Analyst Distraction and Herding in Stock Recommendations

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Abstract

In this study, we examine whether analysts' distraction affects their herding tendency. We find that temporarily distracted analysts herd less when issuing stock recommendations. This finding is robust to the exclusion of earnings announcements, reiterations, and other analysts' recommendations. The finding continues to hold when considering investor sentiment and regulation changes as well as using alternative measures of distraction. The effect of distraction decreases when an analyst is repeatedly distracted by unrelated shocks or events in other companies they cover. The mitigating effect of distraction on analysts' herding is more likely to occur for easy-to-value stocks and for analysts who are experienced and cover larger universes.

Keywords: Analyst distraction, herding, stock recommendations, analyst experience

1. Introduction

Financial analysts serve as an information intermediary who distributes public and private information to investors through research reports and stock recommendations (e.g., Frankel et al., 2006; Fischer and Stocken, 2010; Beyer et al., 2010; Merkley et al., 2017; Duet al., 2017; Loh and Stulz, 2018). However, due to cognitive resource constraints, even analysts have limited ability to gather and process information, and thus suffer from limited attention (Hirshleifer and Teoh, 2003). In other words, given the vast amount of information available, analysts need to allocate their limited attention to processing information. Hence, how selective the analysts are in gathering information will likely affect the nature of the recommendations.

Herding occurs when analysts decide to imitate decisions made by other analysts who they believe are better informed. The literature has shown that analysts tend to herd by issuing recommendations that are close to the consensus (Welch, 2000; Jegadeesh and Kim, 2010; Chiang and Lin, 2019). Analysts may herd rationally because of receiving common information (Scharfstein and Stein, 1990), having similar compensation structures (Chakrabarti and Roll, 1999; Scharfstein and Stein, 1990), or having reputational concerns (Graham, 1999; Hong and Kubik, 2003; Hong et al., 2000; Scharfstein and Stein, 1990). Herding among analysts may also be due to irrational reasons, like sentiment (Chiang and Lin, 2019) and limited attention (Barber et al., 2009). Based on the attention-grabbing hypothesis, investors with limited sources of information may easily make similar trading decisions when they pay a certain amount of attention to the same stock (Hsieh et al., 2020). Thus, distinct from the literature, we conjecture that analysts' distraction is related to their herding in stock recommendations.

Our idea is that attention is a scarce cognitive resource (Kahneman, 1973), and analysts with limited attention tend to selectively allocate their attention and effort to process relevant information (Israeli et al., 2017). Due to exogenous attention-grabbing factors, analysts may shift attention away from the stocks in unaffected industries and toward the attention-grabbing stock. Zhang et al. (2022) find that analysts faced limited attention as a result of the distraction from experiencing a virus like COVID. Bourveau et al. (2022) show that analysts' distraction significantly decreases the accuracy of their earnings forecasts. Based on the attention-grabbing hypothesis, investors with limited sources of information may easily make similar trading decisions when they pay a certain amount of attention to the same stock (Hsieh et al., 2020). Analysts also have limited attention and cognitive resources. When they focus on or are affected by events in the other firms that they cover (shocks unrelated to the focal firm), their available attention for the focal firm can diminish. This reduced attention to the primary covered firm can lead to less herding because they might not be as influenced by the consensus view. Moreover, when unrelated shocks in other firms distract analysts, they may have less time to engage in discussions or interactions with colleagues or market experts about the focal firm. This can result in more independent thinking, as they are not as exposed to the opinions and recommendations of their peers. As a result, we conjecture that when analysts who cover a particular firm are distracted by an event or shock at a different firm that is not related to the one they primarily cover, it can lead them to herd less.

Following Bourveau et al. (2022) and Dat Le and Trinh (2022), we measure analyst distraction using exogenous attention-grabbing events. Specifically, analysts shift attention from the focal firm to another covered firm in an unrelated industry if an extreme event takes place in that industry. Using the same measure, a growing body of literature has shown that distracted analysts are associated with less accurate forecasts and more earnings management (Bourveau et al., 2022; Basu et al., 2019; Dat Le and Trinh, 2022).

Our results show that distraction mitigates analysts' herding. This finding is robust to the exclusion of earnings announcements, reiterations, and other analysts' recommendations. It also continues to hold when considering regulation changes and using alternative measures of analyst distraction. Moreover, the mitigating effect of analysts' distraction on herding is more likely to appear when analysts evaluate less hard-to-value stocks. However, the effect of analyst distraction on herding becomes less pronounced when an analyst is repeatedly distracted. One concern is that analyst distraction can be endogenous, and, therefore, our results may be driven by omitted firm fundamental variables that affect both the recommendations and distractions of analysts. Our measure of analyst distraction mitigates this concern (Bourveau et al., 2022) because we use extreme industry returns to capture exogenous attention-grabbing factors that affect the coverage universe of the analyst.

Hong et al. (2000) and Clement and Tse (2005) find that inexperienced analysts are more likely to herd to the consensus since they are more likely to lose their jobs after providing inaccurate or bold forecasts. In addition to career concerns, analyst's self-assessed ability also contributes to herding (Scharfstein and Stein, 1990; Trueman, 1994). Since analysts' inability to develop and use specialized knowledge declines when they follow many firms or industries, herding among analysts increases with the number of companies and industries they follow (Clement and Tse, 2005). In line with this idea, we find that the mitigating effect of distraction on analysts' herding is more likely to appear for experienced analysts, and when they cover larger universes.

This study makes three contributions to the literature on analysts' herding. First, some studies have related investor attention to herding. Shleifer and Summers (1990), Nofsinger and Sias (1999) and Sias (2004) show that individual investors may herd when they receive similar messages and trade securities at the same time. This literature has shown that when investors pay a certain amount of attention to the same stock, they may easily make similar trading decisions. However, thus far no study has shed light on the relationship between the shocks to attention and analysts' herding. This study tries to fill this gap. Particularly, we find a mitigating effect of distraction on analysts' herding in stock recommendations. Second, Harford et al. (2019) show that analysts strategically allocate more efforts to firms that are relatively more important to their careers. Distinct from this study on the role of career concerns, we investigate the allocation of effort due to distraction on analysts' herding. Third, we contribute to the analyst herding literature by examining the firm characteristics and the analyst features that are more influenced by the exogenous attention-grabbing factors when revising recommendations.

One strand of the literature has examined the effect of investors' distraction on the co-movements in the stock returns of firms (Huang et al., 2019; Hu et al., 2021; Zhaunerchyk et al., 2020). In particular, Huang et al. (2019) and Zhaunerchyk et al. (2020) show that on days with distracting events, inventors shift their attention from firm-specific information to broader market-specific information, which leads to increased co-movements in stock returns. Ehrmann and Jansen (2022) find that investors who are distracted by FIFA World Cup soccer matches shift attention away from firm-specific and global news that leads to increased co-movements in the national market. Another strand shows the effect of investors' distraction on market underreaction. Hirshleifer et al. (2009) posit that this distraction leads to underreacting to the firm's earnings news. Pantzalis and Ucar (2014) show that religious holidays can distract investors and lead to delayed incorporation of firm information into security prices. Our study differs from these papers in two fundamental ways. First, this study focuses on the distraction of analysts instead of on that of investors. Second, we concentrate on herding instead of co-movements and underreactions.

In addition, some studies have examined the effect when professional managers or institutional investors stop focusing their attention on portfolio firms due to other exogenous attention-grabbing events. Schmidt (2019) shows that earnings announcements divert professional asset managers' attention from trading decisions on other stocks, which in turn hurts their performance. Kempf et al. (2017) show that firms with distracted shareholders are more likely to announce diversifying and value-destroying acquisitions, and their managers are less likely to be fired after their poor performance. Ni et al. (2020) and Flugum et al. (2021) find that due to weakened monitoring, institutional shareholders' distraction is positively related to the risk of a stock price crash. Our study differs from these studies since we focus on the distraction of analysts instead of that of professional managers or institutional investors.

Our study is also related to a strand of literature on analysts' limited attention. Dong and Heo (2014) show that analysts have limited attention when the region where they live experiences flu epidemics, also an exogenous factor. Driskill et al. (2020) find that analysts limit their attention to firms with rich information environments that present good business cases for the analysts and their brokerages when they face concurrent earnings announcements across their coverage universe on the same day. Han et al. (2020) show that under conditions of climate disaster, analysts strategically allocate their scarce attention to firms of greater importance. Bourveau et al. (2022) study the role of attention allocation and limited attention in a setting where analysts' distraction follows from an exogenous attention-grabbing surprise. We go a step further and investigate its effect on analysts' herding.

Our study closely relates to but is distinct from the studies that link analysts' distraction to forecast accuracy. For example, Driskill et al. (2020) find that the timeliness and quality of analysts' earnings forecasts decline significantly with the numbers of concurrent earnings announcements in their coverage portfolio. Bourveau et al. (2022) provide empirical evidence that distracted analysts have lower forecast accuracies and produce less informative revisions than non-distracted analysts. Dat Le and Trinh (2022) construct a firm-level measure of analysts' distraction based on exogenous attention-grabbing events and find that their distraction is positively associated with earnings management. Similarly, Liu, Chen, Wang, and Shi (2023) find that analysts' forecast quality declines when they are distracted by typhoon strikes. Hirshleifer et al. (2019) find that on days when analysts issue multiple forecasts, decision fatigue leads to a decrease in their forecast accuracy and an increase in reliance on heuristics in forecasting. Our study differs from these papers since we focus on analysts' herding instead of their forecast accuracy.

This study has the following structure: In Section 2, we review the literature and develop the hypotheses. We report the sample and summary statistics in Section 3 and report the empirical results in Section 4. Robust tests are presented in Section 5. We explore whether the mitigating effects vary between firm characteristics and analyst features Section 6. Section 7 has our conclusions.

2. Literature review and hypothesis development

Analysts herd when they give priority to their peers' opinions instead of their own beliefs or information. The literature contends that analysts herd due to information-driven and behavior-driven motives (Chiang and Lin, 2018; Li, 2019). Information-driven herding means that analysts may make similar recommendations when they have access to similar information (Froot et al., 1990; Hirshleifer et al., 1994; Zhou and Lai, 2009). Another strand of research attributes herding to a psychological bias, like the market-sentiment and the attention-grabbing effects (Barber et al., 2009; Merli and Roger, 2013; Li et al., 2017; Hsieh, Chan, and Wang, 2020). The attention-grabbing hypothesis posits that investors with limited sources of information may easily make similar trading decisions when they have paid a certain amount of attention to the same stock (Hsieh et al., 2020).

