-1} + \beta_5 InstHold_{j,t-1} + \theta X_{i,j,t-1} + \delta Z_i + \varphi W_i + \gamma_t + \varepsilon_{i,j,t}), \quad (1)$$

where the dependent variable  $Y_{i,j,t}$  is the variables representing the analyst  $i$ 's stock recommendation on firm  $j$  at time  $t$ . We utilize several measures of the recommendations in the analysis: (1) raw recommendation, (2) relative recommendation, (3) relative recommendation

ordinal, (4) relative recommendation dummy, (5) revisions, (6) upgrade, and (7) downgrade. The variables of interest are the interaction terms of the end and beginning of the quarter and institutional holdings in the prior quarter.  $X_{i,j,t-1}$  are the firm-level characteristics,  $Z_i$  are brokerage house characteristics,  $W_i$  are analyst characteristics, and  $\gamma_t$  are year-fixed effects. In all regressions, the standard errors ( $\varepsilon_{i,j,t}$ ) are clustered by firm.

To test *Hypotheses 1* and 2, we perform the ordinary least squares (OLS) regression and several alternative estimation methods. When using a dependent variable of raw recommendations with a value range between 1 and 4, we use the ordered logit model (Table 5 Panel A). For a dependent variable of the relative recommendation, in addition to the OLS regression (Table 5 Panel B), we use the ordered logit model for the three-level choice variable of an analyst: issuing an investment rating that is below (-1), at (0), and above (1) consensus (Table 5 Panel C). When testing the hypothesis for a revision, upgrade, and downgrade dependent variables, we use the ordered logit models (Table 5 Panel D, E, F, correspondingly). For each dependent variable specification, we run six models that are based on the specific sample of institutional holdings: (1) all holdings, (2) passive index fund and ETFs' holdings, (3) actively managed mutual funds' holdings, (4) hedge funds' holdings, (5) bank and trust holdings, and (6) other holdings.

Table 5 reports our main results. Panel A shows that analysts cater to mutual fund managers' needs to bolster their portfolios at the end of a quarter with higher Raw Recommendations at the end of a quarter (significant at 10% level), while reversing this action the next month (beginning of a quarter) with lower raw recommendations (significant at 1% level). The coefficients of the interaction terms indicate that in the last month of the quarter, the probability to receive a positive recommendation ("Buy and "Strong Buy") is higher by 3.87%, and the probability to receive a negative recommendation ("Underperform" and "Sell") is lower

by 1.32%, for an additional one per cent in stock's holdings in actively managed mutual funds. In the first month of the quarter, the probability to receive a positive recommendation is lower by 5.69%, and the probability to receive a negative recommendation is higher by 1.94%.<sup>10</sup> The result is not present across other types of institutional holdings.

The same pattern exists in the models with Relative Recommendations (Panel B), and Ordinal Relative Recommendations (Panel C). Relative recommendations have a positive (negative) association with mutual funds' holdings at the quarter end (beginning) at a 1 to 5% significance level. For an additional one per cent in stock's holdings in actively managed mutual funds, the probability of a raw recommendation to be above the market consensus is decreased by 17.94% at the beginning of a quarter and by 6.67% at the end of a quarter. The probability of a raw recommendation to be below the market consensus is higher by 18.65% and 6.94% in the first (last) month of a quarter. Again, the result is observed only for mutual funds' holdings.

Revisions show the same pattern of higher (lower) revisions at the end (beginning) of a quarter, at a 10% (1%) significance level, for stocks with larger mutual funds' holdings (Panel D). The probability of the issuance of upgrades or reiteration of a "Strong Buy" recommendation decreases by 10.25% (increases by 4.20%) in the first (last) month of the quarter, with an additional one per cent in stock's holdings in actively managed mutual funds. The probability of the issuance of downgrades or a reiteration on a "Sell" level increases by 10.52% (decreases by 4.31%) in the first (last) month of the quarter. The results are still unique to actively managed mutual funds' holdings.

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<sup>10</sup> We calculate the probability by computing the marginal effects of the interaction terms for each level of ordinal dependent variable.

Upgrade models do not show the expected results of timing pattern presence in any sample of institutional holdings (Panel E), meaning that the magnitude of the upgrades is not significantly related to a particular month of a quarter and a size of institutional holdings. Downgrade models' results show that analysts reduce the magnitude of downgrades at the end of a quarter across the board for all types of institutional holdings, index funds and ETFs, and mutual funds at a 5% significance level for mutual funds at a 1% significance level for banks, and statistically insignificantly for hedge funds and other holdings. The reversal of the downgrade strategy does not happen at the beginning of a quarter (Panel F). The results are not surprising and consistent with our *Hypotheses 1.2* and *2.2* expectation that a "window dressing" activity is achievable at a lower cost to reputation by withholding bad information with smaller downgrades in the end of a quarter than with overoptimistic recommendations through end-of-the-quarter upgrades.

<Insert Table 5 here>

To test *Hypothesis 3* that star analysts do not engage in the timing strategy of favorable recommendations at the quarter end to preserve their reputational capital, we run the models specified in equation (1) separately for subsample of non-star analysts and star analysts. Given *Hypotheses 1* and *2* results, we test *Hypothesis 3* in the sample of actively managed mutual funds' holdings only. Table 6 reports the results. The results for non-star analysts' recommendations on stocks held by mutual funds are the same as results in Table 5 – more favorable recommendations at the end of a quarter and less favorable recommendations at the beginning of a quarter. However, the result disappears in a subsample of star analysts. Thus, we find confirmation to our *Hypothesis 3* expectation that to star analysts, the benefit of catering to mutual fund managers with timing of favorable recommendations around the mutual fund portfolio performance period is lower than the cost of losing analysts' reputation capital.

<Insert Table 6 here>

#### *4.3. Market response to analysts' recommendations*

If analysts issue biased estimates, then market may recognize that and have muted response to such recommendations. We examine market reaction to analyst recommendations upon report issuance measured with cumulative abnormal returns around the report release. We perform the analysis for the subsamples of the upgrades, downgrades, and reiterations examining whether the market recognizes the bias recommendations in the different periods around the fund managers' reporting.

Figure 2 provides a visual analysis of the market response magnitude and timeliness around the upgrades and downgrades, which are the most significant events of analysts' recommendations. We plot cumulative abnormal returns for (-30, +30) days window around upgrades and downgrades separately. We also separate by top (Q4) and bottom (Q1) quartile of institutional holdings, and by star and non-star analysts' recommendations.

Figure 2 shows that analysts' updates, such as upgrades and downgrades, are informative events. We observe a similar picture in the market response to upgrades issued for stocks held by all institutional investors with no leakage before the event and sizable reaction of 2-3% within the two days around the announcement. There is no post announcement drift for all groups (start vs. non-star, end vs. beginning of a quarter) for the bottom quartile of institutional holdings. In the top quartile of the holdings, there is slightly higher CAR for upgrades in the end of a quarter than in the beginning of a quarter for non-star analysts and no difference in initial reaction to star analysts' upgrades. We observe a reversal of CARs within 30 days after quarter-beginning non-star analyst announcement. In the mutual funds' fourth quartile holdings' sample, the market response is almost the same as for all holdings with slightly larger difference between end-of-the quarter and

beginning-of-the-quarter CARs for non-star analysts' upgrades. Beginning quarter non-star upgrades appear to be uninformative. No post-announcement drift is present. In the mutual funds' first quartile holdings' sample, the response to upgrades is very different from other sample groups across star and non-star analysts and end and beginning of a quarter. For non-star analysts upgrades (end and beginning of a quarter), the initial CAR is about 4-5% with no post announcement drift, but slightly negative return before the event. For star-analysts, the market response is surprising, with observable leakage of 4% over 20 days before the end-of-quarter upgrade, and negative CAR of -5% over 13 days before beginning-of-quarter upgrades.

For downgrade in the sample of all institutional holdings and actively managed mutual funds, the market response is very similar across all groups (star vs non-star and beginning-of-quarter), except for non-star downgrades at the end of a quarter. For the latter group, we observe positive CAR of 1% over 30-day period before the event with the reversal of the gain after the downgrade announcement within 1 day period. This is consistent with our main prediction that the downgrades of stocks with large mutual funds' holdings by non-star analysts, if they happen, are not harmful for those funds' performance. The picture is hugely different for the bottom quartile holdings. For all institutional holdings sample, end-of quarter downgrades by both star and non-star analysts have a positive market response with CAR of 1% and 3% for non-star and star analysts, respectively. The beginning-of-quarter downgrades do receive negative CARs of -3% and -6% for non-star and star analysts, respectively. For bottom quartile mutual fund holdings, market response negatively across all groups (star vs non-star, end and beginning of a quarter), indicating no catering activity in eyes of the market.

Overall, the magnitude of the market reaction differs in the end and beginning of the quarter and for the firms with institutional holdings in the bottom and upper quartiles. The market reaction



is more pronounced around the announcements of upgrades and downgrades for the firms with institutional holdings in the bottom quartile, while the market reaction on the recommendations for the firms with institutional holdings in the upper quartile is more muted. Among the firms held by actively managed mutual funds, the market reaction has a larger magnitude among the firms with holdings in the bottom quartile, both around upgrades and downgrades. The figure also indicates that the market reaction is more pronounced around the upgrades and downgrades made by non-star analysts.

<Insert Figure 2 here>

Next, we conduct a difference-in-difference analysis of the cumulative abnormal returns (-1, +1) days around the upgrades, downgrades, and reiterations to examine whether the market reaction around recommendations differs for the stock with institutional holdings of bottom (1<sup>st</sup>) top (4<sup>th</sup>) quartile and at the beginning and the end of the quarter. Table 7 reports the results for all institutional holdings (Panel A) and for mutual funds holdings only (Panel B). The results show that the market reacts significantly differently for the stocks with small and large institutional ownership and in the different parts of the quarter. The difference in market reaction on upgrades for the stock with large (small) institutional holdings is 2.67% (3.367%) at the end of the quarter and 2.699% (4.072%) at the beginning of the quarter, with the difference of -0.7% (-1.37%), which is marginally significant at 1% level. Market reaction to the downgrades for the stock with large (small) institutional ownership is -3.115% (-3.773%) at the end-of-quarter months and -4.669% (-3.585.1215%) at the begin-of-quarter months, with the difference of 0.66% (0.45%), significant at a 1% (5%) level. The results are similar for mutual fund holdings' sample.

Generally, the market reacts more positively to the upgrades reported at the beginning of the quarter but less negatively to the downgrades reported at the end of the quarter, which may

indicate that investors recognize biased recommendations at the end of a quarter with more muted response. However, the market responds more favorably to analysts' recommendations for stocks with large versus small institutional holdings at the end of a quarter in comparison to large versus small institutional holdings (mutual funds' holdings) difference at the beginning of a quarter by 0.67% (0.75%) at 1% significance level. The result is similar for downgrades: the market response is less negative, i.e., more favorable, for downgrades issued for stocks with large versus small institutional holdings (mutual funds' holdings) at the end of a quarter than at the beginning of a quarter by 0.21% (-0.01%) but statistically insignificant result.

<Insert Table 7 here>

The difference-in-difference analysis does not account for the characteristics of the firm, as well as analyst characteristics. Therefore, next, we perform the analysis using the following OLS model, controlling for year and firm fixed effects with standard errors clustered by firm:

$$CAR_{i,j,t} = \alpha + \beta_1 End\_qtr_t + \beta_2 Begin\_qtr_t + \beta_3 End\_qtr_t * Insthold_{j,t-1} + \beta_4 Begin\_qtr_t * Insthold_{j,t-1} + \beta_5 InstHold_{j,t-1} + \theta X_{i,j,t-1} + \delta Z_i + \varphi W_i + \gamma_t + \tau_j + \varepsilon_{i,j,t} \quad (2)$$

where  $CAR_{i,j,t}$  is CAR (-1, +1) around the upgrades, downgrades, or reiterations, and  $\tau_j$  is the firm fixed effects. The rest of the variables are as in equation (1).

Table 8 Panel A provides the results for the market reaction around upgrades, downgrades, and positive and negative reiterations for whole sample of institutional holdings and for actively managed mutual funds' holdings. In Panel B of Table 8, reports the results by subsamples of non-star analysts and star analysts. The results indicate that market response to analysts' upgrades and downgrades are lower for all stocks at the end of quarter, but significantly higher for stocks with high institutional holdings. Similar to diff-in-diff results, markets are less responsive to analysts' recommendations in the end month of a quarter than in the beginning month of a quarter for both

positive and negative recommendations, suggesting that the market accounts for possible timing biases. However, the result is offset for higher institutional holdings at the end of the quarter for upgrades and downgrades for all institutional holdings, and only upgrades mutual funds' holdings, with the market response being more positive with increase in institutional ownership in the end month of a quarter, suggesting that the discount for possible recommendation biases decreases with the size of institutional ownership. In the samples split by star versus non-star analysts (Panel B), the results of Panel A holds only for non-star analysts.

<Insert Table 8 here>

## **5. Conclusions**

Using a sample of analysts' recommendations on U.S. firms, we document a pattern in analysts' recommendations and updates that are more optimistic in a month of the end of a quarter and less optimistic in a month of the beginning of a quarter. Specifically, analysts tend to issue more positive raw and relative recommendations, as well as issue more positive revisions and smaller downgrades to stocks with more institutional holdings in the end month of a quarter and reverse these actions with less positive raw and relative recommendations, less positive revisions in the beginning month of a quarter. This catering behavior to institutional investors with an objective to aid "window dressing" of managed portfolios around reporting dates is present for actively managed mutual funds, but not other types of institutional investors. However, we observe decrease in downgrades in a stock with increase in institutional holdings by all types of institutional investors in the end month of a quarter with no reversal of the actions the following month. Utilizing smaller downgrades through withholding of information instead of proactively issuing overoptimistic positive recommendations is a less expensive way of the catering strategy for analysts. This behavior is consistent with a balancing act by analysts facing a tradeoff of increasing

benefits through compensation and additional business from institutional clients and increasing costs to reputational capital through catering to institutional investors. We also document that analysts with Institutional Investor all-star ranking do not engage in the timing strategy of issuing favorable recommendations to stocks with larger institutional holdings. The market participants seem to believe rosy recommendations issued for stocks with more institutional holdings in the end month of a quarter with more positive cumulative abnormal returns to upgrade and downgrade recommendations, but only those issued by non-star analysts. Thus, institutional investors benefit from the timing strategy to achieve “portfolio pumping” outcomes at the time when they report their portfolio performance.

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Figure 1. Monthly analysts' recommendations

The figure presents monthly analysts' recommendations and revisions by top and bottom quartile of institutional holdings. The right panel presents statistics for recommendations of all institutional holdings' stocks, while the left panel – for the recommendations of stocks of actively managed mutual funds' holdings.