Consistent with this view, Hsieh et al. (2020) find that the investor's attention level for a particular firm is positively associated with the herding by retail investors.

When analysts divert their attention away from stocks unaffected by attention-grabbing factors, their recommendations are less likely to be due to public and similar information. Thus, analysts' herding may decrease as they may be more likely to engage in independent analysis, rely on diverse information sources, and avoid following the consensus view. Therefore, we formulate our key hypothesis:

Hypothesis 1: The tendency for analysts to herd in one stock is weaker when events at other firms distract them.

Initially, the first shock may have a significant impact because it is novel and unexpected. However, as the shocks continue, people may become accustomed to the changes, reducing the overall impact. Thus, the effect of their distraction on herding will decrease when the distraction occurs repeatedly. That is, the effect of distraction on analysts' herding is more pronounced the first time an analyst is distracted and disappears or becomes less pronounced when an analyst faces repeated distractions. Therefore, we formulate the second hypothesis:

Hypothesis 2: The effect of a distraction on analysts' herding becomes less pronounced when an analyst faces repeated distractions.

Analysts herd when they have doubts about the results of their own analysis, causing them to be attentive to recommendations made by their colleagues. The degree of difficulty in analyzing a particular firm can make analysts more sensitive to attention and makes them more prone to herding. Lin, Chen, and Chen (2011) show that this tendency toward herding in analysts' recommendations increases with the book-to-market ratio of the stock. Blasco et al. (2018) indicate that analysts are more likely to herd when faced with hard-to-value stocks. Taken together, we conjecture that if their distraction mitigates herding, its consequences are less likely to appear when analysts evaluate hard-to-value stocks.[1] According to these arguments, we propose our third hypothesis:

Hypothesis 3: The negative effect of distraction on analysts' herding is less likely to occur when they pay more attention to hard-to-value stocks.

Logically, when analysts cover more firms, their attention is more dispersed; therefore, attention to each stock they cover potentially becomes more sensitive to attention-grabbing shocks to other stocks. Put differently, the attention constraints become more binding, and we expect the effect of distraction on analysts' herding to be more pronounced for analysts who cover more firms. Therefore, we formulate the fourth hypothesis:

Hypothesis 4: The effect of distraction on analysts' herding is larger when they cover larger universes.

3. Data and methodology

3.1 Data

The sample in this study consists of all common stocks listed on the NYSE, Nasdaq, and AMEX exchanges from the database of the Center for Research in Security Prices (CRSP) and covered in Compustat. We use the detail file of the Institutional Brokers Estimate System (IBES) to capture the level of the analysts' distraction. IBES standardizes analysts' recommendations as follows: 1=strong buy, 2=buy, 3=hold, 4=sell, and 5=strong sell. For ease of interpretation, we reverse

[1] The assessment difficulty is most likely to be offered by small firms and high book-to-market values (Baker and Wurgler, 2006).

IBES's recommendation scores so that a more favorable recommendation receives a higher score (e.g., "1" corresponds to a Strong Sell and "5" to a Strong Buy). We exclude stock returns and market data that are not available from CRSP or accounting data that are not available through Compustat. We also exclude data without compete observations. Following Jegadeesh and Kim (2010), stocks must also satisfy the following criteria: (1) analysts' revisions of recommendations are available within 180 calendar days based on the data from IBES; (2) other than the revising analyst, at least two analysts issue recommendations for the stock within 180 days before the revision date (Jegadeesh and Kim, 2010). We exclude financial and utility firms from our sample. We obtain Fama–French 12-industry classifications from Kenneth French's website and assign each firm to 1 of the 12 Fama–French industries based on its SIC code. Because the data on IBES recommendations are available starting with 10/29/1993, our sample starts in 1994. After filtering, we have 242,427 observations for the period from 1994 to 2021.

3.2 Measure of analyst distraction

Kempf et al. (2017) use the extreme returns of stocks in unrelated industries of institutional shareholders' portfolios as a proxy for institutional investors' distraction. Motivated by Kempf et al. (2017), Bourveau et al. (2022), and Dat Le and Trinh (2022) construct a firm-level measure of analysts' distraction.[2] Our measure of analyst distraction is based on the assumption that a firm's analysts' attention declines if they experience a shock to their coverage that is unrelated to the focal firm (i.e., extreme positive or negative returns in industries unrelated to the firm). Because distractions occurring in other industries are by construction exogenous to the firm, firms within an industry have differential exposure because of variations in their investor base.

[2] Dat Le and Trinh (2022) rely on Kempf et al. (2017) and Renjie and Verwijmeren (2020), who focus on institutional investors and firm directors, respectively.

Simply put, suppose one of the stocks that an analyst covers belongs to an industry affected by extreme returns, then the analyst will shift attention away from the stocks in the unaffected industries and toward the attention-grabbing stock. For each stock under coverage, this measure captures the level to which attention-grabbing events, which are related to other stocks under coverage in a given month, distract the analyst. Specifically, for each analyst i who follows firm f in month t, we calculate an analyst-firm-level distraction score, $Distraction_{ift}$, as

$$Distraction_{ift} = \sum_{j \in B_{it\setminus\{f\}}} w_{ijt}^{f} \times 1(Ind_{jt} \neq Ind_{ft}) \times IS_{t}^{Ind_{jt}}, \quad (1)$$

where $B_{it\setminus\{f\}}$ denotes the set of firms other than focal firm f that analyst i follows in month t; $1(Ind_{jt} \neq Ind_{ft})$ indicates whether firm j is in the same Fama–French 12 industry as focal firm f, thereby representing only shocks from industries other than that of firm f; $IS_{t}^{Ind_{jt}}$ captures whether distracting events occur in the industry of firm j in month t. IS is a dummy variable that is equal to one if an industry has the highest or lowest return across all 12 Fama–French industries in a given month. In other words, the variable $IS_{t}^{Ind_{jt}}$ captures the occurrence of an attention-grabbing event in an industry other than Ind_{ft}.

To the extent that analysts pay more (less) attention to firms that are more (less) important than the focal firm, the weight w_{ijt}^{f} measures how much analyst i cares about firm j relative to the focal firm f. Bourveau et al. (2022) measure this variable as the number of firms in the analyst's portfolio belonging to an attention-grabbing industry divided by the total number of firms in the analyst's coverage universe during a given period.

One important advantage of our *Distraction* measure is that the industry shocks embedded in its computation do not mechanically relate to the fundamentals of the firm of interest since its own industry is excluded (Bourveau et al., 2022). Thus, *Distraction* is exogenous to the shocks that tend to distract the analysts (Driskill et al. 2020; Harford et al. 2019). We create an indicator variable that equals one if the distraction is the first significant event experienced by a particular analyst-firm-pair during the sample period. That is, we denote a dummy variable, *D_Distraction*, that equals one if *Distraction* is greater than or equal to 20%, and zero otherwise.

3.3 Method

To assess the role of distraction in analysts' herding, we adopt the market-based test of herding developed by Jegadeesh and Kim (2010). The advantage to this approach is that it uses the market's reactions to recommendations to detect herding. This detection allows us to isolate the effect of correlated private signals from herding. To examine the effect of analyst distraction on herding, we run the following regression:

$$Bhar_{i,j,t}(0,H) = \beta_0 + \beta_1 \times I_{Multi} + \beta_2 \times I_{Single} + \beta_3 \times Deviation_{i,j,t} + \beta_4 \times Distraction_{i,f,t} + \beta_5 \times Deviation_{i,j,t} \times Distraction_{i,f,t} + \sum \beta_i \times I \times Control_{i,t} + \varepsilon_{i,j,t} \quad (4)$$

where $\mathrm{Bhar}(0,H)$ is the H-day buy-and-hold abnormal returns and the announcement date is day zero. The definition is as follows:

$$Bhar_{ijt}(0,\mathrm{H}) = \prod_{\tau=0}^{\mathrm{H}}(1+R_{i,\tau}) - \prod_{\tau=0}^{\mathrm{H}}(1+R_{B,\tau}) \quad (5)$$

where $R_{i,\tau}$ is the returns on stock i and $R_{B,\tau}$ is the benchmark portfolio returns, which are calculated based on Daniel et al. (DGTW, 1997).[3] $Deviation_{i,j,t} = NewRec_{i,j,t} -$

[3] Daniel et al. (1997) form 125 reference portfolios according to size, industry-adjusted book-to-market ratio, and

$Consensus_{i,t}$; $Consensus_{i,t}$ is the consensus recommendation for stock i, which is computed as the average recommendation level of all analysts excluding current analyst j (Hong et al., 2000; Jegadeesh and Kim, 2010). The variable $NewRec_{i,j,t}$ denotes the recommendation level after the revision of stock i by analyst j on day t. We treat each revision as a separate observation if there are multiple revisions on any day t for stock i. The indicator I_{Multi} is either +1 if the revision is a multi-level upgrade (i.e., at least a two-level change) or −1 if the revision is a multi-level downgrade; I_{Single} is either +1 if the revision is a single-level upgrade (i.e., only a one- level change) or −1 if the revision is a single-level downgrade; I is an indicator variable that equals +1 if the revision is an upgrade and −1 if the revision is a downgrade. The main coefficient of interest is $Deviation_{i,j,t} \times Distraction_{i,f,t}$. A positive and significant coefficient would mean that analysts herd more when they are distracted by exogenous shocks. By contrast, a significantly negative coefficient would mean that analysts herd less when they are distracted by exogenous shocks.