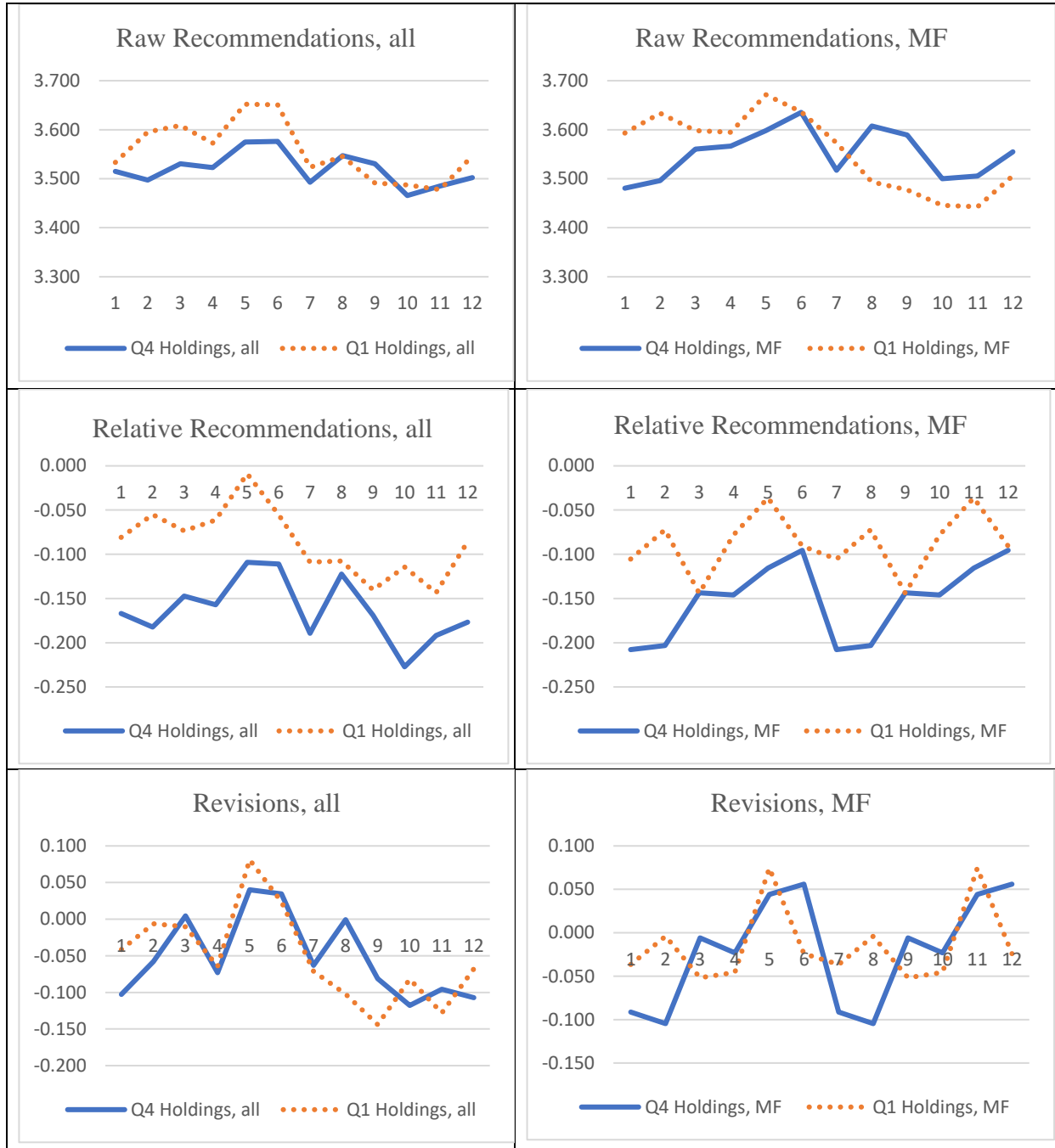




Figure 1. Cont'd

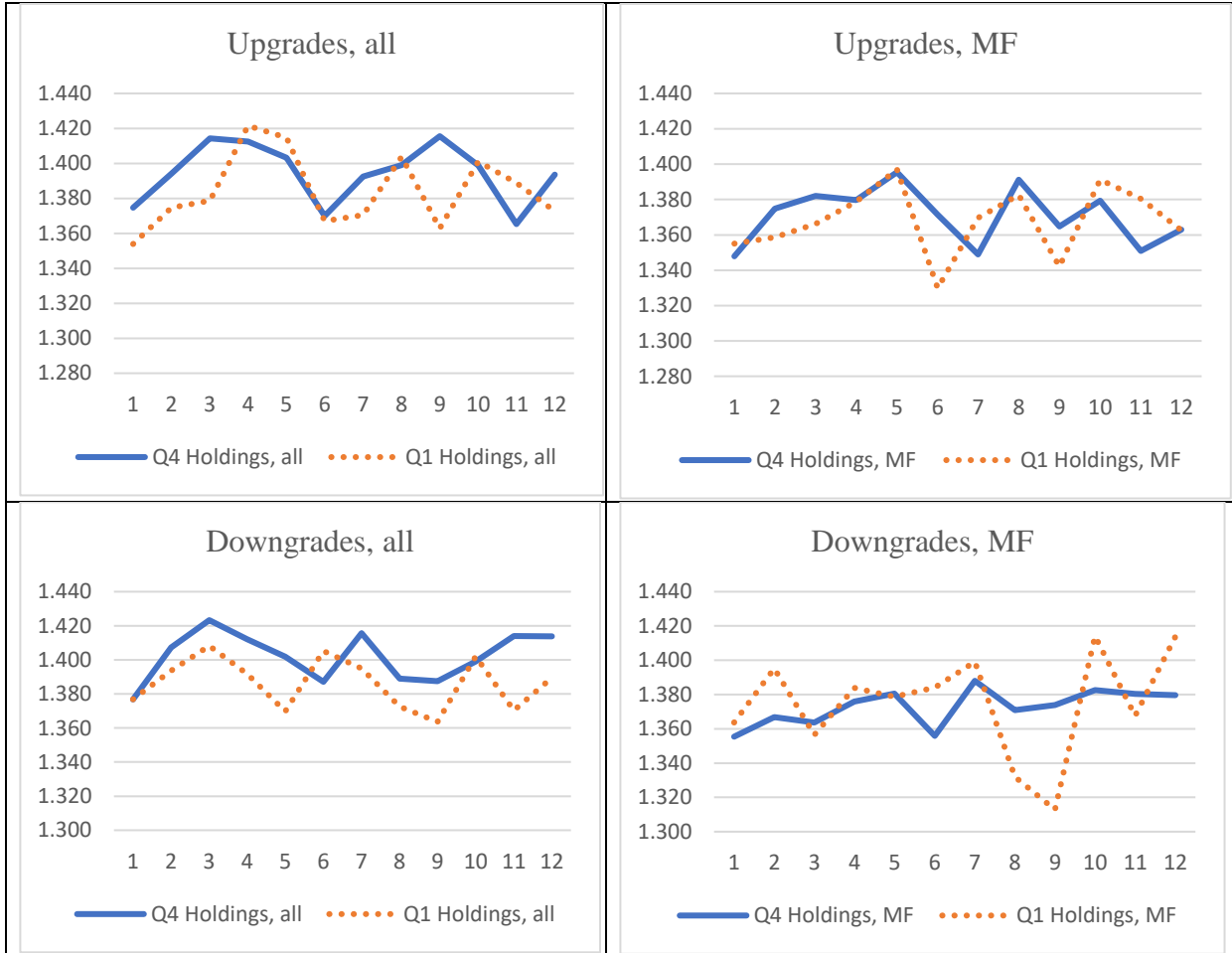


Figure 2.A. Cumulative Abnormal Returns around Upgrade Recommendations

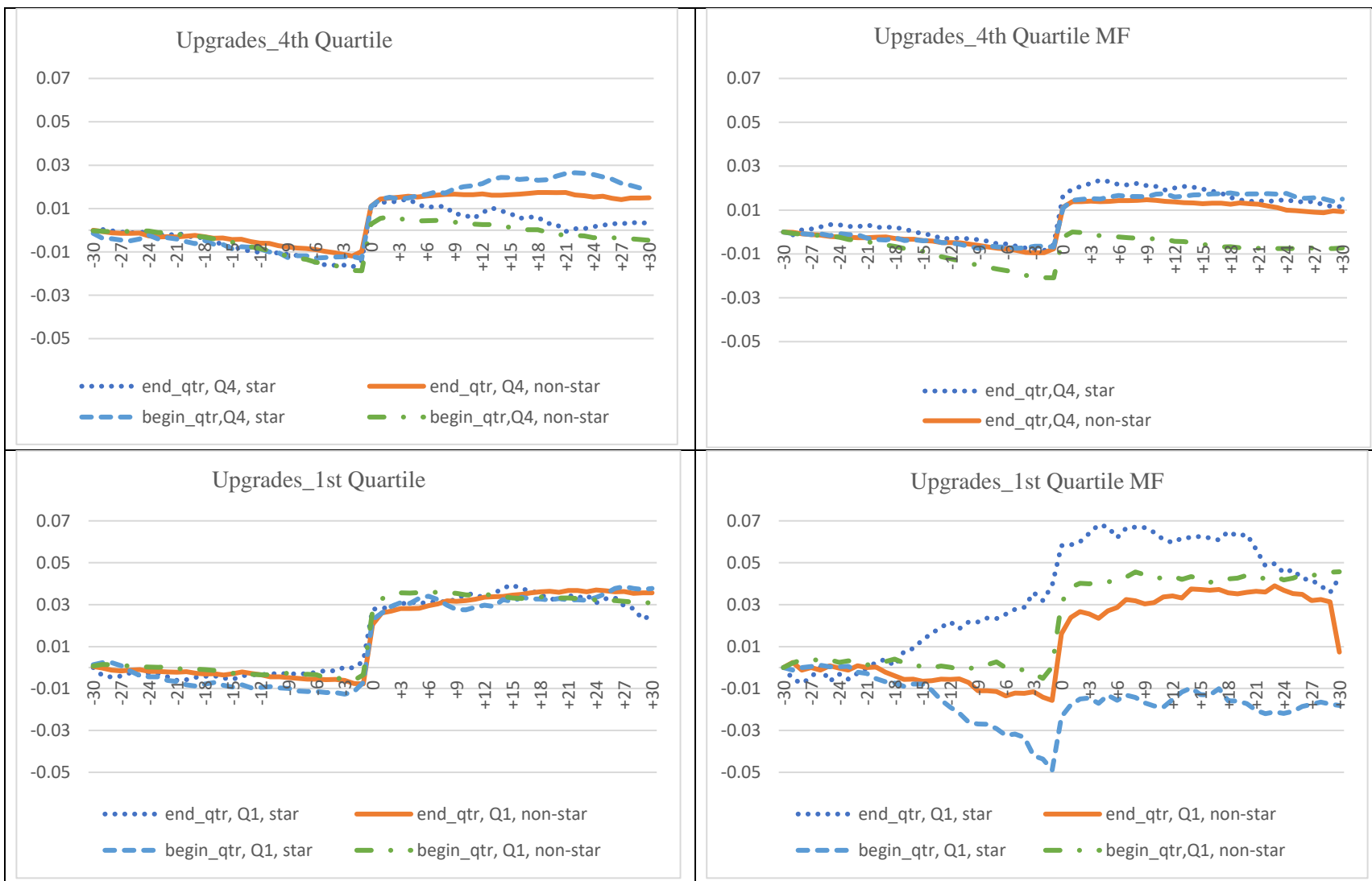


Figure 2.B. Cumulative Abnormal Returns around Downgrade Recommendations

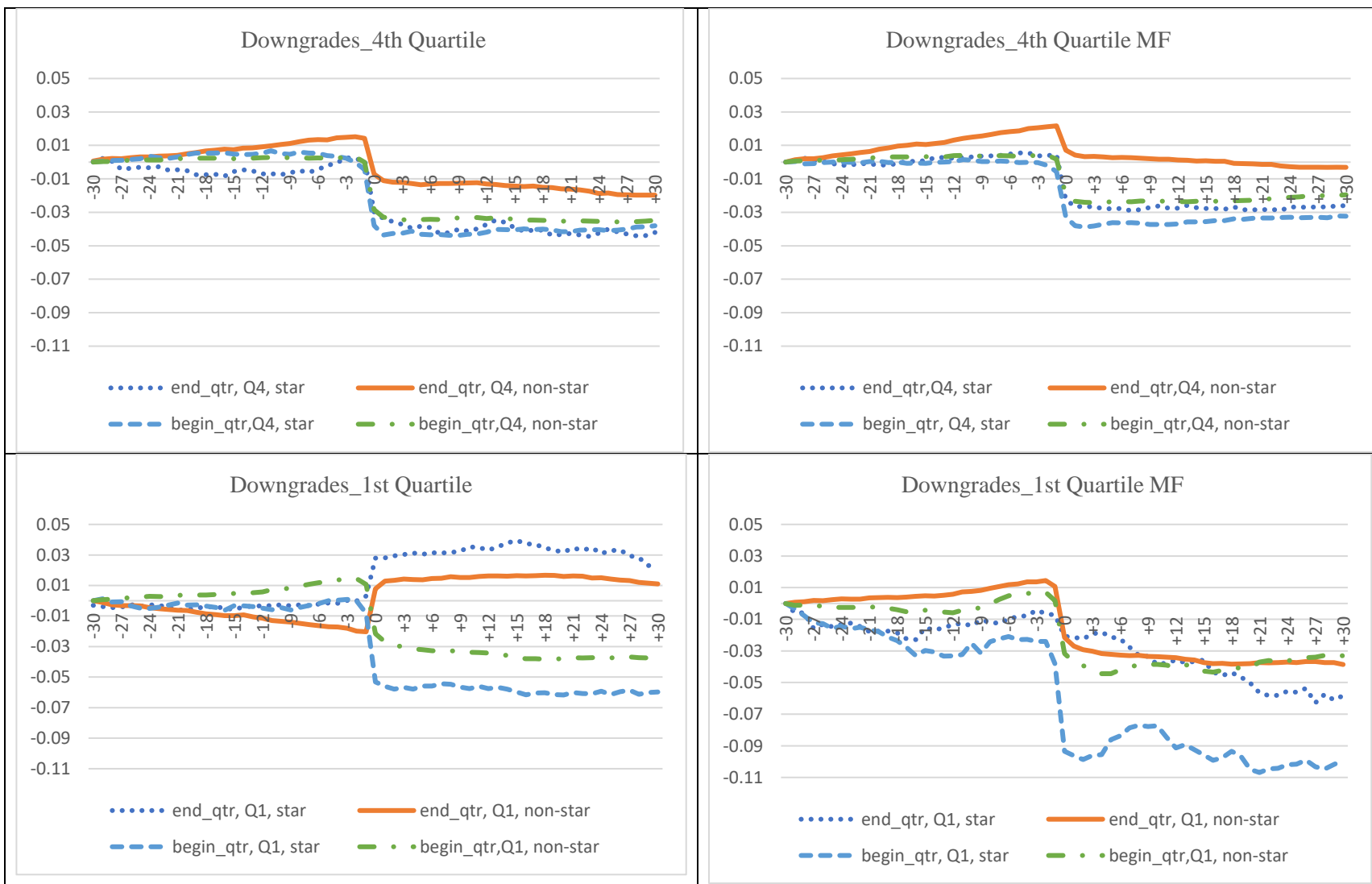


Table 1. Summary Statistics

The table reports descriptive statistics of the sample by analyst recommendations (Panel A), institutional holdings by type of the institution (Panel B), firm characteristics (Panel C) and brokerage house and analyst characteristics (Panel D).

Panel A. Analyst Recommendations

Variable	N	Mean	Median	Std.dev	Min	Q1	Q3	Max
Raw recommendation	303,159	3.539	3	0.955	1	3	4	5
Strong Buy and Buy, %	303,159	46.122	0	0.498	0	0	1	1
Underperform and Sell, %	303,159	9.114	0	0.288	0	0	0	1
Relative Recommendation	302,120	-0.126	-0.170	0.905	-4	-0.740	0.500	4
Relative Recommendation ordinal	302,120	-0.165	-1	0.954	-1	-1	1	1
Relative Recommendation dummy	302,120	0.386	0	0.487	0	0	1	1
Revision	213,391	-0.037	0	0.893	-1	-1	1	1
Upgrade	74,253	1.390	1	0.528	1	1	2	4
Downgrade	88,786	1.395	1	0.538	1	1	2	4

Panel B. Institutional Holdings by Type

Variable	N	Mean	Median	Std.dev	Min	Q1	Q3	Max
Inst. Holdings, all types	303,159	0.71	0.77	0.24	0	0.58	0.90	1
Δ in all Inst. Holdings	303,159	0.01	0.00	0.08	-1	-0.01	0.02	1
IFs & ETFs' Holdings	303,159	0.040	0.015	0.052	0	0.001	0.074	1
Δ in IFs & ETFs' Holdings	303,159	0.002	0.000	0.010	-0.3	0.000	0.004	1
Active Mutual Funds' Holdings	303,159	0.12	0.08	0.12	0	0.01	0.19	1
Δ in Actively Managed MF Holdings	303,159	0.00	0.00	0.05	-1	-0.01	0.02	1
Hedge Funds' Holdings	303,159	0.14	0.12	0.10	0	0.06	0.19	1
Δ in HF Holdings	303,159	0.01	0.00	0.12	-1	0.00	0.02	1
Professional Advisers' Holdings	303,159	0.27	0.26	0.13	0	0.18	0.35	1
Δ in Professional Advisers' Holdings	303,159	0.00	0.01	0.14	-1	-0.01	0.03	1
Bank and Trust Holdings	303,159	0.11	0.11	0.06	0	0.07	0.15	1
Δ in Bank and Trust Holdings	303,159	-0.01	0.00	0.10	-1	-0.01	0.01	1
Insurance Holdings	303,159	0.03	0.02	0.03	0	0.01	0.04	1
Δ in Insurance Holdings	303,159	0.00	0.00	0.06	-1	0.00	0.00	1
Other Inst. Holdings	303,159	0.15	0.12	0.11	0	0.07	0.21	1
Δ in Other Inst. Holdings	303,159	0.00	0.00	0.11	-1	0.00	0.02	1

Panel C. Firm Characteristics

Variable	N	Mean	Median	Std.dev	Min	Q1	Q3	Max
Size	303,121	14.656	14.587	1.956	10.419	13.264	15.944	19.662
Market Capitalization	303,159	14.597	14.485	1.737	10.804	13.356	15.790	19.024
Tobin's Q	303,159	2.036	1.555	1.404	0.697	1.115	2.395	8.832
Profitability	303,159	0.004	0.010	0.042	-0.227	0.001	0.022	0.087
Asset Turnover	303,159	0.219	0.175	0.185	0.000	0.089	0.294	0.916
Leverage	303,159	0.703	0.337	1.282	0.000	0.025	0.769	9.215
Stock Turnover	303,159	12.003	8.846	10.597	0.868	5.246	15.007	63.859
Beta	303,159	1.189	1.133	0.512	-3.141	0.845	1.473	5.383
Idiosyncratic Risk	303,159	0.024	0.021	0.014	0.003	0.015	0.030	0.400
Excess Return	303,159	0.000	0.000	0.007	-0.088	-0.003	0.003	0.579
Forecast Error	303,159	-0.101	0.038	2.134	-15.514	-0.050	0.186	7.919
Financial firms, %	303,159	0.154	0.000	0.361	0.000	0.000	0.000	1.000
Utility firms, %	303,159	0.036	0.000	0.185	0.000	0.000	0.000	1.000

Panel D. Brokerage House and Analyst Characteristics

Variable	N	Mean	Median	Std.dev	Min	Q1	Q3	Max
Brokerage Size	303,159	5.762	5.861	1.179	0.693	151.000	773.000	7.990
Brokerage Busyness	303,159	0.154	0.096	0.162	0.001	0.071	0.143	1.000
Analysts Covering the Stock/ year	303,159	1.107	1.099	0.424	0.693	0.693	2.890	3.178
Analyst Concentration	303,159	1.472	1.099	0.800	0.693	0.693	1.946	6.280
Seniority	303,159	2.915	3.191	1.081	0.000	2.409	3.703	4.589
Star Analyst	303,159	0.104	0.000	0.305	0.000	0.000	0.000	1.000

Table 2. Univariate Analysis of Analyst Recommendations by Institutional Holdings

The table reports descriptive statistics of analysts' recommendations for the whole sample and by type of institutional holdings. Columns (1) and (5) report statistics for subsample of firms with institutional holdings in the bottom quartile, columns (2) and (6) report statistics for subsample of firms with institutional holdings in the top quartile. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1%, respectively.

Recommendations	Institutional Holdings, all				IFs & ETFs' Holdings			
	Q1	Q4	Q4-Q1	t-stat.	Q1	Q4	Q4-Q1	t-stat.
<b>Panel A</b>								
5: Strong Buy, %	20.48	18.25	-2.23	-11.01***	21.270%	16.261%	-5.009%	-25.023***
4: Buy, %	26.65	26.83	0.18	-0.77	27.851%	28.770%	0.919%	3.970***
3: Hold, %	43.34	45.84	2.51	9.82***	41.916%	46.530%	4.615%	18.107***
2-1: Underperform & Sell, %	9.53	9.08	-0.45	-3.01***	8.963%	8.438%	-0.525%	-3.626***
Average Raw Recom.	3.55	3.52	-0.04	-7.27***	3.589	3.514	-7.524%	-15.656***
Relative Recom.	-0.09	-0.16	-0.08	-16.69***	-0.128	-0.149	-2.093%	-4.602***
Relative Recom. (ordinal)	-0.12	-0.20	-0.08	-16.07***	-0.157	-0.196	-3.872%	7.919***
Revision	-0.05	-0.05	0.01	0.96	-0.067	-0.048	1.889%	3.470***
Upgrade	1.38	1.39	0.01	1.88*	1.363	1.356	-0.738%	-1.353
Downgrade	1.38	1.40	0.02	3.55***	1.373	1.362	-1.156%	-2.322**
<b>Panel B</b>								
	Mutual Funds' Holdings				Hedge Funds' Holdings			
5: Strong Buy, %	20.37	17.33	-3.03	-15.11***	19.42	18.82	-0.60	-2.96***
4: Buy, %	27.52	29.17	1.65	7.13***	25.03	28.64	3.61	15.88***
3: Hold, %	42.50	45.61	3.10	12.18***	45.17	44.27	-0.91	-3.55***
2-1: Underperform & Sell, %	9.62	7.90	-1.72	-11.86**	10.38	8.27	-2.11	-14.12***
Average Raw Recom.	3.56	3.54	-0.02	-3.17***	3.51	3.56	0.05	-10.93***
Relative Recom.	-0.12	-0.17	-0.05	-10.08***	-0.10	-0.15	-0.05	-10.81***
Relative Recom. (ordinal)	-0.16	-0.21	-0.06	-11.31***	-0.14	-0.19	-0.05	-9.89***
Revision	-0.07	-0.04	0.03	5.43***	-0.04	-0.04	0.00	-0.12
Upgrade	1.36	1.37	0.01	1.43	1.40	1.39	-0.01	-2.46**
Downgrade	1.37	1.37	0.00	0.96	1.39	1.40	0.01	2.37**
<b>Panel C</b>								
	Bank Holdings				Insurance Firms' Holdings			
5: Strong Buy, %	21.59	18.31	-3.28	-16.14***	21.12	19.51	-1.61	-7.92***
4: Buy, %	29.27	25.12	-4.15	-18.36***	27.76	26.64	-1.12	-4.96***
3: Hold, %	41.31	46.66	5.35	21.17***	42.40	45.04	2.64	10.52***
2-1: Underperform & Sell, %	7.83	9.91	2.09	14.40***	8.72	8.81	0.09	0.62
Average Raw Recom.	3.63	3.49	-0.14	-27.76***	3.59	3.55	-0.04	-8.63***
Relative Recom.	-0.11	-0.13	-0.02	3.89***	-0.11	-0.14	-0.03	-7.22***
Relative Recom. (ordinal)	-0.15	-0.17	-0.03	5.45***	-0.14	-0.17	-0.03	-6.79***
Revision	-0.05	-0.03	0.02	4.52***	-0.05	-0.04	0.02	3.46***
Upgrade	1.38	1.41	0.02	4.22***	1.39	1.39	0.00	-0.42
Downgrade	1.39	1.41	0.03	4.86***	1.41	1.39	0.01	2.60***
<b>Panel D</b>								
	Other Holdings							
5: Strong Buy, %	20.21	17.51	-2.70	-12.81***				
4: Buy, %	25.80	29.32	3.52	-14.76***				
3: Hold, %	44.35	44.69	0.34	1.27				
2-1: Underperform & Sell, %	9.64	8.47	-1.16	7.52***				
Average Raw Recom.	3.54	3.54	0.00	0.12				
Relative Recom.	-0.10	-0.15	-0.05	-10.87***				
Relative Recom. (ordinal)	-0.14	-0.20	-0.06	-11.14***				
Revision	-0.06	-0.04	0.02	4.01***				
Upgrade	1.38	1.37	0.00	-0.71				
Downgrade	1.38	1.39	0.01	1.47				

Table 3. Correlation

The table reports correlation coefficients of institutional holding by type with analyst recommendations' variables (Panel A) and correlation coefficients of the control variables (Panel B). \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1%, respectively.

Panel A

	InstHold	IF/ETF	Active MFs	Hedge Fund	Prof. Advisers	Banks	Insurance Co.	Other InstHold
Raw recom.	-0.02*	-0.02*	-0.001	0.02*	0.01*	-0.05*	-0.01*	-0.004*
Relative recom.	-0.03*	-0.01*	-0.03*	-0.02*	-0.03*	-0.01*	-0.01*	-0.02*
Relative recom ordinal	-0.03*	-0.01*	-0.03*	-0.02*	-0.02*	-0.01*	-0.01*	-0.02*
Revision	0.01*	0.0001	0.01	0.00	-0.01*	0.01*	0.00	0.01*
Upgrade	0.01*	-0.03*	-0.02*	-0.01	0.02*	0.02*	-0.00	-0.01*
Downgrade	0.02*	-0.03*	-0.01*	0.00	0.03*	0.02*	-0.01*	-0.001

Panel B

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	
Marketcap	(1)															
Leverage	(2)	0.033*														
ROA	(3)	0.292*	-0.065*													
Tobin's Q	(4)	0.0927*	-0.134*	0.030*												
Asset Turnover	(5)	-0.054*	-0.101*	0.272*	0.148*											
Stock Turnover	(6)	-0.0003	0.015*	-0.040*	0.115*	0.045*										
Beta	(7)	-0.062*	0.013*	-0.119*	0.046*	-0.075*	0.363*									
Idiosyn. Vol	(8)	-0.510*	0.008*	-0.383*	0.085*	-0.023*	0.340*	0.336*								
Excess Return	(9)	-0.013*	0.002	0.074*	-0.040*	0.022*	-0.022*	-0.023*	0.012*							
Analysts_stock	(10)	0.286*	-0.005*	0.041*	0.049*	-0.036*	0.194*	0.098*	0.030*	-0.070*						
Brokerage Size	(11)	0.135*	0.043*	0.043*	-0.047*	0.027*	0.004*	-0.008*	-0.053*	-0.010*	0.082*					
BrokerageBusyness	(12)	0.034*	-0.002	-0.002	-0.022*	-0.012*	-0.028*	-0.023*	-0.009*	0.006*	0.021*	0.001				
Analyst Concentration	(13)	0.106*	0.021*	0.031*	-0.050*	-0.011*	-0.002	0.004*	-0.058*	0.007*	0.070*	0.275*	0.539*			
Seniority	(14)	0.076*	0.019*	0.016*	-0.031*	0.010*	-0.013*	-0.022*	-0.074*	-0.005*	0.007*	0.018*	0.021*	0.061*		
Forecast Error	(15)	0.068*	-0.049*	0.151*	0.027*	0.042*	-0.033*	-0.025*	-0.086*	0.051*	-0.001	0.019*	0.004*	0.004*	-0.002	
Star	(16)	0.137*	0.035*	0.037*	-0.048*	0.042*	-0.012*	-0.035	-0.063*	0.003	0.058*	0.289*	0.033*	0.105*	0.169*	0.009*

Table 4. The Difference-in-Difference Analysis of Analysts' Recommendations

The table reports difference-in-difference analysis of analysts' recommendations and updates by month of quarter beginning and end and by high and low institutional holdings. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1%, respectively.

	All Institutional Holdings				Mutual Funds holdings			
	Raw Recommendation		Diff.	t-stat (sign)	Raw Recommendation		Diff.	t-stat (sign)
	Inst.Hold Q1	Inst.Hold Q4			Inst.Hold Q1	Inst.Hold Q4		
Begin_QTR	3.529	3.498	-0.031	-3.901***	3.553	3.512	-0.040	-5.077***
End_QTR	3.571	3.535	-0.037	-4.085***	3.548	3.584	0.035	3.973***
Diff (End_QTR - Begin_QTR)	0.042	0.037	-0.005	-0.45	-0.004	0.071	0.076	6.34***
t-stat(sign)	5.0294***	4.3298***			0.5135	8.4678***		
	Relative Recommendation		Diff.	t-stat (sign)	Relative Recommendation		Diff.	t-stat (sign)
Begin_QTR	-0.091	-0.187	-0.096	-12.52***	-0.114	-0.199	-0.085	-11.21***
End_QTR	-0.091	-0.152	-0.060	-7.281***	-0.133	-0.141	-0.008	-0.918
Diff (End_QTR - Begin_QTR)	0.000	0.035	0.035	3.10***	-0.019	0.058	0.077	6.87***
t-stat(sign)	-0.0145	4.2589***			-2.5182**	7.0658***		
	Revision		Diff.	t-stat (sign)	Revision		Diff.	t-stat (sign)
Begin_QTR	-0.064	-0.075	-0.011	-1.294	-0.053	-0.078	-0.025	-2.838***
End_QTR	-0.055	-0.037	0.018	1.757*	-0.098	-0.010	0.088	8.735***
Diff (End_QTR - Begin_QTR)	0.009	0.038	0.030	2.17**	-0.046	0.068	0.113	8.42***
t-stat(sign)	0.9137	3.9526***			-5.0997***	6.7173***		
	Upgrade		Diff.	t-stat (sign)	Upgrade		Diff.	t-stat (sign)
Begin_QTR	1.384	1.393	0.009	1.026	1.373	1.363	-0.010	-1.14
End_QTR	1.370	1.398	0.027	2.516**	1.349	1.370	0.021	1.985**
Diff (End_QTR - Begin_QTR)	-0.014	0.005	0.018	1.31	-0.024	0.007	0.031	2.27**
t-stat(sign)	-1.3947	-0.4592			-2.4506**	0.7597		
	Downgrade		Diff.	t-stat (sign)	Downgrade		Diff.	t-stat (sign)
Begin_QTR	1.391	1.400	0.009	1.100	1.390	1.375	-0.015	1.911*
End_QTR	1.389	1.402	0.013	1.297	1.357	1.369	0.012	1.211
Diff (End_QTR - Begin_QTR)	-0.002	0.003	0.004	0.33	-0.033	-0.006	0.027	2.15**
t-stat(sign)	-0.1730	0.2928			-3.8324***	-0.642		

Table 5. Analysts' recommendations by month of a quarter

The table reports the results of regression models with different measures of analyst recommendation or revisions as the dependent variable on the month of a quarter being either the last month (*Quarter-end*) or the first month (*Quarter-begin*) and their interaction terms with institutional holdings of the stock in the prior quarter (*insthold*). Models are run with all institutional holdings (1), excluding index funds and ETFs (2), active mutual funds' holdings (MF) (3), hedge funds' holdings (HF) (4), banks' holdings (5), and other institutional holdings (6). Panel A Raw Recommendations, Panel B Relative recommendations, Panel C Relative recommendations ordinary, Panel D Revision continuous, Panel E Upgrade and Panel F Downgrade of recommendations. All other control variables are defined in section 2. All regressions control for year fixed effects with standard errors clustered by firm. t-stats are in parentheses. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1%, respectively.