In addition to the characteristics of recommendations, both the analyst's and the firm's characteristics are associated with the influence of recommendation revisions. Large firms tend to have higher levels of organizational complexity that makes covering them difficult for analysts (De Bondt and Forbes, 1999). De Bondt and Forbes (1999) also show that herding in analysts' recommendations increases with a firm's size. Lin et al. (2011) note that herding increases with the firm's size but decreases with the market-to-book ratio. Moreover, the firm's age and analyst coverage affect analysts' recommendations because they represent the amount of public information on the firm. Institutional investors are the main clients of analysts, thus they tend to have a timely response to institutional investors' requests for information, and this information demand increases with institutional ownership (Chiu et al., 2021). Some studies find that recommendation revisions are

momentum of stocks.

more informative for smaller firms (Stickel, 1995; Loh and Stulz, 2011) and are more influential for growth and firms with larger institutional ownership (Loh and Stulz, 2011). Therefore, we add size (Size, defined as the natural log of a firm's market capitalization at the end of the last calendar year), market-to-book ratio (MB, measured as of the end of the last calendar year), age (Firm age, defined as the year difference between the current year and the first year the firm appeared in the CRSP database), institutional ownership (Inst, shares owned by institutional investors divided by shares outstanding), turnover (Turn), and analyst coverage over the prior year (Coverage, measured as the number of analysts' recommendations for a firm) to control for cross-sectional differences in the revisions of recommendations (Chiang and Lin, 2019). Moreover, we also add the momentum effect (Ret6m, measured as the market-adjusted return over the month −6 to −2) to account for the momentum effect (Fama and French, 1992; Jegadeesh and Titman, 1993). Further, we also add the returns over the last month (Ret1m) to control for price reversal over the short term (Lehmann, 1990).

In terms of the analysts' characteristics, we control for analysts' experience and reputation characteristics since they influence the stock price's reaction to the forecast revisions (Cooper et al., 2001; Loh and Stulz, 2011). Analysts' general experience is measured by the number of years between the current year and the year the analyst first appears in the IBES recommendation database (Ana_Age). Analysts' firm-specific experience is measured by the number of years between the current year and the year that the analyst first covered the firm (Ana_Age_Firm). We use a dummy for the lead analysts to represent their reputation. We identify lead analysts based on Cooper et al. (2001). For each recommendation in IBES, we locate two adjacent recommendations issued by different analysts before and after the revision, respectively. We then calculate the number of days between these four adjacent recommendations: days_before1, days_before2, days_after1, and days_after2 are the four corresponding days. We define the leader-follower ratio or LFR statistic for analysts as follows:

$$LFR = \frac{\sum_{k-1}^{K}(days\_before1_{j,k} + days\_before2_{j,k})}{\sum_{k-1}^{K}(days\_after1_{j,k} + days\_after2_{j,k})}, \tag{6}$$

where k indexes each recommendation made by an analyst during the sample period. LFR ratios follow an F distribution with both degrees of freedom equal to 4K (Cooper et al., 2001). Like Jegadeesh and Kim (2010), we define all analysts with LFR ratios above the top 10 percentile of the F distribution as lead analysts. We define a dummy variable, D_Lead, that equals one if the analyst is the lead analyst, and zero otherwise.

Clement and Tse (2005) show that analysts who more frequently revise recommendations are less likely to herd. Accordingly, we define D_Freq as one if the number of recommendation revisions issued by a specific analyst for a given stock one year before the final recommendation is larger than the average number of revisions for that stock in that year. Because the effects of analysts' recommendations can vary across firms and with time, we control for firm-year fixed effects. We adopt Petersen's (2009) method that allows for serial correlation across firms to calculate the firm-clustered standard errors.

It is important to emphasize that when analysts revise their recommendations, whether they tend to follow the consensus or emphasize their divergent views, the subsequent price response does not solely hinge on the degree of the change. It also depends on whether the recommendation aligns closely with the consensus or deviates from it, as discussed by Jegadeesh and Kim (2010). When analysts conform to the consensus, stock prices increase with the degree of deviation from the consensus. That is, if analysts are motivated to herd close to the consensus when making recommendation revisions, the coefficient β_3 would be greater than zero. Conversely, if analysts are incentivized to exaggerate their differences from the consensus, β_3 would be less than zero. Furthermore, if analysts have a stronger inclination to herd close to the consensus when other events distract them from a given firm, the coefficient β_5 would be significantly larger than zero. Conversely, if their tendency to conform with the consensus diminishes when they are distracted, β_5 would be significantly smaller than zero.

4. Empirical results

Table 1 presents the summary statistics. The results show that the one-day buy-and-hold abnormal return following the revision date (*Bhar(0,1)*) is -0.281, and the average recommendation level (*NewRec*) is 3.621. The average deviation of new recommendations from the consensus recommendation (*Deviation*) is -0.030. *Distraction* is rare, as only 2.2% of an analyst-firm-month firms are exposed to attention-grabbing shocks (i.e., extreme monthly returns) in the unrelated Fama–French 12 industries. The average of the log market value (*Size*) is approximately $7.777 billion. The average market-to-book value (*MB*) is 4.445. The average age of a firm (*Firm age*) is 19.489 years. The average institutional ownership (*Inst*) is 61.292% and the average number of stock recommendations (*Coverage*) that a firm receives is 17.044. The standard deviation and the interquartile range show that there are large variations in the firm- and analyst-related variables.

Table 2 presents the Pearson correlation coefficients between the variables used in this study. The highest (second) correlation for the independent variables is between *Distraction* and *D_Distraction* (*NewRec* and *Deviation*) with a correlation of 0.89 (0.75). Since these two variables are not used in the same regression, there is no collinearity problem. The third highest correlation for the independent variables is between *Ana_Age* and *Ana_Age_Firm* with a correlation of 0.58, and the fourth one is between firm size (*Size*) and age (*Firm age*) with a correlation of 0.52.

[Insert Tables 1 and 2 here]

4.1 Analyst distraction and herding among analysts' stock recommendations

Table 3 presents the results of the two-day holding periods. Column 1 presents the results without controlling for firms' and analysts' characteristics. Column 2 presents the results for the firms' characteristics. Column 3 presents the results of the full specification. Column 4 presents the results of the full specification when using the distraction dummy (*D_Distraction*) for the analysis. The herding coefficients (*Deviation*) are significantly positive in all columns. This positive sign indicates that analysts herd close to the consensus when they revise their recommendations. This is consistent with Jegadeesh and Kim (2010) and Chiang and Lin (2019) who find that not only the direction of the recommendation revisions but also their distance from consensus conveys information to investors.

[Insert Table 3 here]

Our primary interest is the coefficient for *Deviation*× *Distraction*. The negative and significant coefficient indicates that analysts' distraction mitigates their propensity to herd close to the consensus recommendation. The analysis in Column 4 using the distraction dummy produces the same result. This result supports Hypothesis 1. That is, analysts are more reluctant to herd toward the consensus when attention-grabbing factors distract them. This result confirms information-driven herding and attention-grabbing herding.

Table 4 shows the results regarding whether the effect of distraction on analysts' herding differs for upgrades or downgrades. Down is a dummy variable that equals one for downgrades, and zero otherwise. We find that the herding coefficients for the downgrade dummy (*Deviation*×*Down*) are all significantly positive. This result is consistent with Jegadeesh and Kim (2010) and Chiang and Lin (2019) who find that analysts have more incentives to herd when downgrading a firm's recommendations. The reason may come from the possibility that analysts receive correlated negative information or have similar reputational concerns. Analysts have larger potential costs to issue a wrong downgrade than a wrong upgrade, since a wrong downgrade not only hurts the analyst's own reputation but can also causes them to lose information channels or potential underwriting business. Therefore, analysts have incentives to herd in order to "share the blame" (Scharfstein and Stein, 1990; Chiang and Lin, 2019) when issuing a downgrade recommendation.

The coefficient for *Deviation* is significantly positive, but the coefficients for both *Deviation*×*Distraction* and *Deviation*×*Down*×*Distraction* become insignificantly negative. This insignificance indicates that a distraction mitigates analysts' herding, and this effect is not stronger when downgrading.

[Insert Table 4 here]

4.2 Is the distraction effect limited to the month in which it occurs?

Our second additional analysis zooms in on the timing of the distraction event. Our measure of analyst distraction, by construction, enables us to identify the month during which analysts become distracted and shift their attention from one firm under coverage to another. The effects of analyst distraction should therefore be limited to the month during which extreme industry returns affect some of the analyst's portfolio firms. To explore this limitation, we augment our baseline regression by adding the first lead and lag of analyst distraction as explanatory variables. The results in Table 5 show that only the contemporaneous Deviation×Distraction variables obtain negative and significant coefficients in the specifications, while the coefficients for leading and lagging distractions are not significantly associated with herding. These findings support the view that the distraction effect on herding is limited to the month in which it occurs.

[Insert Table 5 here]

4.3 Do analysts learn?

To explore whether analysts learn from experience, we examine whether the effect of distraction on their herding is more pronounced the first time an event distracts them. To implement this test, we decompose *Distraction* into two components (*FirstDistraction* and *NotFirstDistraction*) that depend on whether the analyst-firm pair experiences distraction for the first time. We also create an indicator variable, *D_FirstDistraction*, that equals one if the distraction event is the first one experienced by a particular analyst-firm pair during the sample period, and zero otherwise. The dummy variable, *D_NotFirstDistraction*, equals one if the distraction event is not the first distraction event experienced by a particular analyst-firm pair during the sample period, and zero otherwise.

Table 6 presents our results. The coefficient for *Deviation* is significantly positive, but the coefficient for *Deviation*×*FirstDistraction* becomes significantly negative, and the coefficient for *Deviation*×*NotFirstDistraction* becomes insignificantly negative. The analyses in Columns 3 and 4 using the *D_FirstDistraction* and the *D_NotFirstDistraction* have the same result. These results show that the effect of distraction on the analysts' herding is stronger the first time the analyst experiences a distraction from a given stock. When that analyst gets distracted a second time (or more), the mitigation effect appears to decrease. This decrease supports Hypothesis 2.

[Insert Table 6 here]

4.4 Extending the holding periods

To investigate whether investors take a longer time to respond to analysts' herding and the mitigating effect of analyst distraction on their herding, Table 7 presents the results when extending the holding periods. The left part is the distraction results, and the right part is the distraction dummy results. For the sake of brevity, we use *Distraction* as a proxy for both parts. The herding coefficients should increase with the holding periods if the market does not fully reflect the herding among analysts in the short term but takes a longer time to recognize the herding effect. By contrast, the positive herding coefficient should decline over time if the market overreacts to analysts' herding. Similarly, the absolute value of the negative coefficient for *Deviation*×*Distraction* should increase (decline) with time if the market underreacts (overreacts) to the mitigating effect of distraction on analysts' herding.

The coefficients for *Deviation* are significantly positive for all periods and the coefficients increase with time. These coefficients indicate that investors take a long time to react to the herding among analysts' recommendations. In addition, the coefficients for *Deviation*×*Distraction* and *Deviation*×*D_Distraction* are significantly negative within one month after the recommendation but become insignificant afterwards. The absolute value of the negative coefficient for *Deviation*×*Distraction* (*Deviation*×*D_Distraction*) increases with time and reaches the highest in one month (one week) after the recommendation, and then decreases. This increase indicates that the market also takes time to reflect the mitigating effect from distraction on analysts' herding.

[Insert Table 7 here]

5. Robustness test

5.1 Excluding earnings announcements, other analysts' recommendations, and reiterations

Analysts can use common information regarding earnings, rather than herding toward the consensus. Therefore, we follow the approach of Jegadeesh and Kim (2010) and Chiang and Lin (2019) to conduct a robustness test. We exclude recommendations that have earnings forecasts by the same analyst within -5 to +5 trading days around the release of the recommendations. Panel A of Table 8 shows the regression results. For the sake of brevity, we only report the coefficients and t-statistics for *Deviation*, *Distraction*, and their interaction. The herding coefficients (*Deviation*) are still significant, the same as those in Table 3. However, the coefficient for *Deviation*×*Distraction* becomes insignificantly negative for all holding periods. These coefficients indicate that after excluding the possibility that analysts are confounded by the information in earnings forecasts, distraction also mitigates the analysts' herding. In Columns 3 and 4, we find similar results when using *D_Distraction* for the analysis.

[Insert Table 8 here]

Analysts can make similar recommendations due to having common information. To avoid this possibility, we re-run regression (4) and exclude the recommendations that different analysts make at least five days after the most recent recommendations. In Panel B of Table 8, we find that the herding (*Deviation*) coefficients remain significant at the 5% level, which is similar to those in Panel A. The coefficients for *Deviation*×*Distraction* and *Deviation*×*D_Distraction* are both significant for Bhar(0,1), Bhar(0,5), and Bhar(0,21) at the 5% confidence level. The coefficients for *Deviation*×*Distraction* are marginally significant for Bhar(0,42) and Bhar(0,63) at the 10% confidence level, but the coefficients for *Deviation*×*D_Distraction* are insignificant for Bhar(0,42) and Bhar(0,63). These results indicate that the market takes a long time to recognize that the analysts are herding but realize that a distraction can decrease their herding.

Further, we exclude the reiteration observations to test whether reiterations change the effects of distraction on analysts' herding. As reported in Panel C of Table 8, the coefficient for *Deviation* remains significantly positive for all periods and the coefficients for *Deviation*×*Distraction* and *Deviation*×*D_Distraction* remain negative and significant for Bhar(0,1), Bhar(0,5), and Bhar(0,21) at the 5% confidence level. Overall, our results are robust to reiterations of revisions.

5.2 Excluding effects due to investor sentiment and regulation amendments

Kaplanski and Levy (2010) argue that during periods of investors' heightened sentiment, analysts tend to provide less diverse recommendations. Corredor et al. (2013) find that investor sentiment influences analysts' optimistic bias when issuing recommendations, with higher sentiment leading to more optimistic consensus recommendations. Chiang and Lin (2019) find that analysts' herding toward a consensus increases with market sentiment. Hence, we further control for the effect of investor sentiment on analysts' herding to investigate whether their distraction still influences their herding after accounting for that sentiment. The results presented in Panel A of Table 9 show that regardless of the measurement period (one day, one week, one month, two months, or one quarter), the coefficient for *Deviation*×*Distraction* remains significantly negative even after controlling for investor sentiment.

Amendments to NASD Rule 2711 and NYSE Rule 472, enacted in May 2002, prevent investment bankers from pressuring analysts to provide optimistic recommendations. These two regulations mandate that sell-side analysts disclose the distribution of their security recommendations by category of buys, holds, and sells. In April 2003, the Global Analyst Research Settlement (GRAS) was enforced to address conflicts of interest between the investment banking and analysis departments in relation to optimistic recommendations. These changes induced analysts to redistribute many recommendations that thereby significantly increased downgrades. To ensure our results are robust to the GRAS, we follow Lin (2018) and exclude the years from 2002 to 2004 from our study. The results in Panel B of Table 9 show that the main results remain unchanged.

[Insert Table 9 here]

5.3 Alternative measures of distraction

In this subsection, we examine the robustness of our key findings by using four alternative measures of analyst distraction. First, we introduce an alternative value-weighted measure of analyst distraction, that is denoted as "*Distraction_VW*", which accounts for the career concerns of analysts. This measure follows the framework proposed by Harford et al. (2019). Those scholars argue that analysts strategically allocate their efforts among portfolio firms and that they focus more on firms with greater career significance, such as larger firms. Our analysis is repeated using a market capitalization-weighted measure of investors' distraction. The results in Panel A of Table 10 show that the results follow similar qualitative patterns.

Second, to ensure the robustness of our findings concerning the industry classification used to measure distraction, we re-evaluate our results using the Fama–French 17 industry classifications ("*Distraction_Ind17*"). The results in Panel B of Table 10 show that our results hold under the new classification system.

Third, we investigate whether the results are influenced by the direction of extreme returns. Specifically, we define analyst distraction separately for positive and negative extreme returns. Panel C of Table 10 shows that both of the coefficients for *Deviation*×*Distraction_Positive* and

Deviation×*Distraction_Negative* are significantly negative. These findings indicate that our results hold for both measures. That is, our results are insensitive to the sign of the extreme returns.

Fourth, to address the concern that certain industries may be more susceptible to extreme returns than others, we develop a measure of analyst distraction known as "*Distraction_IERPW*". This measure is weighted by the inverse likelihood of an industry experiencing extreme returns, as extreme returns in less volatile industries may divert analysts' attention to a greater extent than those in more turbulent industries. We use historical data to look for patterns that might indicate the likelihood of extreme returns in the future. Panel D of Table 10 shows that *Deviation_IERPW* has a significant and positive coefficient, and the coefficient for *Deviation*×*Distraction_IERPW* becomes insignificant, which indicates that our results remain consistent when using this measure.

[Insert Table 10 here]

6. Firm characteristics and analyst features

6.1 Firm characteristics, analysts' distraction, and herding

Analysts' herding is related to firm characteristics. In particular, analysts generally prefer to recommend stocks with positive momentum, high growth, and high volume (Jegadeesh et al., 2004). Lin et al. (2011) find that herding in analysts' recommendations is positive for firm size and negatively related to the market-to-book ratio. Hsieh et al. (2020) suggest that the degree of attention to a particular stock is positively related to the herding of retail investors. Furthermore, small stocks generate more insensitive herding. Kumar (2009) find that investors have stronger behavioral biases when stocks are harder to value. Therefore, we postulate that the effects of analysts' distraction on their herding will vary with firms' characteristics. To address this issue, we first divide the sample into three groups per year based on the firm's characteristics like size, age, market-to-book, and analyst coverage, respectively. We then re-run the regression (4) for each subsample.

Table 11 presents the results of the regression for both high and low groups for each characteristic. For the sake of brevity, we only report the coefficients and t-statistics for *Deviation*, *Distraction*, and their interaction. Overall, the results indicate that analysts herd regardless of the firm's characteristics.

[Insert Table 11 here]

However, the effects of distraction on analysts' herding are related to firms' characteristics. The results in Table 11 show that the coefficients for *Deviation*×*Distraction* are significantly negative regardless of the size and the market-to-book ratio; the coefficients for *Deviation*×*Distraction* are significantly negative for old firms and for firms with high analyst coverage, but insignificantly negative for young firms and for firms with low analyst coverage. This result indicates that the effect of distraction on analysts' herding is stronger for less hard-to-value stocks, like old firms and firms with high analyst coverage. These firms are more visible and thus more familiar to market participants and therefore attract more attention than young firms and firms with low analyst coverage. Wang and Zhang (2009) show that analysts tend to cover firms with more information transparency. Hong et al. (2000) posit that firm-specific information travels more slowly to the public for firms with lower coverage. Therefore, the effect of distraction on analysts' herding for old firms and firms with high analyst coverage is stronger than that of young firms and firms with low analyst coverage. This result supports Hypothesis 3.

6.2 Analyst characteristics, analyst distraction, and herding

The literature shows that analysts' herding is related to their characteristics. Clement and Tse (2005) and Lin (2018) show that analysts who revise their recommendations more frequently are less likely to herd because they want to convey their own ability to collect information. Hong et al. (2000) posit that inexperienced analysts are more likely to be fired if they issue a wrong recommendation, therefore they are more likely to herd. Table 12 presents the results of regressions for both high and low groups of analysts' characteristics: analyst coverage universe, general experience, and firm-specific experience.

Table 12 presents the estimates with respect to the analysts' characteristics. The results indicate that the herding coefficient for *Deviation* is significantly positive regardless of analyst characteristics. However, the herding coefficient for *Deviation*×*Distraction* is significantly negative for analysts with a larger coverage universe, general experience, and firm-specific experience, but insignificantly negative for analysts with a smaller coverage universe, less general experience, and less firm-specific experience. This finding shows that analysts who cover more firms and are more experienced are less likely to herd when exogenous factors attract their attention because they want to convey their own ability to collect information. This finding supports Hypothesis 4.

[Insert Table 12 here]

7. Conclusion

The literature has shown that analysts have tendency to report recommendations similar to those previously released by other analysts; that is, they herd (Jegadeesh and Kim, 2010). Investor attention is one of the explanations for herding among analysts (Barber et al., 2009; Hsieh et al., 2020). This study goes further to show that the herding of analysts' recommendations could be mitigated by their distraction. Our results hold after excluding earnings announcements, other analysts' recommendations, and reiterations. Similarly, our results also remain when excluding the effects of regulation changes and using alternative measures of analyst distraction. Our results also show that the effect of distraction on the analysts' herding is stronger the first time the analyst experiences the distraction from a given stock. When other events repeatedly distract analysts, the mitigation effect decreases.

Moreover, the market does not completely reflect the mitigating effect from distraction on analysts' herding in the short term but takes longer to incorporate it. Furthermore, the effects of distraction on analysts' herding among their recommendations mainly occur for less hard-to-value stocks, like old firms and firms with high analyst coverage. This phenomenon is also more prevalent for analysts who cover more firms and are more experienced.

Appendix A: Definitions of Variables

This appendix shows the definitions of all variables used in this study. Accounting data are from Compustat, stock return data are from CRSP, analyst recommendation data are from IBES, and institutional ownership data are from Thomson 13F.