Panel A ologit	Raw Recommendations					
	Inst Hold	IF & ETF Hold	MF Hold	HF Hold	Bank Hold	Other Hold
	(1)	(2)	(3)	(4)	(5)	(6)
Quarter-begin	-0.036 (-1.274)	-0.008 (-0.594)	-0.008 (-0.486)	-0.060*** (-4.041)	-0.042** (-2.156)	-0.042*** (-2.701)
Quarter-end	0.023 (0.822)	0.011 (0.796)	-0.007 (-0.407)	-0.006 (-0.386)	0.001 (0.044)	-0.014 (-0.835)
Quarter-begin*Inst.Hold	-0.007 (-0.194)	-0.590*** (-3.278)	-0.239*** (-2.978)	0.145* (1.753)	0.024 (0.157)	0.013 (0.154)
Quarter-end*Inst.Hold	-0.028 (-0.731)	0.133 (0.711)	0.162* (1.888)	0.074 (0.855)	-0.012 (-0.074)	0.125 (1.355)
Inst.Hold_lagged	0.155*** (3.913)	-3.137*** (-10.347)	0.054 (0.494)	0.613*** (6.723)	-0.889*** (-4.691)	0.053 (0.545)
Change in Inst.Hold_lagged	0.764*** (12.693)	0.684 (1.277)	0.210* (1.854)	0.214*** (2.843)	1.240*** (10.865)	0.265*** (2.867)
Market Cap_lagged	0.020*** (3.589)	0.020*** (3.304)	0.023*** (3.796)	0.025*** (4.490)	0.030*** (5.085)	0.018*** (3.274)
Leverage_lagged	-0.010* (-1.876)	-0.012* (-1.924)	-0.010* (-1.724)	-0.016*** (-2.822)	-0.010* (-1.861)	-0.011* (-1.914)
ROA_lagged	0.443*** (2.722)	0.366* (1.897)	0.275 (1.449)	0.574*** (3.588)	0.572*** (3.446)	0.524*** (3.246)
Tobin's Q_lagged	0.093*** (15.829)	0.078*** (11.978)	0.082*** (12.709)	0.097*** (16.693)	0.090*** (15.047)	0.095*** (16.257)
Asset Turnover_lagged	-0.015 (-0.333)	0.012 (0.242)	-0.007 (-0.144)	-0.007 (-0.170)	0.040 (0.893)	0.001 (0.033)
Stock Turnover_lagged	-0.005*** (-7.279)	-0.004*** (-5.184)	-0.006*** (-7.320)	-0.006*** (-8.401)	-0.004*** (-5.178)	-0.005*** (-6.715)
Mean Beta	-0.019 (-1.330)	0.036** (2.111)	0.005 (0.283)	-0.023* (-1.684)	-0.006 (-0.407)	-0.023* (-1.652)
Mean Idiosyncratic Volatility	2.450*** (3.577)	0.743 (0.917)	3.438*** (4.244)	2.334*** (3.569)	0.715 (1.044)	2.025*** (3.097)
Mean Excess Return	36.575*** (48.260)	38.134*** (48.289)	38.145*** (47.616)	37.029*** (49.452)	37.007*** (48.826)	37.015*** (49.476)
# of Analysts Covering Stock	-0.264*** (-19.049)	-0.265*** (-17.466)	-0.262*** (-17.200)	-0.270*** (-19.606)	-0.268*** (-19.048)	-0.268*** (-19.230)
Brokerage Size	-0.171*** (-33.508)	-0.158*** (-27.723)	-0.158*** (-27.774)	-0.173*** (-34.407)	-0.170*** (-33.238)	-0.171*** (-33.598)
Brokerage Busyness	0.306*** (8.785)	0.388*** (10.325)	0.390*** (10.388)	0.302*** (8.714)	0.308*** (8.790)	0.307*** (8.813)
Analyst Concentration	-0.126*** (-12.488)	-0.112*** (-10.242)	-0.114*** (-10.380)	-0.126*** (-12.593)	-0.127*** (-12.516)	-0.127*** (-12.576)
Seniority	0.002 (0.527)	0.008* (1.803)	0.006 (1.406)	0.003 (0.653)	0.005 (1.119)	0.002 (0.515)
Forecast Error	0.018*** (6.732)	0.037*** (8.984)	0.038*** (9.212)	0.017*** (6.491)	0.021*** (7.540)	0.018*** (6.819)
Star	-0.205*** (-13.390)	-0.206*** (-12.198)	-0.201*** (-11.919)	-0.205*** (-13.479)	-0.202*** (-13.079)	-0.204*** (-13.374)
Observations	301185	245284	245168	303159	297153	303159
Pseudo R <sup>2</sup>	0.0207	0.0192	0.0185	0.0210	0.0209	0.0206
Wald Chi <sup>2</sup>	6006.39	5357.25	5289.48	6105.11	5888.58	5924.37



Table 5 cont'd

Panel B, OLS	Relative Recommendations					
	Inst Hold	IF & ETF Hold	MF Hold	HF Hold	Bank Hold	Other Hold
	(1)	(2)	(3)	(4)	(5)	(6)
Quarter-begin	0.007 (0.516)	-0.003 (-0.517)	-0.005 (-0.617)	-0.022*** (-3.207)	-0.011 (-1.184)	-0.018** (-2.475)
Quarter-end	-0.007 (-0.508)	-0.002 (-0.236)	-0.017** (-2.240)	-0.010 (-1.399)	-0.016* (-1.858)	-0.017** (-2.428)
Quarter-begin*Inst.Hold	-0.039** (-2.209)	-0.302*** (-3.528)	-0.112*** (-2.943)	0.004 (0.108)	-0.088 (-1.233)	-0.028 (-0.757)
Quarter-end*Inst.Hold	0.000 (0.011)	0.059 (0.663)	0.110*** (2.762)	0.023 (0.575)	0.077 (1.090)	0.071* (1.875)
Inst.Hold_lagged	-0.074*** (-5.129)	0.664*** (6.188)	-0.230*** (-5.797)	-0.126*** (-3.743)	-0.050 (-0.764)	-0.170*** (-4.877)
Change in Inst.Hold_lagged	-0.031 (-1.302)	-0.564** (-2.265)	-0.033 (-0.663)	0.149*** (4.564)	-0.004 (-0.097)	0.164*** (4.158)
Market Cap_lagged	0.010*** (5.719)	0.009*** (4.520)	0.008*** (4.198)	0.009*** (5.034)	0.011*** (5.735)	0.010*** (5.699)
Leverage_lagged	0.002 (1.291)	0.002 (1.025)	0.001 (0.637)	0.003* (1.655)	0.002 (0.962)	0.003 (1.472)
ROA_lagged	0.039 (0.750)	-0.042 (-0.663)	-0.001 (-0.024)	0.003 (0.055)	0.014 (0.267)	0.007 (0.145)
Tobin's Q_lagged	-0.017*** (-9.891)	-0.016*** (-8.375)	-0.015*** (-7.770)	-0.017*** (-9.950)	-0.017*** (-9.646)	-0.017*** (-9.908)
Asset Turnover_lagged	0.012 (0.870)	-0.020 (-1.325)	-0.012 (-0.804)	-0.001 (-0.054)	-0.003 (-0.242)	0.001 (0.103)
Stock Turnover_lagged	0.001** (2.207)	-0.000 (-0.131)	0.000 (1.494)	0.000 (0.741)	0.000 (0.347)	0.000 (0.848)
Mean Beta	0.027*** (5.845)	0.016*** (2.954)	0.028*** (5.088)	0.021*** (4.608)	0.021*** (4.632)	0.021*** (4.629)
Mean Idiosyncratic Volatility	-0.262 (-1.109)	0.205 (0.777)	-0.445* (-1.708)	0.096 (0.417)	0.097 (0.405)	0.092 (0.400)
Mean Excess Return	14.688*** (29.926)	15.871*** (41.083)	15.851*** (41.119)	14.653*** (30.241)	14.690*** (29.505)	14.651*** (30.228)
# of Analysts Covering Stock	-0.047*** (-8.855)	-0.050*** (-8.250)	-0.048*** (-8.075)	-0.048*** (-9.099)	-0.048*** (-8.916)	-0.048*** (-9.059)
Brokerage Size	-0.056*** (-23.283)	-0.054*** (-20.430)	-0.052*** (-19.571)	-0.056*** (-23.615)	-0.057*** (-23.844)	-0.056*** (-23.654)
Brokerage Busyness	0.130*** (9.353)	0.153*** (10.164)	0.162*** (10.795)	0.130*** (9.319)	0.130*** (9.273)	0.131*** (9.433)
Analyst Concentration	-0.055*** (-15.102)	-0.052*** (-13.459)	-0.053*** (-13.573)	-0.055*** (-15.028)	-0.055*** (-14.837)	-0.055*** (-15.145)
Seniority	0.014*** (7.639)	0.014*** (6.625)	0.015*** (7.083)	0.014*** (7.459)	0.014*** (7.642)	0.014*** (7.464)
Forecast Error	0.004*** (3.919)	0.005*** (3.146)	0.006*** (3.842)	0.004*** (4.054)	0.004*** (3.804)	0.004*** (3.996)
Star	-0.074*** (-10.926)	-0.073*** (-9.726)	-0.075*** (-9.932)	-0.074*** (-11.005)	-0.074*** (-10.929)	-0.074*** (-10.983)
Intercept	0.190*** (6.600)	0.120*** (3.799)	0.117*** (3.608)	0.183*** (6.589)	0.159*** (5.523)	0.167*** (6.032)
Observations	300637	244786	244625	302120	296225	302120
Adj R <sup>2</sup>	0.0285	0.0282	0.0282	0.0282	0.0281	0.0283