Variables	Definition
Bhar(0, H)	The H-day buy-and-hold abnormal return following the revision date t=0
NewRec	The revised individual recommendation on date 0
Deviation	*Deviation=NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation that is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations.
Distraction	Percentage of an analyst-firm-month portfolio exposed to firms experiencing attention-grabbing shocks (i.e., extreme monthly returns) in the unrelated Fama–French 12 industries: an industry experiences an extreme return if it achieves the highest or the lowest return across all 12 Fama–French industries in a given month.
D_Distraction	A dummy variable that equals one if *Distraction* is greater than or equal to 20%, and zero otherwise
FirstDistraction	First distraction event that is a dummy variable that equals one if it is the first time that an analyst experiences a significant distraction shock on a specific firm, and zero otherwise
NotFirstDistraction	Not first distraction event that is a dummy variable that equals one if it is not the first time that an analyst experiences a significant distraction shock on a specific firm, and zero otherwise
D_First Distraction	A dummy variable that equals one if the distraction event is the first one experienced by a particular analyst-firm pair during the sample period, and zero otherwise.
D_NotFirstDistraction	A dummy variable that equals one if the distraction event is not the first one experienced by a particular analyst-firm pair during the sample period, and zero otherwise.
Distraction_Positive	Percentage of an analyst-firm-month portfolio exposed to firms experiencing extreme and positive monthly returns in the unrelated Fama–French 12 industries
Distraction_Negative	Percentage of an analyst-firm-month portfolio exposed to firms experiencing extreme and negative monthly returns in the unrelated Fama–French 12 industries
Distraction_IERPW	Analyst distraction which is weighted by the inverse of the probability that an industry will experience extreme returns

To be continued

Appendix Continuing

Variable	Definition
I_{multi}	A dummy variable that equals one for multilevel upgrades and zero for downgrades
I_{single}	A dummy variable that equals one for one-level upgrades and zero for downgrades.
I	A dummy variable that equals one for upgrades and zero for downgrades.
Down	A dummy variable that equals one for downgrades, and zero otherwise.
Size	The natural logarithm of market capitalization.
MB	The ratio of market value of equity to book value of equity.
Firmage	The number of years since the firm was first covered by CRSP.
Inst	The institutional ownership.
Turn	Turnover ratio that is the trading volume over the numbers of shares outstanding.
Coverage	The number of analyst coverage
Ret1m	Return in the previous month.
Ret6m	The cumulative returns from month -6 to -2 before recommendation revision date t.
Ana_Age	The numbers of years that the analyst is in the IBES database.
Ana_Age_Firm	The number of years between the current year and the year that the analyst first covered the firm
D_Lead	A dummy that equals one if the analyst is the lead analyst, and zero otherwise
D_Freq	A dummy variable that equals one if the number of recommendation revisions issued by a given analyst for a given stock is greater than the average number of revisions for that stock in that year.

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Table 1 Summary statistics

This table presents the summary statistics for the all sample. *Bhar(0,1)* is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation=NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. *D_Distraction* is a dummy variable, which is one if *Distraction* is greater than or equal to 20%, and zero otherwise. *Size* is the natural logarithm of market capitalization, denoted in billion dollars. Firmage is defined as the year difference between current year and the first year the firm appeared in the CRSP database. *MB* is market-to-book ratio. *Inst* is the institutional ownership. *Turn* is the trading volume over the numbers of shares outstanding. *Coverage* is the number of analyst coverage. *Ret1m* is the cumulative returns from month -1 to recommendation revision date t. *Ret6m* is the cumulative returns from month -6 to -2 before recommendation revision date t. *Ana_Age* is the numbers of year that the analyst is on the IBES database. *Ana_Age_Firm* is the number of years between the current year and the year the analyst first covered the firm. *D_Lead* is the dummy being one if the analyst is the lead analysts, and zero otherwise. *D_Freq* equals one if the number of recommendation revisions issued by a given analyst for a given stock is greater than the average number of revisions for that stock in that year.

Variables	N	Mean	Stddev	Q1	Median	Q3
Bhar(0,1)(%)	242427	-0.281	7.859	-2.223	-0.061	2.102
NewRec	242427	3.621	0.942	3.000	4.000	4.000
Deviation	242427	-0.030	1.052	-0.750	0.000	0.667
Distraction	242427	0.022	0.090	0.000	0.000	0.000
D_Distraction	242427	0.047	0.212	0.000	0.000	0.000
Size	242427	7.777	1.858	6.467	7.715	9.062
MB	242427	4.445	50.648	1.233	1.894	3.331
Firmage	242427	19.489	20.355	4.000	12.000	27.000
Inst(%)	242427	61.292	29.699	42.658	67.975	84.964
Turn	242427	2.607	5.523	0.920	1.716	3.148
Coverage	242427	17.044	69.240	0.000	8.000	18.000
Ret1m(%)	242427	0.013	0.160	-0.058	0.009	0.076
Ret6m(%)	242427	0.085	0.462	-0.127	0.046	0.226
Ana_Age	242427	5.137	5.293	1.000	4.000	8.000
Ana_Age_Firm	242427	1.885	3.213	0.000	0.000	3.000
D_Lead	242427	0.013	0.112	0.000	0.000	0.000
D_Freq	242427	0.008	0.088	0.000	0.000	0.000

Table 2 Pearson correlation

This table shows the Pearson correlation coefficient between all variables. All variables are as defined in Table 2. Correlation coefficients in bold indicate that they are statistically significant at least 5 percent level, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Bhar(0,1)(1)	1.00															
NewRec(2)	**0.19**	1.00														
Deviation(3)	**0.17**	**0.75**	1.00													
Distraction(4)	0.00	**0.01**	**0.00**	1.00												
D_Distraction(5)	0.00	**0.01**	0.00	**0.89**	1.00											
Size(6)	**0.02**	**-0.03**	**0.01**	**-0.02**	**-0.02**	1.00										
MB(7)	0.00	**0.02**	0.00	**0.01**	**0.01**	**0.01**	1.00									
Firmage(8)	**0.02**	**-0.07**	**0.01**	0.00	0.00	**0.52**	**-0.04**	1.00								
Inst(%)(9)	**-0.01**	**-0.02**	**0.01**	**-0.03**	**-0.03**	**0.25**	**-0.04**	**0.19**	1.00							
Turn(10)	**-0.02**	**-0.02**	0.00	**-0.01**	**-0.01**	**-0.03**	**0.01**	**-0.10**	**0.05**	1.00						
Coverage(11)	0.00	**-0.02**	0.00	**-0.01**	**-0.01**	**0.10**	**-0.01**	**0.02**	**0.02**	**0.03**	1.00					
Ret1m(%)(12)	**0.03**	**0.03**	**-0.01**	**-0.01**	**-0.01**	**0.04**	**0.02**	**-0.01**	**0.00**	**0.03**	**-0.01**	1.00				
Ret6m(%)(13)	**0.04**	**0.09**	**0.01**	**-0.01**	**0.00**	**0.06**	**0.05**	**-0.03**	**0.01**	**0.07**	**-0.02**	**0.42**	1.00			
Ana_Age(14)	**0.01**	**-0.07**	**0.01**	**-0.03**	**-0.03**	**0.18**	**-0.01**	**0.11**	**0.08**	**0.02**	**0.01**	0.00	**-0.01**	1.00		
Ana_Age_Firm(15)	**0.01**	**-0.06**	**0.01**	**-0.01**	**-0.02**	**0.22**	**-0.02**	**0.24**	**0.14**	**-0.01**	**0.04**	0.00	**-0.02**	**0.58**	1.00	
D_Lead(16)	0.00	**0.01**	**0.01**	**-0.01**	**-0.01**	**-0.01**	0.00	**-0.03**	**-0.01**	**0.01**	**0.00**	0.00	**0.01**	**-0.06**	**-0.04**	1.00
D_Freq(17)	**-0.02**	**-0.01**	**-0.01**	**0.00**	0.00	**-0.01**	0.00	**-0.01**	0.00	**0.01**	**0.01**	**-0.01**	**-0.01**	**-0.01**	0.00	0.00

Table 3 Analyst distraction and herding

Bhar(0,1) is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation=NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. *D_Distraction* is a dummy variable, which is one if *Distraction* is greater than or equal to 20%, and zero otherwise. I_{Multi} equals one for multilevel upgrades and zero for downgrades. I_{Single} equals one for one-level upgrades and zero for downgrades. I equals one for upgrades and zero for downgrades. Other variables are defined in Appendix A. All control variables are lagged one year relative to the dependent variable. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Variables	*Bhar(0,1)*	*Bhar(0,1)*	*Bhar(0,1)*	*Bhar(0,1)*
Intercept	-0.107	-0.339	-0.312	-0.311
	(-0.57)	(-1.28)	(-1.15)	(-1.14)
I_{Multi}	0.227***	0.230***	0.233***	0.233***
	(3.96)	(3.10)	(3.14)	(3.14)
I_{Single}	0.696***	0.649***	0.649***	0.649***
	(7.53)	(5.26)	(5.25)	(5.26)
Deviation	1.240***	1.248***	1.248***	1.245***
	(76.72)	(65.64)	(65.46)	(66.42)
Distraction	0.056	0.327	0.347*	
	(0.34)	(1.59)	(1.69)	
Deviation×Distraction	-0.645***	-0.802***	-0.799***	
	(-3.64)	(-3.28)	(-3.26)	
D_Distraction				0.089
				(1.09)
Deviation×D_Distraction				-0.311***
				(-3.53)
I × Size		0.055***	0.055***	0.055***
		(3.54)	(3.58)	(3.59)
I × MB		0.001	0.001	0.001
		(1.57)	(1.57)	(1.56)
I × Firmage		0.003***	0.003***	0.003***
		(2.94)	(3.13)	(3.12)
I × Inst		-0.004***	-0.004***	-0.004***
		(-4.59)	(-4.55)	(-4.55)
I × Turn		-0.034***	-0.034***	-0.034***
		(-4.53)	(-4.59)	(-4.58)
I × Log(Coverage)		-0.114***	-0.112***	-0.112***
		(-4.68)	(-4.62)	(-4.61)
I × Ret1m		0.920***	0.921***	0.920***
		(5.09)	(5.10)	(5.10)
I × Ret6m		0.444***	0.443***	0.443***
		(7.01)	(7.00)	(6.99)
I × Ana_Age			-0.008	-0.008
			(-1.49)	(-1.48)
I × Ana_Age_Firm		-0.004	-0.004	
		(-0.67)	(-0.67)	
I ×D_Lead			0.141*	0.141*
			(1.86)	(1.86)
I ×D_Freq			0.000	0.000
			(0.51)	(0.50)
Year-fixed	Yes	Yes	Yes	Yes
Firm-fixed	Yes	Yes	Yes	Yes
Analyst-fixed	Yes	Yes	Yes	Yes
N	242427	242427	242427	242427
Adj. R^2	0.032	0.038	0.038	0.038