Table 5. cont'd

Panel C, ologit	Relative Recommendations ordinal					
	Inst Hold	IF & ETF Hold	MF Hold	HF Hold	Bank Hold	Other Hold
	(1)	(2)	(3)	(4)	(5)	(6)
Quarter-begin	0.029 (1.029)	0.010 (0.660)	0.004 (0.238)	-0.033** (-2.131)	-0.010 (-0.496)	-0.019 (-1.187)
Quarter-end	0.020 (0.714)	0.005 (0.361)	-0.029* (-1.774)	-0.013 (-0.824)	-0.019 (-0.962)	-0.019 (-1.205)
Quarter-begin*Inst.Hold	-0.091** (-2.387)	-0.860*** (-4.238)	-0.294*** (-3.366)	-0.019 (-0.216)	-0.213 (-1.218)	-0.115 (-1.260)
Quarter-end*Inst.Hold	-0.039 (-1.020)	-0.031 (-0.149)	0.192** (2.117)	0.037 (0.415)	0.067 (0.419)	0.077 (0.863)
Inst.Hold_lagged	-0.142*** (-4.338)	0.826*** (3.254)	-0.480*** (-5.149)	-0.218*** (-2.840)	-0.283* (-1.921)	-0.313*** (-3.916)
Change in Inst.Hold_lagged	0.078 (1.456)	-0.959 (-1.635)	-0.054 (-0.494)	0.246*** (3.185)	0.152 (1.480)	0.346*** (3.634)
Market Cap_lagged	0.032*** (8.398)	0.030*** (7.422)	0.030*** (7.304)	0.028*** (7.580)	0.034*** (8.450)	0.031*** (8.160)
Leverage_lagged	0.001 (0.348)	-0.000 (-0.073)	-0.002 (-0.541)	0.003 (0.708)	0.000 (0.069)	0.002 (0.576)
ROA_lagged	0.077 (0.654)	-0.054 (-0.383)	0.026 (0.183)	0.019 (0.166)	0.068 (0.569)	0.028 (0.244)
Tobin's Q_lagged	-0.018*** (-5.047)	-0.018*** (-4.455)	-0.015*** (-3.589)	-0.018*** (-4.964)	-0.020*** (-5.324)	-0.018*** (-4.967)
Asset Turnover_lagged	-0.005 (-0.173)	-0.070** (-2.271)	-0.059* (-1.908)	-0.036 (-1.268)	-0.034 (-1.200)	-0.030 (-1.074)
Stock Turnover_lagged	0.001** (2.027)	-0.001 (-1.149)	0.000 (0.001)	0.000 (0.419)	0.000 (0.318)	0.000 (0.597)
Mean Beta	0.029*** (2.914)	0.024** (1.973)	0.042*** (3.607)	0.015 (1.515)	0.021** (2.147)	0.015 (1.554)
Mean Idiosyncratic Volatility	1.256*** (2.722)	2.371*** (4.099)	1.376** (2.442)	2.048*** (4.551)	1.840*** (3.990)	2.002*** (4.458)
Mean Excess Return	31.511*** (42.127)	33.348*** (38.577)	33.259*** (38.276)	31.442*** (42.563)	31.572*** (41.955)	31.452*** (42.596)
# of Analysts Covering Stock	-0.151*** (-11.871)	-0.159*** (-10.948)	-0.155*** (-10.789)	-0.154*** (-12.141)	-0.154*** (-11.991)	-0.154*** (-12.100)
Brokerage Size	-0.124*** (-28.185)	-0.119*** (-24.460)	-0.114*** (-23.419)	-0.125*** (-28.612)	-0.127*** (-28.841)	-0.125*** (-28.654)
Brokerage Busyness	0.241*** (7.598)	0.288*** (8.375)	0.308*** (8.938)	0.239*** (7.542)	0.242*** (7.537)	0.241*** (7.614)
Analyst Concentration	-0.096*** (-12.773)	-0.091*** (-11.436)	-0.093*** (-11.771)	-0.096*** (-12.705)	-0.095*** (-12.451)	-0.096*** (-12.787)
Seniority	0.016*** (4.127)	0.014*** (3.377)	0.016*** (3.727)	0.015*** (3.934)	0.016*** (4.257)	0.015*** (3.935)
Forecast Error	0.007*** (3.072)	0.012*** (3.202)	0.013*** (3.617)	0.007*** (3.133)	0.007*** (3.073)	0.007*** (3.150)
Star	-0.147*** (-9.468)	-0.150*** (-8.745)	-0.154*** (-8.952)	-0.148*** (-9.535)	-0.147*** (-9.398)	-0.148*** (-9.516)
Observations	300637	244786	244625	302120	296225	302120
Pseudo R <sup>2</sup>	0.0147	0.0143	0.0145	0.0145	0.0146	0.0145
Wald Chi-squared	4025.60	3384.52	3422.1	4002.91	3951.38	3996.17

Table 5. cont'd

Panel D, ologit	Revisions					
	Inst Hold	IF & ETF Hold	MF Hold	HF Hold	Bank Hold	Other Hold
	(1)	(2)	(3)	(4)	(5)	(6)
Quarter-begin	-0.013 (-0.388)	0.031* -1.874	0.008 (0.404)	-0.061*** (-3.417)	-0.044* (-1.700)	-0.044** (-2.389)
Quarter-end	-0.020 (-0.527)	-0.015 (-0.839)	-0.055*** (-2.716)	-0.042** (-2.097)	-0.036 (-1.331)	-0.057*** (-2.765)
Quarter-begin*Inst.Hold	-0.063 (-1.386)	-1.039*** (-4.882)	-0.417*** (-4.379)	0.010 (0.101)	-0.112 (-0.555)	-0.105 (-1.034)
Quarter-end*Inst.Hold	-0.019 (-0.397)	0.156 -0.673	0.305*** (2.818)	0.049 (0.433)	-0.021 (-0.101)	0.152 (1.328)
Inst.Hold_lagged	-0.018 (-0.535)	0.206 -0.918	-0.056 (-0.667)	-0.015 (-0.199)	-0.329** (-2.113)	-0.130 (-1.626)
Change in Inst.Hold_lagged	0.428*** (6.300)	-0.231 (-0.353)	-0.053 (-0.419)	0.386*** (4.561)	0.665*** (5.825)	0.438*** (4.335)
Market Cap_lagged	0.049*** (15.046)	0.066*** -20.807	0.048*** (13.308)	0.050*** (15.006)	0.054*** (15.818)	0.049*** (15.124)
Leverage_lagged	0.006* (1.860)	0.003 -0.887	0.005 (1.332)	0.006* (1.854)	0.005 (1.427)	0.006* (1.938)
ROA_lagged	0.242* (1.899)	0.026 -0.167	0.018 (0.111)	0.266** (2.084)	0.298** (2.277)	0.263** (2.058)
Tobin's Q_lagged	0.008*** (2.784)	0.008** -2.298	0.009** (2.572)	0.010*** (3.223)	0.007** (2.175)	0.010*** (3.144)
Asset Turnover_lagged	0.066*** (3.396)	0.027 -1.249	0.042** (1.971)	0.057*** (2.953)	0.072*** (3.722)	0.060*** (3.135)
Stock Turnover_lagged	-0.000 (-0.656)	0.001 -1.139	-0.001* (-1.692)	-0.001 (-1.596)	-0.000 (-0.615)	-0.001 (-1.237)
Mean Beta	0.054*** (6.006)	0.061*** -5.791	0.064*** (6.043)	0.051*** (5.672)	0.058*** (6.316)	0.051*** (5.656)
Mean Idiosyncratic Volatility	0.348 (0.677)	1.550*** -2.634	0.602 (0.994)	0.453 (0.902)	0.076 (0.143)	0.425 (0.848)
Mean Excess Return	52.385*** (49.402)	53.381*** -44.479	54.289*** (44.248)	52.706*** (49.814)	52.725*** (49.192)	52.708*** (49.836)
# of Analysts Covering Stock	-0.024*** (-3.224)	-0.280*** (-18.114)	-0.016* (-1.920)	-0.027*** (-3.679)	-0.025*** (-3.352)	-0.026*** (-3.508)
Brokerage Size	-0.009*** (-2.812)	-0.001 (-0.416)	0.004 (1.257)	-0.009*** (-2.846)	-0.009*** (-2.716)	-0.008*** (-2.688)
Brokerage Busyness	0.123*** (6.193)	0.150*** -6.821	0.193*** (8.986)	0.126*** (6.336)	0.137*** (6.772)	0.129*** (6.493)
Analyst Concentration	0.042 (1.175)	0.06 -1.484	0.056 (1.361)	0.041 (1.143)	0.044 (1.225)	0.040 (1.140)
Seniority	-0.011*** (-2.813)	-0.014*** (-3.332)	-0.013*** (-3.080)	-0.011*** (-2.829)	-0.010** (-2.458)	-0.011*** (-2.837)
Forecast Error	0.014*** (6.855)	0.026*** -6.531	0.028*** (6.984)	0.015*** (7.167)	0.015*** (6.807)	0.015*** (7.185)
Star	-0.004 (-0.535)	0.005 -0.527	0.011 (1.270)	-0.004 (-0.509)	-0.005 (-0.568)	-0.003 (-0.431)
Observations	213276	174091	173799	213391	209665	213391
Pseudo R <sup>2</sup>	0.0206	0.0215	0.0201	0.0205	0.0205	0.0206
Wald Chi-squared	4497.16	4411.17	3635.34	4396.94	4262.41	4410.21

Table 5. cont'd

Panel E, ologit	Upgrade					
	Inst Hold (1)	IF & ETF Hold (2)	MF Hold (3)	HF Hold (4)	Bank Hold (5)	Other Hold (6)
Quarter-begin	0.012 (0.205)	0.038 (1.344)	0.032 (1.011)	0.035 (1.112)	-0.037 (-0.880)	0.056* (1.725)
Quarter-end	-0.103 (-1.571)	0.032 (1.069)	0.044 (1.244)	-0.027 (-0.760)	-0.000 (-0.009)	-0.060 (-1.609)
Quarter-begin*Inst.Hold	0.002 (0.025)	-0.682* (-1.807)	-0.167 (-0.980)	-0.150 (-0.819)	0.408 (1.256)	-0.282 (-1.591)
Quarter-end*Inst.Hold	0.112 (1.308)	-0.699* (-1.703)	-0.355* (-1.849)	0.039 (0.196)	-0.185 (-0.513)	0.256 (1.231)
Inst.Hold_lagged	0.096 (1.395)	1.894*** (3.860)	0.441** (2.463)	0.118 (0.706)	0.507 (1.615)	0.260 (1.551)
Change in Inst.Hold_lagged	-0.009 (-0.084)	-3.093*** (-2.944)	-0.295 (-1.437)	-0.096 (-0.587)	0.066 (0.337)	-0.211 (-1.210)
Market Cap_lagged	-0.040*** (-5.234)	-0.044*** (-5.370)	-0.045*** (-5.479)	-0.040*** (-5.086)	-0.045*** (-5.465)	-0.040*** (-5.206)
Leverage_lagged	0.001 (0.101)	0.003 (0.277)	0.001 (0.147)	0.000 (0.045)	0.002 (0.224)	0.000 (0.021)
ROA_lagged	0.794*** (2.754)	0.701** (2.099)	0.645* (1.942)	0.817*** (2.828)	0.796*** (2.700)	0.824*** (2.866)
Tobin's Q_lagged	-0.014* (-1.886)	-0.012 (-1.559)	-0.015* (-1.910)	-0.014* (-1.875)	-0.010 (-1.422)	-0.013* (-1.851)
Asset Turnover_lagged	0.460*** (7.617)	0.464*** (7.215)	0.479*** (7.438)	0.479*** (7.963)	0.462*** (7.605)	0.476*** (7.915)
Stock Turnover_lagged	-0.005*** (-4.178)	-0.005*** (-3.488)	-0.005*** (-3.548)	-0.004*** (-3.662)	-0.005*** (-4.152)	-0.004*** (-3.741)
Mean Beta	0.041* (1.894)	0.007 (0.287)	0.014 (0.588)	0.048** (2.250)	0.039* (1.772)	0.049** (2.276)
Mean Idiosyncratic Volatility	-2.895*** (-2.626)	-2.113 (-1.608)	-2.532* (-1.954)	-3.531*** (-3.187)	-2.605** (-2.371)	-3.447*** (-3.115)
Mean Excess Return	3.465*** (2.999)	3.307** (2.554)	3.556*** (2.751)	3.441*** (2.971)	3.457*** (2.965)	3.351*** (2.892)
# of Analysts Covering Stock	0.138*** (5.588)	0.129*** (4.861)	0.126*** (4.745)	0.138*** (5.643)	0.138*** (5.606)	0.139*** (5.654)
Brokerage Size	-0.220*** (-22.419)	-0.226*** (-20.646)	-0.228*** (-20.885)	-0.219*** (-22.369)	-0.220*** (-22.432)	-0.219*** (-22.400)
Brokerage Busyness	-2.482*** (-16.979)	-2.524*** (-15.538)	-2.573*** (-15.811)	-2.481*** (-16.968)	-2.501*** (-16.986)	-2.480*** (-16.955)
Analyst Concentration	0.170*** (4.436)	0.155*** (3.702)	0.157*** (3.750)	0.169*** (4.424)	0.175*** (4.560)	0.169*** (4.427)
Seniority	0.053*** (4.455)	0.055*** (4.158)	0.057*** (4.358)	0.053*** (4.497)	0.049*** (4.094)	0.053*** (4.499)
Forecast Error	-0.011** (-2.139)	-0.021*** (-2.998)	-0.022*** (-3.227)	-0.011** (-2.143)	-0.010* (-1.768)	-0.011** (-2.162)
Star	-0.269*** (-7.853)	-0.278*** (-7.350)	-0.273*** (-7.268)	-0.269*** (-7.852)	-0.273*** (-7.899)	-0.269*** (-7.848)
Observations	74224	61449	61494	74253	72922	74253
Pseudo R <sup>2</sup>	0.0254	0.0247	0.0245	0.0253	0.0257	0.0254
Wald Chi-squared	1634.26	1384.97	1377.16	1643.4	1621.76	1646.69

Table 5. cont'd

Panel F, ologit	Downgrade					
	Inst Hold	IF & ETF Hold	MF Hold	HF Hold	Bank Hold	Other Hold
	(1)	(2)	(3)	(4)	(5)	(6)
Quarter-begin	0.120** (2.197)	0.047* (1.809)	0.061** (2.065)	0.019 (0.668)	0.125*** (3.205)	0.033 (1.138)
Quarter-end	0.161*** (2.619)	0.079*** (2.737)	0.100*** (3.107)	0.046 (1.463)	0.130*** (3.059)	0.044 (1.361)
Quarter-begin*Inst.Hold	-0.107 (-1.497)	0.090 (0.257)	-0.031 (-0.200)	0.172 (1.068)	-0.765** (-2.567)	0.068 (0.432)
Quarter-end*Inst.Hold	-0.186** (-2.320)	-0.823** (-2.077)	-0.397** (-2.267)	-0.145 (-0.824)	-0.896*** (-2.773)	-0.120 (-0.701)
Inst.Hold_lagged	0.274*** (4.359)	2.088*** (4.697)	0.370** (2.291)	0.102 (0.691)	1.525*** (5.170)	0.309** (2.032)
Change in Inst.Hold_lagged	-0.041 (-0.378)	-1.542 (-1.587)	-0.167 (-0.874)	0.162 (1.181)	0.223 (1.214)	0.233 (1.388)
Market Cap_lagged	-0.049*** (-6.623)	-0.051*** (-6.131)	-0.051*** (-6.110)	-0.047*** (-6.284)	-0.058*** (-7.272)	-0.048*** (-6.451)
Leverage_lagged	-0.010 (-1.324)	0.003 (0.329)	0.000 (0.049)	-0.010 (-1.368)	-0.009 (-1.215)	-0.010 (-1.428)
ROA_lagged	-0.114 (-0.488)	-0.047 (-0.166)	-0.069 (-0.244)	-0.064 (-0.274)	-0.009 (-0.039)	-0.070 (-0.300)
Tobin's Q_lagged	-0.010 (-1.544)	-0.009 (-1.258)	-0.013* (-1.649)	-0.010 (-1.468)	-0.008 (-1.114)	-0.010 (-1.455)
Asset Turnover_lagged	0.469*** (8.739)	0.474*** (8.106)	0.488*** (8.271)	0.497*** (9.340)	0.469*** (8.763)	0.492*** (9.267)
Stock Turnover_lagged	-0.004*** (-4.055)	-0.004*** (-3.140)	-0.003*** (-2.612)	-0.003*** (-3.353)	-0.004*** (-3.846)	-0.004*** (-3.515)
Mean Beta	-0.022 (-1.153)	-0.050** (-2.158)	-0.034 (-1.484)	-0.010 (-0.497)	-0.026 (-1.354)	-0.009 (-0.491)
Mean Idiosyncratic Volatility	0.158 (0.148)	0.274 (0.207)	-0.896 (-0.683)	-0.875 (-0.821)	0.497 (0.465)	-0.821 (-0.770)
Mean Excess Return	-4.213*** (-4.182)	-4.869*** (-4.340)	-4.821*** (-4.319)	-4.340*** (-4.281)	-4.368*** (-4.290)	-4.354*** (-4.296)
# of Analysts Covering Stock	0.207*** (9.849)	0.212*** (9.319)	0.208*** (9.057)	0.212*** (10.169)	0.212*** (10.084)	0.211*** (10.125)
Brokerage Size	-0.217*** (-24.057)	-0.234*** (-23.143)	-0.235*** (-23.115)	-0.215*** (-23.853)	-0.217*** (-23.970)	-0.215*** (-23.889)
Brokerage Busyness	-2.061*** (-16.939)	-2.251*** (-16.541)	-2.322*** (-16.910)	-2.056*** (-16.923)	-2.037*** (-16.619)	-2.057*** (-16.923)
Analyst Concentration	0.137*** (3.832)	0.123*** (3.070)	0.125*** (3.119)	0.135*** (3.780)	0.138*** (3.867)	0.135*** (3.791)
Seniority	0.079*** (7.185)	0.082*** (6.722)	0.085*** (6.968)	0.081*** (7.304)	0.079*** (7.074)	0.081*** (7.313)
Forecast Error	-0.008** (-2.041)	-0.013** (-2.203)	-0.016*** (-2.725)	-0.008* (-1.910)	-0.006 (-1.406)	-0.007* (-1.872)
Star	-0.313*** (-9.721)	-0.305*** (-8.485)	-0.305*** (-8.484)	-0.314*** (-9.781)	-0.317*** (-9.768)	-0.315*** (-9.781)
Observations	88742	72381	72239	88786	87264	88786
Pseudo R <sup>2</sup>	0.0297	0.0302	0.0300	0.0295	0.0299	0.0296
Wald Chi-squared	2567.14	2191.18	2174.17	2549.08	2522.97	2558.95

Table 6. Star and Non-Star Analysts' recommendations and revisions by month of a quarter, Mutual Fund Holdings

The table reports the results of regression models with different measures of analyst recommendation or revisions as the dependent variable on the month of a quarter being either the last month (*Quarter-end*) or the first month (*Quarter-begin*) and their interaction terms with institutional holdings of the stock in the prior quarter (*insthold*) by Institutional Investor All-Star analysts and the rest of the analysts. Models are run with a sample of active mutual funds' holdings. Panel A Raw Recommendations, Panel B Relative recommendations, Panel C Relative recommendations ordinary, Panel D Relative recommendations dummy, Panel E Revision continuous, Panel F Upgrade and Panel G Downgrade of recommendations. All other control variables are defined in section 2. All regressions control for year fixed effects with standard errors clustered by firm. t-stats are in parentheses. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1%, respectively.

	Raw Recommendations		Relative Recommendations		Relative Recom_ordinal		Revisions		Upgrade		Downgrade	
	Star	non-Star	Star	non-Star	Star	non-Star	Star	non-Star	Star	non-Star	Star	non-Star
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Quarter-begin	-0.034 (-0.897)	-0.014 (-1.059)	-0.024 (-1.514)	-0.010* (-1.657)	-0.036 (-0.878)	-0.005 (-0.348)	0.047 (1.166)	-0.015 (-0.940)	-0.075 (-0.820)	0.056** (2.031)	-0.020 (-0.246)	0.049* (1.956)
Quarter-end	-0.014 (-0.362)	-0.016 (-1.236)	-0.001 (-0.044)	-0.023*** (-3.731)	-0.016 (-0.393)	-0.028** (-2.107)	0.068* (1.667)	-0.079*** (-4.645)	0.077 (0.814)	-0.006 (-0.192)	-0.256*** (-3.100)	0.078*** (2.896)
Quarter-begin* MF Hold	-0.255 (-1.102)	-0.189*** (-2.591)	-0.078 (-0.786)	-0.080** (-2.283)	-0.336 (-1.306)	-0.228*** (-2.878)	-0.591** (-2.294)	-0.228*** (-2.633)	0.252 (0.443)	-0.278* (-1.724)	0.052 (0.101)	0.017 (0.115)
Quarter-end* MF Hold	0.258 (1.032)	0.182** (2.293)	0.119 (1.081)	0.126*** (3.418)	0.282 (1.030)	0.171** (2.031)	-0.194 (-0.678)	0.343*** (3.472)	-0.843 (-1.375)	-0.118 (-0.667)	1.119** (2.073)	-0.300* (-1.856)
MF Hold <sub>t-1</sub>	0.528** (2.158)	-0.262*** (-2.871)	-0.079 (-0.818)	-0.201*** (-5.681)	-0.057 (-0.229)	-0.412*** (-5.013)	0.309 (1.427)	-0.259*** (-3.613)	0.484 (0.932)	0.439*** (2.772)	0.168 (0.348)	0.433*** (3.085)
$\Delta$ MF Hold <sub>t-1</sub>	-0.112 (-0.370)	0.327*** (2.898)	-0.042 (-0.319)	-0.077 (-1.514)	0.283 (0.837)	-0.173 (-1.564)	0.229 (0.741)	-0.036 (-0.276)	-0.775 (-1.218)	-0.225 (-1.068)	-0.018 (-0.029)	-0.208 (-1.066)
Controls	X	X	X	X	X	X	X	X	X	X	X	X
Observations	31576	271583	31544	270576	31576	270576	26797	186594	7425	66828	9283	79503
Adj. R <sup>2</sup> / Pseudo R <sup>2</sup>	0.0242	0.0195	0.0327	0.0269	0.0157	0.0139	0.0316	0.0217	0.0333	0.0244	0.0340	0.0268
Wald Chi <sup>2</sup>	1185.75	5363.41			588.79	3661.49	1456.27	4558.27	241.74	1459.3	338.72	2149.03

Table 7. The Difference-in-Difference Analysis of Three-Day Cumulative Abnormal Returns around Upgrades and Downgrades

The table reports difference-in-difference analysis of CAR (-1, +1) around the analysts' upgrades, downgrades, and reiterations by beginning and end month of quarter and by high and low institutional holdings for whole sample of institutional holdings and mutual funds' holdings. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1%, respectively.