Table 4 Does the effect of analyst distraction on herding differ with upgrade or downgrades?
Bhar(0,1) is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation=NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. *D_Distraction* is a dummy variable, which is one if *Distraction* is greater than or equal to 20%, and zero otherwise. I_{Multi} equals one for multilevel upgrades and zero for downgrades. I_{Single} equals one for one-level upgrades and zero for downgrades. *Down* is a dummy variable, which equals one for downgrades and zero for otherwise. Other variables are defined in Appendix A. All control variables are lagged one year relative to the dependent variable. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Variables	Bhar(0,1)	Bhar(0,1)	Bhar(0,1)	Bhar(0,1)
Intercept	-0.007	-0.216	-0.005	-0.216
	(-0.04)	(-0.79)	(-0.03)	(-0.79)
I_{Multi}	0.328***	0.332***	0.328***	0.332***
	(5.22)	(4.08)	(5.21)	(4.08)
I_{Single}	0.764***	0.717***	0.763***	0.717***
	(8.11)	(5.71)	(8.10)	(5.71)
Deviation	0.839***	0.842***	0.845***	0.849***
	(10.69)	(8.06)	(10.81)	(8.16)
Deviation×Down	0.415***	0.418***	0.405***	0.407***
	(5.16)	(3.94)	(5.07)	(3.85)
Distraction	0.049	0.337		
	(0.30)	(1.63)		
Deviation×Distraction	-0.250	-0.159		
	(-0.35)	(-0.15)		
Deviation×Down×Distraction	-0.407	-0.660		
	(-0.56)	(-0.60)		
D_Distraction			-0.031	0.087
			(-0.46)	(1.06)
Deviation×D_Distraction			-0.224	-0.206
			(-0.77)	(-0.52)
Deviation×Down×D_Distraction			-0.005	-0.106
			(-0.02)	(-0.26)
Controls	No	Yes	No	Yes
Year-fixed	Yes	Yes	Yes	Yes
Firm-fixed	Yes	Yes	Yes	Yes
Analyst-fixed	Yes	Yes	Yes	Yes
N	242427	242427	242427	242427
Adj R^2	0.032	0.038	0.032	0.038

Table 5 Timing of the effect of analyst distraction on herding

Bhar(0,1) is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation*=*NewRec*-*Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. *D_Distraction* is a dummy variable, which is one if *Distraction* is greater than or equal to 20%, and zero otherwise. I_{Multi} equals one for multilevel upgrades and zero for downgrades. I_{Single} equals one for one-level upgrades and zero for downgrades. LeadDistraction and LagDistraction are the first lead and lag, respectively, of analyst distraction. D_LeadDistraction (D_LagDistraction) is a dummy variable, which is one if LeadDistraction (LagDistraction) is greater than or equal to 20%, and zero otherwise. Other variables are defined in Appendix A. All control variables are lagged one year relative to the dependent variable. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Variables	Bhar(0,1)	Bhar(0,1)	Bhar(0,1)	Bhar(0,1)
Intercept	-0.110	-0.318	-0.107	-0.314
	(-0.58)	(-1.17)	(-0.57)	(-1.15)
I_{Multi}	0.227***	0.233***	0.227***	0.233***
	(3.96)	(3.14)	(3.96)	(3.14)
I_{Single}	0.695***	0.648***	0.696***	0.650***
	(7.52)	(5.24)	(7.53)	(5.27)
Deviation	1.239***	1.249***	1.238***	1.249***
	(76.13)	(65.20)	(76.32)	(65.76)
Distraction	0.044	0.315		
	(0.27)	(1.53)		
LeadDistraction	-0.046	0.085		
	(-0.46)	(0.75)		
LagDistraction	0.152*	0.172*		
	(1.84)	(1.88)		
Deviation×Distraction	-0.654***	-0.787***		
	(-3.66)	(-3.20)		
Deviation×LeadDistraction	0.062	0.089		
	(0.86)	(1.27)		
Deviation×LagDistraction	-0.004	-0.137		
	(-0.04)	(-1.26)		
D_Distraction			-0.041	0.069
			(-0.60)	(0.82)
D_ LeadDistraction			-0.113	-0.043
			(-1.14)	(-0.35)
D_ LagDistraction			0.208**	0.204*
			(2.24)	(1.88)
Deviation×D_Distraction			-0.224***	-0.284***
			(-3.18)	(-3.11)
Deviation×D_LeadDistraction			0.024	0.008
			(0.26)	(0.07)
Deviation×D_LagDistraction			-0.075	-0.173
			(-0.87)	(-1.64)
Controls	No	Yes	No	Yes
Year-fixed	Yes	Yes	Yes	Yes
Firm-fixed	Yes	Yes	Yes	Yes
Analyst-fixed	Yes	Yes	Yes	Yes
N	242427	242427	242427	242427
Adj R^2	0.032	0.038	0.032	0.038

Table 6 Do analysts learn from experience?

Bhar(0,1) is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation*=*NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. *D_Distraction* is a dummy variable, which is one if *Distraction* is greater than or equal to 20%, and zero otherwise. I_{Multi} equals one for multilevel upgrades and zero for downgrades. I_{Single} equals one for one-level upgrades and zero for downgrades. *FirstDistraction (NotFirstDistraction)* is refer to as the analyst-firm pair experiencing distraction for (not) the first time. *D_FirstDistraction (D_NotFirstDistraction)* equals one if the distraction event is (not) the first distraction event experienced by a particular analyst-firm pair during the sample period, and 0 otherwise. Other variables are defined in Appendix A. All control variables are lagged one year relative to the dependent variable. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

variable	Bhar(0,1)	Bhar(0,1)	Bhar(0,1)	Bhar(0,1)
Intercept	-0.108	-0.311	-0.108	-0.312
	(-0.58)	(-1.14)	(-0.57)	(-1.15)
I_{Multi}	0.228***	0.234***	0.227***	0.234***
	(3.97)	(3.15)	(3.96)	(3.15)
I_{Single}	0.697***	0.649***	0.697***	0.650***
	(7.53)	(5.26)	(7.54)	(5.27)
Deviation	1.240***	1.248***	1.237***	1.245***
	(76.82)	(65.62)	(77.45)	(66.42)
FirstDistraction	0.102	0.345		
	(0.44)	(1.16)		
NotFirstDistraction	0.052	0.370		
	(0.24)	(1.39)		
Deviation×FirstDistraction	-1.326***	-1.601***		
	(-5.43)	(-4.72)		
Deviation×NotFirstDistraction	-0.220	-0.356		
	(-0.96)	(-1.16)		
D_FirstDistraction			0.061	0.129
			(0.64)	(1.06)
D_NotFirstDistraction			-0.091	0.073
			(-1.01)	(0.69)
Deviation× *D*_FirstDistraction			-0.527***	-0.637***
			(-5.09)	(-4.50)
Deviation×D_NotFirstDistraction			-0.038	-0.120
			(-0.43)	(-1.09)
Controls	No	Yes	No	Yes
Year-fixed	Yes	Yes	Yes	Yes
Firm-fixed	Yes	Yes	Yes	Yes
Analyst-fixed	Yes	Yes	Yes	Yes
N	242427	242427	242427	242427
Adj R^2	0.032	0.038	0.032	0.038

Table 7 Analyst distraction and herding over different holding periods

Bhar(0,1) is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation=NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. *D_Distraction* is a dummy variable, which is one if *Distraction* is greater than or equal to 20%, and zero otherwise. I_{Multi} equals one for multilevel upgrades and zero for downgrades. I_{Single} equals one for one-level upgrades and zero for downgrades. Other variables are defined in Appendix A. All control variables are lagged one year relative to the dependent variable. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Variables	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)
Intercept	-0.312	-0.567*	-1.518***	-3.229***	-4.347***	-0.311	-0.565*	-1.513***	-3.224***	-4.349***
	(-1.15)	(-1.71)	(-3.10)	(-4.67)	(-5.15)	(-1.14)	(-1.71)	(-3.09)	(-4.66)	(-5.15)
I_{Multi}	0.233***	0.165*	-0.077	-0.256	-0.651**	0.233***	0.165*	-0.077	-0.256	-0.651**
	(3.14)	(1.71)	(-0.46)	(-1.07)	(-2.19)	(3.14)	(1.71)	(-0.46)	(-1.07)	(-2.19)
I_{Single}	0.649***	0.826***	0.740***	0.133	-0.808*	0.649***	0.826***	0.740***	0.134	-0.808*
	(5.25)	(5.32)	(3.05)	(0.40)	(-1.86)	(5.26)	(5.32)	(3.05)	(0.40)	(-1.86)
Deviation	1.248***	1.354***	1.521***	1.583***	1.710***	1.245***	1.351***	1.518***	1.579***	1.708***
	(65.46)	(56.81)	(42.95)	(32.94)	(28.61)	(66.42)	(57.55)	(43.22)	(33.16)	(28.81)
Distraction	0.347*	0.386	0.420	-0.055	-0.513					
	(1.69)	(1.44)	(0.96)	(-0.08)	(-0.72)					
Deviation× Distraction	-0.799***	-0.874***	-0.918**	-0.839	-0.807					
	(-3.26)	(-2.90)	(-2.20)	(-1.45)	(-1.22)					
D_Distraction						0.089	0.087	0.042	-0.166	-0.200
						(1.09)	(0.81)	(0.24)	(-0.65)	(-0.69)
Deviation×D_Distraction						-0.311***	-0.356***	-0.354**	-0.319	-0.345
						(-3.53)	(-3.19)	(-2.14)	(-1.37)	(-1.27)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Analyst-fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	154466	154466	154466	154466	154466	154466	154466	154466	154466	154466
Adj. R^2	0.038	0.027	0.020	0.016	0.017	0.038	0.027	0.020	0.016	0.017