	Inst.Hold Q1	Inst.Hold Q4	Diff.	t-stat	Inst.Hold Q1	Inst.Hold Q4	Diff.	t-stat	Inst.Hold Q1	Inst.Hold Q4	Diff.	t-stat
All Inst Hold	CAR (-1, +1) around Upgrades				CAR (-1, +1) around Downgrades				CAR (-1, +1) around Reiterations			
Begin_QTR	4.072	2.699	-1.37	-8.411***	-5.121	-4.669	0.45	-2.581**	0.356	-0.029	-0.39	-2.878***
End_QTR	3.367	2.666	-0.70	-3.642***	-3.773	-3.115	0.66	2.942***	-0.171	-0.168	0.00	0.017
Diff												
(End_QTR - Begin_QTR)	-0.704	-0.033	0.67	2.65***	1.348	1.553	0.21	0.73	-0.527	-0.139	0.39	1.76*
t-stat	-3.398***	-0.226			6.340***	8.417***			-2.959***	-1.134		
MF Hold	CAR (-1, +1) around Upgrades				CAR (-1, +1) around Downgrades				CAR (-1, +1) around Reiterations			
Begin_QTR	3.690	2.302	-1.39	-9.161***	-5.955	-3.467	2.49	14.233***	0.302	-0.012	-0.31	-2.398**
End_QTR	3.076	2.433	-0.64	-3.379***	-4.358	-1.876	2.48	9.825***	-0.299	-0.108	0.19	1.103
Diff												
(End_QTR - Begin_QTR)	-0.614	0.132	0.75	2.65***	1.597	1.591	-0.01	0.73	-0.601	-0.097	0.50	1.76*
t-stat	3.029***	1.033			6.982***	9.276***			3.659***	1.009		

Table 8 Market Response to Analysts' Revisions

The table reports the results of OLS models with cumulative abnormal returns (-1, +1) around the upgrades, downgrades, and positive "+" and negative "-" reiterations as the dependent variable. The main explanatory variables are the month of a quarter being either the last month (*end\_quarter*) or the first month (*begin\_quarter*) and their interaction terms with institutional holdings of the stock in the prior quarter (*insthold*). Panel A presents models for a sample of all analysts' recommendations for all types of institutional holdings (models (1)-(4)) and actively managed mutual funds' holdings (models (5)-(8)). Panel B presents the models by subsamples of Institutional Investor All-star analysts (even columns) and non-star analysts (odd columns). All other control variables are defined in section 2. All regressions control for year and firm fixed effects with standard errors clustered by firm. t-stats are reported below coefficients. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1%, respectively.

	Institutional Holdings, all				Actively Managed Mutual Fund Holdings			
	Upgrades	Downgrades	"+"	"-"	Upgrades	Downgrades	"+"	"-"
			Reiterations	Reiterations			Reiterations	Reiterations
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Quarter-begin	0.546	-0.569	0.755*	-1.744	0.105	-0.574	0.295	-0.767
	-1.282	(-1.027)	-1.834	(-0.869)	(0.445)	(-1.442)	(1.465)	(-1.029)
Quarter-end	-1.075***	-0.166	0.331	-2.195	-0.406	0.621**	-0.057	-1.638**
	(-3.358)	(-0.447)	-0.612	(-1.271)	(-1.752)	(2.224)	(-0.301)	(-2.568)
Qtr-begin*InstHold	-0.608	0.188	-0.882	1.991	-0.663	0.944	-1.574	5.755
	(-1.201)	-0.276	(-1.716)	-0.853	(-0.748)	(0.565)	(-1.210)	(1.674)
Qtr-end*InstHold	1.157**	1.296**	-0.623	1.904	1.442	1.599	-0.773	9.365**
	-2.881	-2.389	(-0.911)	-0.925	(1.490)	(1.077)	(-0.684)	(2.691)
Inst.Hold	-0.157	-1.035	0.706	-3.596	-0.653	-2.929	0.016	-6.561*
	(-0.286)	(-1.211)	-1.496	(-1.459)	(-0.832)	(-1.482)	(0.013)	(-1.861)
Δ Inst.Hold	0.525	10.429***	1.01	0.315	-2.555	1.776	1.034	0.279
	-0.414	-3.905	-0.866	-0.091	(-1.408)	(0.752)	(0.818)	(0.056)
Market Cap	-1.990***	-1.224***	-1.369***	-1.705**	-2.022***	-1.616***	-1.181***	-1.305**
	(-9.311)	(-3.570)	(-6.341)	(-2.507)	(-7.914)	(-5.973)	(-4.389)	(-2.232)
Leverage	0.026	-0.193**	0.161	0.266	-0.040	-0.176*	0.158	0.423
	-0.26	(-2.298)	-1.126	-1.398	(-0.380)	(-1.779)	(1.037)	(1.680)
ROA	9.159***	13.670***	4.443	4.776	8.904**	12.835***	3.435	2.411
	-3.524	-4.332	-1.432	-0.641	(2.724)	(3.442)	(1.081)	(0.236)
Tobin's Q	-0.917***	-0.347**	-0.008	-0.11	-0.915***	-0.219	-0.086	0.243
	(-10.371)	(-2.651)	(-0.102)	(-0.365)	(-8.593)	(-1.692)	(-0.940)	(0.882)
Asset Turnover	2.059***	4.045**	-0.39	3.045	2.314***	4.132**	0.671	1.546
	-3.042	-2.925	(-0.431)	-0.978	(3.284)	(2.809)	(0.581)	(0.517)
Stock Turnover	-0.061***	0.004	-0.002	-0.036	-0.066***	0.014	-0.007	-0.025
	(-3.836)	-0.203	(-0.149)	(-1.167)	(-3.356)	(1.211)	(-0.621)	(-0.769)
Beta	-0.161	-0.177	0.402	0.009	-0.295	0.182	0.707**	-0.158
	(-0.434)	(-0.402)	-1.334	-0.013	(-0.698)	(0.476)	(2.894)	(-0.251)
Idiosyn Vol	142.767***	-5.249	-10.568	-34.618	171.339***	-58.374**	-12.672	-54.117
	-4.211	(-0.088)	(-0.912)	(-0.744)	(4.259)	(-2.796)	(-0.802)	(-1.279)
# Analysts/Stock	0.809***	-3.582***	-0.252	-0.317	0.936***	-2.899***	-0.099	-0.363
	-4.915	(-8.036)	(-1.602)	(-0.677)	(5.036)	(-7.214)	(-0.555)	(-0.898)
Brokerage Size	0.257***	-0.256**	-0.029	0.104	0.217**	-0.214**	-0.018	0.146
	-3.355	(-2.871)	(-0.491)	-0.689	(2.673)	(-2.175)	(-0.233)	(0.901)
Brokerage Busyness	-2.250***	4.078***	-0.286	1.027	-2.063***	3.385***	-0.486*	0.629
	(-5.527)	-3.192	(-1.015)	-1.559	(-5.235)	(2.974)	(-1.871)	(0.964)
Analyst Concentr.	-0.905***	1.335***	-0.102	-0.001	-0.894***	1.183***	-0.160	0.207
	(-14.584)	-9.403	(-1.291)	(-0.004)	(-13.028)	(10.050)	(-1.575)	(0.735)
Seniority	0.326***	-0.357***	0.064	0.111	0.297***	-0.382***	0.084	0.106
	-5.053	(-4.592)	-1.45	-0.497	(4.220)	(-4.960)	(1.441)	(0.501)
Forecast Error	0.02	0.169***	0.03	0.256*	-0.075	0.318***	0.131	0.265
	-0.439	-4.172	-0.696	-1.797	(-0.716)	(3.774)	(1.691)	(1.130)
Star	0.514**	-0.480**	-0.158	-0.798**	0.595**	-0.540***	-0.186	-0.896**
	-2.521	(-2.926)	(-1.303)	(-2.551)	(2.753)	(-3.297)	(-1.718)	(-2.575)
Intercept	29.302***	19.249***	20.655***	28.008**	29.812***	24.848***	18.209***	19.635*
	-8.621	-3.389	-6.791	-2.328	(7.123)	(6.182)	(4.786)	(2.100)
Observations	73349	87938	21433	2653	60827	71640	16841	2156
Adj. R <sup>2</sup>	0.1513	0.2378	0.0714	0.1138	0.1618	0.2357	0.0812	0.1031



Table 8 cont'd.

Panel B	Institutional Holdings, all								Active Mutual Fund Holdings							
	“+”				“-”				“+”				“-”			
	Upgrades		Downgrades		Reiterations		Reiterations		Upgrades		Downgrades		Reiterations		Reiterations	
	non-Star	Star	non-Star	Star	non-Star	Star	non-Star	Star	non-Star	Star	non-Star	Star	non-Star	Star	non-Star	Star
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
Qtr-begin	0.72*	0.12	-0.40	-1.34	0.57	2.75***	-0.71	-0.42	0.21	0.569	-0.53	-0.80*	0.34*	0.01	-0.16	-1.06
	(1.85)	(0.11)	(-0.97)	(-1.24)	(1.08)	(2.78)	(-0.48)	(-0.12)	(1.07)	(1.63)	(-1.45)	(-2.02)	(1.83)	(0.02)	(-0.20)	(-1.03)
Qtr-end	-0.94**	-0.73	-0.194	0.194	0.326	1.907*	-3.13	2.14	-0.29	0.337	0.63*	0.27	0.01	-0.42	-2.22**	-0.50
	(-2.45)	(-0.83)	(-0.42)	(0.19)	(0.53)	(1.83)	(-1.65)	(0.59)	(-1.29)	(0.92)	(1.98)	(0.68)	(0.07)	(-0.97)	(-2.42)	(-0.47)
Qtr-begin	-0.72	-0.48	-0.068	1.72	-0.69	-3.62**	0.86	-0.71	-0.70	-5.36**	0.49	5.25**	-1.67	-1.37	0.53	9.67
*Inst.Hold	(-1.44)	(-0.35)	(-0.12)	(1.24)	(-1.06)	(-2.48)	(0.43)	(-0.15)	(-1.01)	(-2.31)	(0.30)	(2.32)	(-1.65)	(-0.43)	(0.16)	(1.63)
Qtr-end	1.05**	0.67	1.37**	0.34	-0.66	-2.835*	2.54	-3.50	1.18	-3.77	1.70	0.94	-0.96	-0.06	8.75*	7.84
*Inst.Hold	(2.17)	(0.57)	(2.17)	(0.25)	(-0.88)	(-1.94)	(1.03)	(-0.73)	(1.30)	(-1.64)	(1.00)	(0.39)	(-0.80)	(-0.02)	(2.12)	(1.03)
Inst.Hold	-0.23	0.82	-1.04	0.05	0.60	2.59*	-2.53	1.45	-0.88	2.66	-2.76	-4.77*	0.417	-1.98	-5.64	-6.81
	(-0.45)	(0.58)	(-1.48)	(0.04)	(0.89)	(1.89)	(-1.11)	(0.29)	(-1.11)	(0.83)	(-1.38)	(-2.01)	(0.30)	(-0.46)	(-1.70)	(-0.80)
Δ Inst.Hold	1.738**	1.51	10.69***	7.88***	0.74	0.89	0.70	1.78	-1.92	-2.49	2.00	1.10	1.60	-2.22	6.58	-2.24
	(2.32)	(0.93)	(7.02)	(4.15)	(0.89)	(0.78)	(0.16)	(0.32)	(-1.07)	(-0.96)	(0.83)	(0.39)	(1.17)	(-0.71)	(1.09)	(-0.33)
Controls	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Obs.	65901	6890	78635	8608	17327	3484	1663	746	54607	5781	64184	6874	13560	2862	1355	594
Adj. R <sup>2</sup>	0.1449	0.3621	0.2367	0.2600	0.0694	0.0533	0.1375	0.1414	0.1526	0.4030	0.2358	0.2352	0.0843	0.0347	0.1110	0.1902