Table 8 Robust tests

Bhar(0,1) is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation=NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. *D_Distraction* is a dummy variable, which is one if *Distraction* is greater than or equal to 20%, and zero otherwise. Panel A excludes all recommendations that have earnings forecasts by the same analyst within -5 to +5 trading days of issuing recommendations. Panel B includes recommendations that different analysts made at least five days after the most recent recommendations. Panel C includes reiterations. Variables are as defined in Appendix A. All control variables are lagged one year relative to the dependent variable. Statistical significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

Variables	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)
			Distraction					D_Distraction		
Panel A: Excluding earnings announcements										
Deviation	0.802***	0.900***	1.045***	1.008***	1.154***	0.802***	0.901***	1.047***	1.011***	1.153***
	(17.40)	(15.17)	(11.31)	(7.40)	(6.96)	(17.60)	(15.36)	(11.44)	(7.48)	(7.00)
Distraction	-0.110	-0.040	0.767	1.104	2.045	-0.122	-0.114	0.366	0.313	0.770
	(-0.29)	(-0.07)	(0.69)	(0.71)	(1.13)	(-0.78)	(-0.48)	(0.86)	(0.50)	(1.05)
Deviation× Distraction	-0.097	-0.143	-0.563	-1.389	-1.164	-0.058	-0.093	-0.305	-0.733	-0.554
	(-0.26)	(-0.23)	(-0.55)	(-0.96)	(-0.72)	(-0.39)	(-0.38)	(-0.80)	(-1.21)	(-0.79)
N	21760	21760	21760	21760	21760	21760	21760	21760	21760	21760
Adj. R^2	0.021	0.018	0.014	0.011	0.013	0.021	0.018	0.014	0.011	0.013
Panel B: Excluding recommendations by other analysts										
Deviation	1.045***	1.147***	1.321***	1.389***	1.509***	1.041***	1.142***	1.313***	1.381***	1.504***
	(54.30)	(45.80)	(33.20)	(25.50)	(22.18)	(54.57)	(45.95)	(33.26)	(25.54)	(22.26)
Distraction	0.189	0.187	0.419	-0.485	-0.875	0.050	0.018	0.126	-0.272	-0.258
	(0.83)	(0.62)	(0.81)	(-0.59)	(-1.04)	(0.57)	(0.15)	(0.63)	(-0.90)	(-0.76)
Deviation× Distraction	-0.811***	-1.027***	-1.210**	-1.181*	-1.286*	-0.298***	-0.368***	-0.407**	-0.384	-0.483
	(-3.92)	(-3.66)	(-2.57)	(-1.81)	(-1.75)	(-3.53)	(-3.22)	(-2.21)	(-1.46)	(-1.55)
N	112157	112157	112157	112157	112157	112157	112157	112157	112157	112157
Adj. R^2	0.032	0.022	0.015	0.014	0.016	0.032	0.022	0.015	0.014	0.016

To be continued

Table 8 Continuing

Variables	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)
			Distraction					D_Distraction		
Panel C: Excludes reiterations										
Deviation	1.250***	1.356***	1.527***	1.579***	1.704***	1.247***	1.353***	1.523***	1.574***	1.574***
	(65.04)	(56.49)	(42.88)	(32.67)	(28.36)	(65.99)	(57.23)	(43.14)	(32.88)	(32.88)
Distraction	0.364*	0.436	0.521	0.046	-0.466	0.101	0.110	0.090	-0.113	-0.113
	(1.77)	(1.62)	(1.18)	(0.07)	(-0.65)	(1.24)	(1.02)	(0.52)	(-0.44)	(-0.44)
Deviation× Distraction	-0.817***	-0.888***	-0.976**	-0.858	-0.961	-0.318***	-0.361***	-0.375**	-0.311	-0.311
	(-3.32)	(-2.92)	(-2.31)	(-1.47)	(-1.44)	(-3.59)	(-3.21)	(-2.25)	(-1.33)	(-1.33)
N	152615	152615	152615	152615	152615	152615	152615	152615	152615	152615
Adj. R^2	0.038	0.028	0.020	0.016	0.017	0.038	0.028	0.020	0.016	0.016

Table 9 Robust test: Controlling for sentiment and excluding the periods of 2002-2004

This table makes robust tests by employing four alternative measures of analyst distraction. Panel A controls for investor sentiment and Panel B excludes the periods of 2002-2004. *Bhar(0,1)* is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation*=*NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. *D_Distraction* is a dummy variable, which is one if *Distraction* is greater than or equal to 20%, and zero otherwise. Other variables are defined in Appendix A. All control variables are lagged one year relative to the dependent variable. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Variables	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)
Panel A: Controlling for investor sentiment										
Deviation	1.245***	1.345***	1.502***	1.692***	1.245***	1.242***	1.343***	1.498***	1.563***	1.690***
	(65.28)	(56.60)	(42.57)	(28.48)	(65.28)	(66.18)	(57.30)	(42.81)	(32.72)	(28.65)
Distraction	0.394**	0.396	0.470	-0.263	0.394**	0.103	0.090	0.060	-0.132	-0.138
	(2.01)	(1.54)	(1.10)	(-0.38)	(2.01)	(1.28)	(0.85)	(0.35)	(-0.53)	(-0.48)
Deviation× Distraction	-0.901***	-0.951***	-1.068***	-0.925	-0.901***	-0.351***	-0.397***	-0.400**	-0.367	-0.382
	(-3.79)	(-3.23)	(-2.60)	(-1.43)	(-3.79)	(-4.15)	(-3.66)	(-2.46)	(-1.62)	(-1.42)
Sentiment	-0.299***	-0.385***	-0.669***	-0.507**	-0.299***	-0.300***	-0.385***	-0.670***	-0.783***	-0.507**
	(-4.24)	(-4.15)	(-4.62)	(-2.33)	(-4.24)	(-4.25)	(-4.15)	(-4.63)	(-4.23)	(-2.34)
Deviation× Sentiment	0.049	0.073	0.156**	0.084	0.049	0.048	0.073	0.155**	0.148*	0.084
	(1.37)	(1.60)	(2.32)	(0.77)	(1.37)	(1.35)	(1.59)	(2.31)	(1.71)	(0.77)
N	154466	154466	154466	154466	154466	154466	154466	154466	154466	154466
Adj. R^2	0.038	0.027	0.019	0.017	0.038	0.038	0.027	0.019	0.016	0.017
Panel B: Excluding the periods of 2002-2004										
Deviation	1.204***	1.304***	1.467***	1.540***	1.663***	1.198***	1.299***	1.460***	1.531***	1.654***
	(58.79)	(50.41)	(37.70)	(29.10)	(25.08)	(59.12)	(50.67)	(37.82)	(29.16)	(25.12)
Distraction	0.506**	0.590**	0.853*	0.046	-0.407	0.156*	0.145	0.152	-0.137	-0.201
	(2.33)	(2.08)	(1.79)	(0.06)	(-0.52)	(1.77)	(1.24)	(0.80)	(-0.48)	(-0.63)
Deviation× Distraction	-0.861***	-0.969***	-1.070**	-1.070*	-1.058	-0.288***	-0.355***	-0.377**	-0.317	-0.312
	(-3.89)	(-3.47)	(-2.43)	(-1.75)	(-1.53)	(-3.02)	(-2.94)	(-2.08)	(-1.24)	(-1.04)
N	129591	129591	129591	129591	129591	129591	129591	129591	129591	129591
Adj. R^2	0.035	0.025	0.019	0.018	0.019	0.035	0.025	0.019	0.018	0.019

Table 10 Robust test: Alternative measures of analyst distraction

This table makes robust tests by employing four alternative measures of analyst distraction. Panel A is value-weighted measure of analyst distraction, Panel B uses the Fama–French 17 industry classification, Panel C defines analyst distraction separately for positive and negative extreme returns, and Panel D is analyst distraction measure weighted by the inverse likelihood of an industry experiencing extreme returns. *Bhar(0,1)* is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation=NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. *D_Distraction* is a dummy variable, which is one if *Distraction* is greater than or equal to 20%, and zero otherwise. Other variables are defined in Appendix A. All control variables are lagged one year relative to the dependent variable. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Variables	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)
Panel A: Value-weighted measure of analyst distraction					
Deviation	1.261***	1.365***	1.532***	1.590***	1.714***
	(66.75)	(57.84)	(43.49)	(33.31)	(28.79)
Distraction_VW	0.309***	0.333**	0.514*	0.781*	1.169**
	(2.64)	(2.09)	(1.82)	(1.95)	(2.36)
Deviation× Distraction_VW	-0.991***	-1.095***	-1.222***	-0.955***	-1.045**
	(-8.61)	(-7.03)	(-4.83)	(-2.79)	(-2.29)
Panel B: Using the Fama–French 17 industry classification					
Deviation	1.192***	1.192***	1.192***	1.192***	1.192***
	(61.28)	(61.28)	(61.28)	(61.28)	(61.28)
Distraction_Ind17	0.601**	0.601**	0.601**	0.601**	0.601**
	(2.21)	(2.21)	(2.21)	(2.21)	(2.21)
Deviation× Distraction_Ind17	-1.146***	-1.146***	-1.146***	-1.146***	-1.146***
	(-4.27)	(-4.27)	(-4.27)	(-4.27)	(-4.27)

To be continued

Table 10 Continuing

Variables	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)
Panel C: Define analyst distraction separately for positive and negative extreme returns					
Deviation	1.253***	1.357***	1.522***	1.580***	1.711***
	(66.37)	(57.70)	(43.54)	(33.39)	(29.10)
Distraction_Positive	3.267***	5.852***	10.846***	11.026***	10.169***
	(14.12)	(17.49)	(17.99)	(10.60)	(9.94)
Deviation× Distraction_Positive	-1.541***	-1.893***	-2.386***	-1.976**	-2.235**
	(-7.46)	(-6.00)	(-4.44)	(-2.46)	(-2.51)
Distraction_Negative	-2.695***	-5.520***	-10.734***	-11.205***	-11.451***
	(-9.07)	(-14.21)	(-17.43)	(-12.77)	(-11.39)
Deviation× Distraction_Negative	-0.771**	-0.893**	-1.108**	-0.798	-0.743
	(-2.22)	(-2.22)	(-2.14)	(-1.04)	(-0.85)
Panel D: Weighted by the inverse of the probability that an industry will experience extreme returns					
Deviation	1.236***	1.339***	1.506***	1.565***	1.684***
	(65.81)	(57.12)	(43.15)	(33.11)	(28.70)
Distraction_IERPW	0.016	0.011	0.008	-0.030	-0.043
	(1.09)	(0.58)	(0.25)	(-0.57)	(-0.82)
Deviation× Distraction_IERPW	-0.032	-0.034	-0.056*	-0.057	-0.061
	(-1.63)	(-1.40)	(-1.74)	(-1.30)	(-1.20)

Table 11 Firm characteristics, analyst distraction and herding

This table estimates whether the relation between herding and analyst distraction is related to firm characteristics. The sample is divided into three groups based on firm size, firm age, market-to book ratio, institutional ownership and analyst coverage. This table reports the results of regression (4) for the high and low groups, respectively. For brevity, this table only reports the coefficients and t-statistics for Deviation and its interaction with Distraction. *Bhar(0,1)* is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation=NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. *D_Distraction* is a dummy variable, which is one if *Distraction* is greater than or equal to 20%, and zero otherwise. Other variables are defined in Appendix A. All control variables are lagged one year relative to the dependent variable. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Variables	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)
			Larger					Smaller		
Panel A: Firm size										
Deviation	0.791***	0.852***	0.941***	0.993***	1.038***	1.849***	1.987***	2.319***	2.363***	2.492***
	(40.12)	(33.25)	(23.24)	(17.98)	(15.28)	(39.70)	(34.35)	(27.61)	(20.89)	(17.97)
Distraction	-0.094	0.164	0.517	0.113	0.168	0.764*	0.457	-0.830	-0.557	-0.520
	(-0.41)	(0.51)	(1.02)	(0.16)	(0.20)	(1.77)	(0.81)	(-0.88)	(-0.35)	(-0.34)
Deviation× Distraction	-0.970***	-1.014***	-1.477***	-1.634***	-2.143***	-1.487***	-1.614***	-1.840**	-2.415**	-1.800
	(-4.75)	(-3.78)	(-3.30)	(-2.62)	(-2.90)	(-3.54)	(-2.97)	(-2.16)	(-2.00)	(-1.35)
N	53906	53906	53906	53906	53906	53822	53822	53822	53822	53822
Adj. R^2	0.037	0.026	0.023	0.025	0.029	0.047	0.035	0.027	0.022	0.024
Panel B: Firm age										
Deviation	0.767***	0.846***	0.953***	0.948***	1.069***	1.799***	1.897***	2.089***	2.199***	2.364***
	(37.34)	(32.20)	(22.88)	(16.27)	(13.92)	(39.49)	(33.84)	(25.53)	(20.02)	(17.74)
Distraction	0.284	0.320	0.945*	0.014	-0.151	-0.067	-0.236	-0.527	0.196	-1.910
	(1.33)	(1.04)	(1.84)	(0.02)	(-0.17)	(-0.16)	(-0.43)	(-0.59)	(0.13)	(-1.34)
Deviation× Distraction	-0.824***	-1.109***	-1.155**	-1.249*	-1.621**	-0.732	-0.716	0.480	1.287	1.644
	(-4.31)	(-4.17)	(-2.56)	(-1.93)	(-2.04)	(-1.41)	(-1.16)	(0.59)	(1.13)	(1.36)
N	53906	53906	53906	53906	53906	53822	53822	53822	53822	53822
Adj. R^2	0.035	0.027	0.022	0.020	0.019	0.048	0.036	0.032	0.034	0.040

To be continued

Table 11 Continuing

Variables	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)
			High					Low		
Panel C: Market-to-book										
Deviation	0.791***	0.852***	0.941***	0.993***	1.038***	1.043***	1.184***	1.375***	1.435***	1.546***
	(40.12)	(33.25)	(23.24)	(17.98)	(15.28)	(35.17)	(29.79)	(22.53)	(17.18)	(14.62)
Distraction	-0.094	0.164	0.517	0.113	0.168	0.219	-0.217	-1.913**	-2.007	-3.919***
	(-0.41)	(0.51)	(1.02)	(0.16)	(0.20)	(0.59)	(-0.45)	(-2.32)	(-1.35)	(-3.11)
Deviation× Distraction	-0.970***	-1.014***	-1.477***	-1.634***	-2.143***	-1.010***	-1.282***	-1.366*	-2.069*	-1.756
	(-4.75)	(-3.78)	(-3.30)	(-2.62)	(-2.90)	(-3.06)	(-2.82)	(-1.83)	(-1.86)	(-1.58)
N	53906	53906	53906	53906	53906	53822	53822	53822	53822	53822
Adj. R^2	0.037	0.026	0.023	0.025	0.029	0.041	0.031	0.027	0.028	0.032
Panel D: Analyst coverage										
Deviation	1.176***	1.247***	1.335***	1.363***	1.509***	1.548***	1.607***	1.426***	2.041***	1.393*
	(48.50)	(40.75)	(28.67)	(21.38)	(18.63)	(5.63)	(4.91)	(2.84)	(2.65)	(1.73)
Distraction	0.264	0.058	0.581	0.219	-1.157	3.380	1.816	3.544	-7.562	-1.404
	(0.97)	(0.16)	(0.94)	(0.21)	(-1.18)	(0.96)	(0.40)	(0.54)	(-0.86)	(-0.14)
Deviation× Distraction	-0.864***	-0.836**	-0.976*	-1.441*	-1.987**	-0.107	1.914	7.269	9.372	14.942
	(-3.03)	(-2.32)	(-1.68)	(-1.73)	(-2.18)	(-0.03)	(0.39)	(1.02)	(1.14)	(1.64)
N	53906	53906	53906	53906	53906	53822	53822	53822	53822	53822
Adj. R^2	0.043	0.029	0.022	0.025	0.027	0.008	0.042	0.024	0.030	0.046

Table 12 Analyst characteristics, analyst distraction and herding

This table estimates whether the relation between herding and analyst distraction is related to firm characteristics. The sample is divided into three groups based on analyst coverage universe, general experience, and firm-specific experience. This table reports the results of regression (4) for the high and low groups, respectively. For brevity, this table only reports the coefficients and t-statistics for Deviation and its interaction with Distraction. *Bhar(0,1)* is the one-day buy-and-hold abnormal return following the revision date t=0. *Deviation=NewRec-Consensus*, *NewRec* is the revised individual recommendation on date 0, and *Consensus* is the consensus recommendation, which is defined as the median of recommendations the day before the revision, excluding the revising analyst's recommendations. *Distraction* is the percentage of an analyst-firm-month portfolio exposed to firms experiencing attention grabbing shocks (i.e., extreme monthly returns) in unrelated Fama–French 12 industries. Other variables are defined in Appendix A. All control variables are lagged one year relative to the dependent variable. Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***, respectively.

Variables	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)
			Larger					Smaller		
Panel A: Analyst coverage universe										
Deviation	1.234***	1.309***	1.443***	1.482***	1.654***	1.349***	1.471***	1.685***	1.760***	1.849***
	(35.79)	(30.18)	(22.84)	(16.97)	(14.77)	(35.98)	(31.21)	(24.09)	(18.87)	(16.48)
Distraction	0.024	0.195	0.651	0.356	0.131	0.474	0.366	1.113	0.661	0.247
	(0.07)	(0.44)	(0.91)	(0.29)	(0.11)	(1.09)	(0.63)	(1.16)	(0.52)	(0.16)
Deviation× Distraction	-0.717*	-0.870*	-1.156*	-0.628	-0.014	-0.655	0.160	0.224	-1.234	-1.683
	(-1.71)	(-1.70)	(-1.73)	(-0.67)	(-0.01)	(-1.47)	(0.26)	(0.24)	(-1.01)	(-1.25)
N	51734	51734	51734	51734	51734	51173	51173	51173	51173	51173
Adj. R^2	0.039	0.028	0.020	0.017	0.018	0.039	0.029	0.021	0.017	0.019
Panel B: General experience										
Deviation	1.288***	1.386***	1.550***	1.573***	1.689***	1.141***	1.238***	1.401***	1.526***	1.662***
	(38.71)	(33.77)	(25.40)	(19.00)	(16.49)	(35.54)	(30.43)	(22.62)	(18.02)	(15.09)
Distraction	0.270	0.279	0.040	-1.564	-2.081*	0.829**	0.221	-0.403	0.378	-0.833
	(0.74)	(0.58)	(0.05)	(-1.54)	(-1.71)	(2.14)	(0.46)	(-0.49)	(0.25)	(-0.61)
Deviation× Distraction	-0.800**	-0.924**	-0.910	-0.558	-0.324	-0.486	-0.737	-0.902	-1.259	-1.839
	(-2.35)	(-2.05)	(-1.29)	(-0.59)	(-0.29)	(-1.18)	(-1.46)	(-1.25)	(-1.22)	(-1.58)
N	51017	51017	51017	51017	51017	51693	51693	51693	51693	51693
Adj. R^2	0.038	0.029	0.021	0.016	0.015	0.033	0.023	0.017	0.017	0.019

To be continued

Table 12 Continuing

Variables	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)	Bhar(0,1)	Bhar(0,5)	Bhar(0,21)	Bhar(0,42)	Bhar(0,63)
			Larger					Smaller		
Panel C: Firm-specific experience										
Deviation	1.217***	1.314***	1.503***	1.614***	1.673***	1.272***	1.385***	1.547***	1.614***	1.779***
	(39.55)	(34.98)	(27.62)	(21.98)	(17.52)	(43.86)	(37.32)	(27.31)	(21.19)	(18.89)
Distraction	0.302	0.641	0.736	0.704	0.353	0.250	0.091	0.047	-0.762	-1.549
	(0.89)	(1.46)	(1.09)	(0.80)	(0.33)	(0.74)	(0.21)	(0.06)	(-0.72)	(-1.23)
Deviation× Distraction	-1.111***	-0.877**	-1.529**	-1.450*	-1.083	-0.374	-0.778	-0.030	0.147	-0.382
	(-3.39)	(-2.12)	(-2.34)	(-1.70)	(-1.07)	(-0.97)	(-1.58)	(-0.04)	(0.14)	(-0.33)
N	51496	51496	51496	51496	51496	51497	51497	51497	51497	51497
Adj. R^2	0.044	0.036	0.025	0.021	0.019	0.037	0.025	0.019	0.020	0.022